

PRODUCT SPECIFICATION

DOC NO.: CPS-A048175132

REV. : A0

SHEET : 1 of 14

Product Specifictaion Confirm Book

Code : FFH4D3

Material Code : DL-SLF-FFH4D3-0302

Product design preparation	Product Manager Approval	Sales approval	Project Engineering Approval	Quality assurance approval

	Signature	Date
customer Confirm		
	Custom code :	
	Company Stamp :	

Confidential : () Level 3 **Private** () Level 2 **High confidential** () Level 1 **Low private**

**PRODUCT
SPECIFICATION**

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Update Record

Version	Description	Date	Recognize
A0	New version	07/07/2017	
A1	Modify cell pictures	07/20/2017	
A2	Update Safety Test Reference Standard	08/25/2017	
A3	Modify the battery weight specification / modify the charge / discharge operating temperature range / increase the low temperature capacity test charge / discharge voltage interval Description	09/15/2017	
A4	Material code update; Resistance specification update	01/04/2018	

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Customer requirements

Code: S5E8J0

Version: A4

The customer needs to point their demand information and communicate with the Delong battery in advance. If the customer has some special applications or the operating conditions which are different from those described in this document, the Delong battery can be designed and produced according to the customer's special requirements.

	Special Requests	Standard
1		
2		
3		
4		
5		

Customer Code: Signature: Date:

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Definition of Terms	Definition
Product	The "product" in this specification refers to the 100Ah 3.2V rechargeable lithium iron phosphate power battery manufactured by Delong Battery.
Customer	Refers to the buyer in the "Product Sales Contract" of Delong Battery.
Delong battery	Refers to the seller in the Delong Battery Product Sales Contract
PN	In order to distinguish the battery in different application areas or under different application conditions, the front battery is a material number defined for a 100Ah 3.2V rechargeable lithium battery.
Ambient temperature	The ambient temperature of the battery
Battery Management System (BMS)	An effective tracking and control system used by the customer to monitor and record the product's operating parameters throughout the service life. The parameters tracked and recorded include, but are not limited to, voltage, current, temperature, etc., to control the operation of the product and ensure the product The operating environment and operating conditions comply with the specifications of this specification.
Battery cell Temperature	The temperature of the cell measured by the temperature sensor connected to the battery, the selection of the temperature sensor and the measuring circuit are agreed upon by the Delong battery and the customer.
New battery status	It refers to the state of the battery within 7 days from the date of manufacture of the product.
C-Rate	The ratio of the charging current to the battery capacity value measured multiple times by the battery management system. For example: When the battery capacity is 100Ah, and the charging current is 18.6A, the charging rate is 0.2C. When the battery capacity drops to 74Ah and the charging current is 14.8A, the charging rate is 0.2C.
Cycle	The battery is charged and discharged once in one cycle according to the specified charging and discharging standards. The cycle includes a short-term normal charge or a combination of regenerative charge and discharge processes, and sometimes only normal charge without regenerative charge during the charging process. Discharges can be formed by combining partial discharges.
Product Date	The date of manufacture of the battery. The clear date code on the sticker on the top of each relevant battery is the date of manufacture.
Open circuit voltage (OCV)	The voltage of the battery measured when no load or circuit is connected.
Recoverable Capacity	After the battery is stored, the capacities measured according to the standard charge and discharge conditions listed in Clauses 2.2.3, 2.3.1, and 2.3.5 of this specification shall be in accordance with 2.2.3, 2.3.1, and For the charge and discharge criteria given in 2.3.5, the maximum value of 3 measurements was selected respectively.
Product Supply Agreement	Delong Battery and the customer jointly signed the transaction terms of this product specification.
Standard Charge	The charging mode described in 2.2.3 of this specification.
Standard Discharge	In accordance with the discharge current of 46.5 A described in Article 2.3.1 of this specification and the discharge mode of the minimum voltage of 2.5V described in Article 2.3.5 of this specification.

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Standard shelf life	Refers to the general quality assurance period of the product of the Delong battery. 8 year capacity decay no more than 30% from the date of manufacture of the product.
State of Charge (SOC)	In the case of no load, all linear relationships of the state of charge of the battery measured in Abe hours or in watt hours. For example, if the capacity of 100Ah is regarded as 100% SOC, the capacity is 0Ah and the SOC is 0%.
The temperature rises	In the conditions specified in this specification, such as the charging process or the discharge process, the temperature of the cell increases.
Units of measurement	<p>"V" (Volt) Voltage (V) , Voltage unit</p> <p>"A" (Ampere) Abe (A) , Current unit</p> <p>"Ah" (Ampere-Hour) Abe - hours (Ah) , Load unit</p> <p>"Wh" (Watt- Hour) Watt-hours (Wh) , Energy unit</p> <p>"Ω" (Ohm) ohm (Ω) , Resistance unitS</p> <p>"mΩ" (MilliOhm) Milliohm (mΩ) , Resistance unit</p> <p>"°C" (Degree Celsius) Celsius (°C) , Temperature unit</p> <p>"mm" (Millimetre) (mm) , Unit of length</p> <p>"s" (Second) (s) , time unit</p> <p>"Hz" (Hertz) (Hz) , frequency unit</p>

1 Scope of Application

This specification describes in detail the performance specifications of 3.2V 100Ah (electrical core number: DL-SLF-FFH4D3-0302) rechargeable lithium iron phosphate power battery produced by Delong Battery and the product use conditions and risk warnings.

