



上海航天电源技术有限责任公司

SHANGHAI AEROSPACE POWER TECHNOLOGY CO.,LTD.

Product Specification Sheet for Square Nickel-Cobalt-Manganese-Lithium-Based Lithium-Ion Battery

INP27135165P

Ratify	Examine and verify	Authorized strength
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1 Scope

This document applies to square nickel-cobalt-manganese-lithium-based lithium-ion batteries manufactured by Shanghai Aerospace Power Technology Co., Ltd. and Zhejiang Changxing Aerospace Power Technology Co., Ltd.

2 Battery Model

INP27135206P

3 Product Performance Indicators

3.1 Technical Parameter

This parameter applies only to new products delivered by SAPT to customers, not to products used by customers.

Order number	Project	Technical parameter	Remarks
3.1.1	Rated capacity	50Ah	1I ₁ (A), RT
3.1.2	Nominal voltage	3.6V	
3.1.3	Open circuit voltage	3.6~3.8V	50%~60% charged state
3.1.4	Internal resistance	≤0.5mΩ	1 KHz AC impedance
3.1.5	Weight	1.35±0.03kg	
3.1.6	Maximum charging voltage	4.2V	Constant Current & Constant Voltage
3.1.7	Maximum charging current	4C	
3.1.8	Maximum equilibrium charging current	0.1C	
3.1.9	Minimum discharge voltage	3V	
3.1.10	Maximum discharge current	8C	
3.1.11	Working temperature	Charging: 0°C~45°C Discharge: -20°C to 55°C	
3.1.12	Storage temperature	-20°C~45°C	
3.1.13	Outline dimension	Thickness: 28.5 mm (max.) Width: 136.0 mm (max.) Length: 137.0 mm (max.)	Length excluding pole height
3.1.14	Cathode material system	Nickel Cobalt Manganese Lithium (523)	

Before using this battery, carefully read all relevant safety guidelines and this specification to ensure safe and correct operation.

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3.1.15	Shell material	Alufer	

3.2 Charging Mode/parameters

Order number	Parameter	Size of product	Condition
3.2.1	Standard charging current	50A	25±2℃, 15%~90% RH
3.2.2	Maximum charging current	200A	
3.2.3	Maximum charging voltage	4.2±0.02V	Standard: 4.2V
3.2.4	Standard charging mode (constant current and constant voltage)	Under the condition of ambient temperature of 25±2℃, constant current charging was performed with 1I ₁ (A)=50A until 4.2V was reached, followed by constant voltage charging. Charging was terminated when the charging current was less than 0.05I ₁ (A), and the battery was left at rest for 1h.	
3.2.5	Standard charging temperature	25 ±2℃	

3.3 Discharge Mode/Parameters

Order number	Parameter	Size of product	Condition
3.3.1	Standard discharge current	50A	25±2℃, 15%~90% RH
3.3.2	Maximum discharge current	400A	
3.3.3	Minimum discharge voltage	3±0.05V	Standard: 3.0V
3.3.4	Standard discharge temperature	25 ±2℃	

4 Battery Performance Standards

4.1 Surface

The battery exhibits no deformation or cracks, with a dry surface free from burrs, external trauma, or contaminants, and bears clear and correct markings.

4.2 Polarity

Use a voltmeter to check the battery polarity, and ensure the terminal polarity markings are correct and clear.

4.3 Standard Test Conditions

The test batteries must be newly manufactured by our company within one month and have not undergone more than five charge-discharge cycles. Unless otherwise specified, all product test conditions in this specification are conducted at a temperature of 25±5℃, relative humidity of 15%–90%, and atmospheric pressure of 86 kPa–106 kPa. The room temperature mentioned in this specification refers to 25±2℃.

4.4 Test Equipment Requirements

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- (1) Voltage measurement device: not lower than Class 0.5; (2) Current measurement device: not less than Class 0.5
- (3) Temperature measurement device: $\pm 0.5^{\circ}\text{C}$ (4) Time measurement device: $\pm 0.1\%$
- (5) Dimension measurement device: $\pm 0.1\%$ (6) Quality measurement device: $\pm 0.1\%$

4.5 Electrical Performance Testing

Order number	Project	Test method	Examination requirements
4.5.1	Room temperature discharge capacity (initial capacity)	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) Perform $1I_1(\text{A})$ constant current discharge to 3V and record the discharge capacity (in Ah)	Discharge capacity $\geq 100\%$ and $\leq 110\%$ *rated capacity
4.5.2	Room Temperature Rate Charging Performance	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery is discharged at a constant current of $1I_1(\text{A})$ to 3V and left undisturbed for 1h. 3) Charge $4I_1(\text{A})$ at a constant current to 4.2V and let it stand for 1h 4) Perform $1I_1(\text{A})$ constant current discharge to 3V and record the discharge capacity (in Ah)	Discharge capacity $\geq 80\%$ * initial capacity
4.5.3	Equilibrium charging performance	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) Charge at a constant current of $0.1I_1(\text{A})$ for 5 hours, and record the cutoff voltage during charging.	Charging cutoff voltage $< 4.25\text{V}$
4.5.4	Room Temperature Rate Discharge Performance	4) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 5) The battery shall be charged according to the method specified in 3.2.4. 6) Perform $8I_1(\text{A})$ constant current discharge to 3V and record the discharge capacity (in Ah)	Discharge capacity $\geq 80\%$ * initial capacity
4.5.5	High Temperature Discharge Performance	1) The battery shall be charged according to the method specified in 3.2.4. 2) Incubated at $55\pm 2^{\circ}\text{C}$ for 5 hours 3) Under an environment of $55\pm 2^{\circ}\text{C}$, a constant current discharge of $1I_1(\text{A})$ to 3V was performed, and the discharge capacity (in Ah) was recorded. 4) Remove the battery and place it at $25\pm 5^{\circ}\text{C}$ for 12 hours, then visually inspect its appearance.	Post-test battery The appearance should remain unchanged. Form, bloating, etc. Abnormal phenomenon; discharge capacity $\geq 90\%$ * initial capacity
4.5.6	Low-temperature discharge performance	1) The battery shall be charged according to the method specified in 3.2.4. 2) Incubated at $-20\pm 2^{\circ}\text{C}$ for 24 hours 3) At $-20\pm 2^{\circ}\text{C}$, a constant current discharge of $1I_1(\text{A})$ to 3V was performed, and the discharge capacity (in Ah) was recorded. 4) Remove the battery and place it at $25\pm 5^{\circ}\text{C}$ for 12 hours, then visually inspect its appearance.	Post-test battery The appearance should remain unchanged. Form, bloating, etc. Abnormal phenomenon; discharge capacity $\geq 70\%$ * initial capacity

Before using this battery, carefully read all relevant safety guidelines and this specification to ensure safe and correct operation.

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Order number	Project	Test method	Examination requirements
4.5.7	Cycle life	1) Ambient temperature $25\pm 2^{\circ}\text{C}$ 2) When the battery is charged at a constant current of $1I_1(\text{A})$ to 4.2V, it switches to constant voltage charging with a cutoff current of $0.05I_1(\text{A})$. 3) After being left in open circuit for 30 minutes, discharge at a constant current of $1I_1(\text{A})$ to 3V and leave for another 30 minutes. 4) Repeat steps 2) and 3) until the cycle discharge capacity falls below 80% of the rated capacity, at which point the lifespan is terminated. Record the number of cycles performed.	Number of cycles ≥ 2000
4.5.8	Room Temperature Charge Retention and Capacity Recovery Capability	1) Ambient temperature $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) Store at room temperature for 28 days 4) The battery is discharged at a constant current of $1I_1(\text{A})$ to 3V, and the charge retention capacity (in Ah) is measured. 5) The battery shall be charged according to the method specified in 3.2.4. 6) $1I_1(\text{A})$ Constant current discharge to 3V, measure recovery capacity (in Ah)	Posttrial cell The appearance should show no abnormal phenomena such as deformation or swelling; the charged holding capacity should be $\geq 90\%$ * of the initial capacity; and the recovery capacity should be $\geq 94\%$ * of the initial capacity.
4.5.9	High Temperature Charge Retention and Capacity Recovery Capability	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Storage at $55\pm 2^{\circ}\text{C}$ for 7 days 3) After being stored at $25\pm 5^{\circ}\text{C}$ for 5 hours, the $1I_1(\text{A})$ was discharged at a constant current to 3V to measure the charge retention capacity (in Ah). 4) The battery shall be charged according to the method specified in 3.2.4. 5) $1I_1(\text{A})$ Constant current discharge to 3V, measure recovery capacity (in Ah)	Posttrial electrode cell The appearance should show no abnormal phenomena such as deformation or swelling; the charged holding capacity should be $\geq 90\%$ * of the initial capacity; and the recovery capacity should be $\geq 94\%$ * of the initial capacity.

4.6 Safety Performance Testing

Order number	Project	Test method	Examination requirements
4.6.1	Temperature cycle	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Place the battery into the temperature chamber, which should be configured according to Table 4.6.1 and Figure. 4.6.1 Perform adjustments, with 5 cycles 3) Observation for 1 hour	The battery must not be explosive, ignitable, or leaky.
4.6.2	Heat Test	1) The battery was charged at $25\pm 2^{\circ}\text{C}$ according to the method specified in Section 3.2.4. 2) Place the battery into the temperature chamber. The chamber is heated from room temperature to $130\pm 2^{\circ}\text{C}$ at a rate of $5^{\circ}\text{C}/\text{min}$, and the heating is maintained for 30 minutes before stopping. 3) Observation for 1 hour	The battery must not be explosive or combustible.

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Continue Table 4.6

Order number	Project	Test method	Examination requirements
4.6.3	Drop test	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Allow the battery terminals to fall freely downward from a height of 1.5 meters onto a concrete surface. 3) Observation for 1 hour	The battery should not explode, catch fire, or leak liquid.
4.6.4	Vibration resistance test	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Secure the battery on the vibration test bench and perform linear scanning vibration tests under the following conditions: ---Discharge current: $\frac{1}{3} I_1(A)$ Vibration direction: Top single vibration Vibration frequency: 10Hz~55Hz Maximum acceleration: $30m/s^2$ ---Scan cycle: 10 times Vibration time: 3h 3) During the vibration test, observe for any abnormal phenomena.	No abnormal phenomena such as sharp changes in discharge current, voltage abnormalities, battery casing deformation, or electrolyte leakage were observed, and the system maintained continuous reliability with intact structural integrity.
4.6.5	Sea immersion	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Immerse the battery in a 3.5 wt.% NaCl aqueous solution for 2 hours. 3) The water depth should completely submerge the battery.	The cell should not explode or catch fire.
4.6.6	Acupuncture test	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Using a high-temperature resistant steel needle with a diameter of $\Phi 5mm$ to 8mm (with a cone angle of 45° to 60° at the tip, smooth surface free from rust, oxidation layers, or oil contamination), penetrate the battery vertically at a speed of $25\pm 5mm/s$. The penetration position should be close to the geometric center of the punctured surface, and the steel needle must remain stationary within the battery. 4) Observation for 1 hour	The cell should not explode or catch fire.
4.6.7	Extrusion test	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Perform the compression test under the following conditions: Compression direction: Apply pressure perpendicular to the battery plate orientation Compression shape: A semicircular cylinder with a radius of 75mm, where the length of the cylinder exceeds the size of the battery being compressed. Compression speed: $5\pm 1 mm/s$ Compression degree: Stop compression when voltage reaches 0V, deformation reaches 30%, or compression force reaches 200kN. 4) Observation for 1 hour	The cell should not explode or catch fire.

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4.6.8	Low-pressure test	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) Place the battery into a low-pressure chamber and adjust the air pressure in the test chamber to 11.6 kPa, static for 6 hours 4) Observation for 1 hour	The battery should not explode, catch fire, or leak liquid.
4.6.9	Overcharge test	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) Charge $1I_1(\text{A})$ at a constant current to 5.5V or stop charging after 1h of charging time 5) Observation for 1 hour	The cell should not explode or catch fire.
4.6.10	Overdischarge test	1) Test ambient temperature: $25\pm 2^{\circ}\text{C}$ 2) The battery shall be charged according to the method specified in 3.2.4. 3) $1I_1(\text{A})$ Constant current discharge for 90 minutes 3) Observation for 1 hour	The battery must not be explosive, ignitable, or leaky.
4.6.11	Short circuit test	1) At room temperature, the battery is charged according to the method specified in 3.2.4. 2) Short-circuit the positive and negative electrodes of the battery externally for 10 minutes, with the external circuit resistance being less than $5\text{ m}\Omega$. 3) Observation for 1 hour	The battery must not be explosive or combustible.

Table 4.6.1 Temperature and Time for One Cycle of Temperature Cycle Test

Temperature ($^{\circ}\text{C}$)	Time increment (min)	Cumulative time (min)	Temperature 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

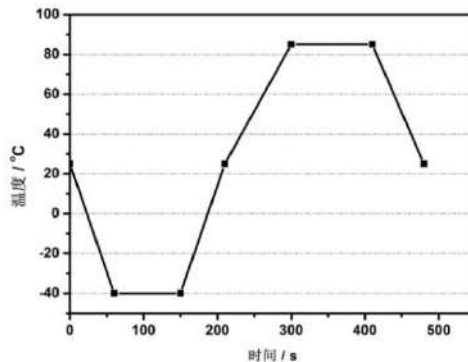


Figure 4.6.1 Schematic Diagram of Temperature Cycling Test

Before using this battery, carefully read all relevant safety guidelines and this specification to ensure safe and correct operation.

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4.7 Storage Performance

The battery was charged according to the method specified in 3.2.4 at room temperature, followed by 1 I_I(A) constant current discharge for 30 minutes. After storage at 45±2°C for 28 days, the battery was removed and left at room temperature for 5 hours. The battery was then charged again using the same method before undergoing 1I_I(A) constant current discharge to 3V, with discharge capacity (measured in Ah) recorded. The discharge capacity should not be less than 90% of the initial capacity. No abnormal phenomena such as deformation or gas expansion were observed in the battery after storage.

Maintenance recommendations: If the battery is not used for an extended period, it is recommended to perform complete charge-discharge cycles 1–2 times every 3–6 months. This practice helps slow down the degradation rate of active materials within the battery.

5 Product Certification

Order number	Certification Category	Certification Project	Product
5.1	Lithium-ion Battery for Electric Vehicles	GB/T 31484-2015 GB/T 31485-2015 GB/T 31486-2015	IFP27135206P

6 Transportation and Storage of Batteries

6.1 Transport

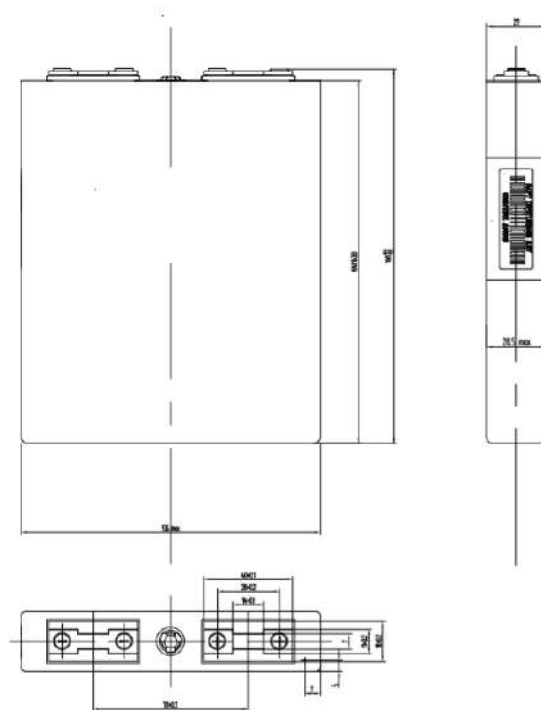
The battery transport state of charge (SOC) should be below 50%, and it must not be subjected to severe mechanical impacts, direct sunlight exposure, rain exposure, or inverted positioning during transportation. During loading and unloading operations, gentle handling is required to strictly prevent dropping, rolling, and heavy compression.

6.2 Keep in Storage

Batteries shall be stored in a clean, dry, and well-ventilated warehouse with an ambient temperature ranging from 5°C to 40°C, protected from direct sunlight, and kept away from ignition sources and heat sources at a distance of no less than 2 m. Batteries must not be inverted or laid horizontally, and mechanical impact or heavy pressure should be avoided.

7 Battery Exterior Diagram

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8 Quality Assurance

The warranty period for batteries shall be determined according to the contract from the date of shipment. However, during this period, if battery quality issues are caused by customer misuse rather than manufacturing defects of Shanghai Aerospace Power Technology Co., Ltd., the company does not guarantee free replacement.

Shanghai Aerospace Power Technology Co., Ltd. shall not be held liable for any issues or safety incidents arising from the following circumstances:

- 1) Problems and safety incidents resulting from non-compliance with safety usage guidelines;
- 2) Defective batteries produced by customers during battery assembly after shipment;
- 3) Problems arising from the combined use of batteries with circuits, battery packs, and chargers.

For safety considerations, if there are special applications such as equipment design, lithium-ion battery system protection circuits, or high-current scenarios, please consult Shanghai Aerospace Power Technology Co., Ltd. for relevant details.

Before using this battery, carefully read all relevant safety guidelines and this specification to ensure safe and correct operation.

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9 Safety Guidelines

To prevent battery damage or personal injury caused by the misuse of prismatic lithium-ion batteries, please carefully read the following safety guidelines before using prismatic lithium-ion batteries:

warn !



—— Batteries pose risks of fire, explosion, and burns. Do not disassemble, crush, incinerate, heat, or dispose of batteries in open flames. — Keep batteries out of reach of children. Do not remove original packaging before use. Dispose of used batteries promptly in accordance with local recycling or waste regulations. — When replacing batteries, always use those from the same manufacturer. Using batteries from other manufacturers may pose risks of fire and explosion.

- Do not immerse batteries in water or wet them;
- Do not allow the battery's positive and negative terminals to contact the metal casing simultaneously.
- Do not short-circuit, overcharge, or overdischarge the battery;
- Do not use or store batteries near heat sources (such as fire or heaters);
- Do not reverse the polarity of the battery;
- Do not store batteries with coins, metal jewelry or other metal objects;
- Do not puncture the battery casing with nails or other sharp objects, and avoid hammering or stepping on the battery.
- Do not weld batteries directly or disassemble or repair batteries in any way;
- Do not impact, throw, or subject the battery to mechanical vibration or natural drop.
- Do not mix lithium-ion batteries of different types or brands.
- Do not connect the negative electrode column to the housing (positive polarity).
- Do not use the battery if it emits an odor, generates heat, deforms, changes color, or exhibits any other abnormal phenomena, and remove the battery from the usage environment.
- If electrolyte from a leaking battery enters the eyes, do not rub it out; instead, rinse with water and seek immediate medical assistance. Failure to address the situation promptly may cause ocular injury.
- If a battery catches fire, extinguish it using dry powder, foam extinguisher, or sand, and remove it from the operating environment.

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— If the battery is assembled into a replaceable battery pack that can be installed by non-professionals, precautions and usage instructions for end applications should be labeled in accordance with the above guidelines.

10 Battery Shipment Status

Unless otherwise specified by the customer, batteries typically come with approximately 50% to 60% charge capacity and a voltage range of 3.6 to 3.8V at the time of shipment.

11 Technical Advisory Work

For any questions regarding battery usage, please contact us as follows: Factory Address: Shanghai Aerospace Power Technology Co., Ltd. — No.501 Wanfang Road, Pujiang Town, Minhang District, Shanghai.

Tel: 021-33292225 Fax: 021-33883383

Factory location: Zhejiang Changxing Aerospace Power Technology Co., Ltd. — No.399 Changxing Avenue, Changxing County, Zhejiang Province

Tel: 0572-6512676 Fax: 057221-6526622

12 Revision of Product Specification Document

The Company reserves the right to revise the specification documents for this product series. Except as an appendix to the contract, the revised product specifications are generally not provided to customers.

13 Term

Term	Definition
SAPT	Shanghai Aerospace Power Technology Co., Ltd., Changxing Aerospace Power Technology Co., Ltd.
Cell	A basic electrochemical functional unit composed of electrodes, electrolyte, container, and terminal blocks, typically including a separator and all associated packaging.
Client	Company, enterprise, or individual
$I_1(A)$	1 Hourly discharge current, equal to the rated capacity at 1-hour rate (A)
Open circuit voltage	The voltage between the positive and negative terminals of the battery when no load is connected
SOC	State of charge, as a percentage of the battery's full capacity
Fully charged	100% Charged State
Ambient temperature	All tests specified in this document shall be conducted at an ambient temperature within the range of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
Explode	The battery casing ruptured violently with a loud explosion, accompanied by the ejection of its primary components (solid materials).
Fire breaking out	Persistent combustion occurring in any part of the battery (lasting longer than 1 second). Sparks and arcing do not constitute combustion.

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