2 Product electrical performance index

2.1 Summary

No.	Parameter	Specification	Conditions
2.1.1	Standard capacity	100 Ah	2.5~3.65V , 30A Discharge current, new battery state
2.1.2	Minimum capacity	95.0 Ah	2.5~3.65V, 30A discharge current, new battery condition
2.1.3	Operating Voltage	2.50 - 3.65V	N.A.
2.1.4	Battery resistance (1KHz)	≤0.33 mΩ	New battery 50% SOC status
2.1.5	Battery average resistance (1KHz)	0.28 mΩ	New battery 50% SOC status
2.1.6	Out-put capacity	About 40%SOC charging status (40 Ah)	N.A.
2.1.7	Working temperature (charging)	0 - 55°C	See section 2.2
2.1.8	Working (discharging)	-20 - 55°C	See section 2.3

2.1.9	Battery Weight	≤2.14Kg	N.A.
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2.1.10	Monthly self-discharge rate	≤3.5%/month	25°C , 50%SOCStorage, new battery storage after 3 months
2.1.11	Battery size	Please refer to Article 9 of this specification	N.A.

2.2 充电模式/参数

No.	Parameter	Product Specification	Condition
2.2.1	Standard charge current	0.5C	25°C
2.2.2	Standard charging voltage	Monomer battery up to 3.65 volts	
2.2.3	Standard charging mode	0.5CConstant current continues to charge up to the maximum 3.65 volts of the cell and then continues charging at a constant voltage of 3.65 volts at atmospheric pressure until the current limit is low≤4.65.0±0.5A	
2.2.4	Standard charging temperature	25°C	Battery temperature
2.2.5	Absolute charge temperature (cell temperature)	0 ~ 55°C	No matter which charging mode the battery is in, the charging will stop once the battery temperature exceeds the absolute charging temperature range.
2.2.6	Absolute charge voltage	Max3.8V	Regardless of the charge mode of the cell, including the regenerative charge state, charging is stopped once the cell voltage is found to exceed the absolute charge voltage range.

2.2.7Other charging conditions (mode)

Battery temperature	Standard charging	Fast charging	Violent charge
< 0°C	Do not allow charging	Do not allow charging	Do not allow charging
0 ~ 10°C	Charging current 0.1C	Do not allow charging	Do not allow charging
10 ~ 15°C	Charging current0.2C	Charging current 0.3C	Do not allow charging
15 ~ 25°C	Charging current0.3C	Charging current0.5C	Do not allow charging
25 ~ 45°C	Charging current0.5C	Charging current1.0C	Do not allow charging
45 ~ 55°C	0.3Ccharging		
> 55°C	Do not allow charging		

2.3 Discharge modes

No.	Parameter	Product specification	Condition
2.3.1	Standard discharge current	50.0A	25°C
2.3.2	Maximum continuous discharge current	100.0A	
2.3.3	Maximum pulse discharge current (long pulse)	200.0A	The maximum discharge time is 3 minutes

2.3.4	Maximum pulse discharge current (short pulse)	300.0A	Cell temperature is below 50°C and SOC > 40%
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			The longest discharge time is 60s, and the SOC is less than 40%. The longest discharge time is 10s.
2.3.5	Discharge cut-off voltage	Monomer battery minimum 2.5V	
2.3.6	Standard discharge temperature	25°C	Battery temperature
2.3.7	Absolute discharge temperature	-20 ~ 55°C	Whether the cell is in the continuous discharge mode or the pulse discharge mode, if the cell temperature exceeds the absolute discharge temperature, the discharge is stopped.

2.4 Regeneration pulse charging mode

Regeneration pulse charging refers to the reverse charging of the cell by the pulse current during the use of the product. The charge of the regenerative pulse must strictly comply with the state of charge and cell temperature conditions described in this specification. The size and duration of the pulsed current must strictly comply with all states of charge and cell temperature conditions listed in the table below. Violation of regenerative pulse charging conditions may result in permanent damage to the battery and thus relieve the product quality responsibility of the Delong battery.

2.4.1 Maximum Regulated Pulse Charge Voltage 3.65V

2.4.2 Allowed Regeneration Pulse Charge Current and Duration

SOC	Battery temperature				
	≤0°C	0°C~10°C	10°C~20°C	20°C ~ 55°C	≥55°C
> 95%	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
80%~95%	Not allowed	Not allowed	≤1C, ≤5s	≤1C, ≤10s	Not allowed
50%~80%	Not allowed	≤1C, ≤5s	≤1C, ≤10s	≤1.5C, ≤10s	Not allowed
< 50%	Not allowed	≤1.0C, ≤10s	≤1.5C, ≤10s	≤2.0C, ≤10s	Not allowed

2.4.3 After each regeneration pulse charge, the battery needs to have a period of sleep, and the time should be equal to or longer than the duration of the regeneration pulse. During the sleep period, the battery may be in the discharge state or in the zero-current non-operation state, but during the sleep period, the battery is not allowed to regenerate the recharge pulse.

2.5 Low temperature capacity (new battery condition)

No.	parameter	Products specification	condition
2.5.1	25°C capacity	≥100.0Ah	25±2°C Temperature standard charge/discharge
2.5.2	0°C capacity	≥90.0Ah	25±2°C Temperature standard charge, discharge: 0°C, 1.0C, 2.0~3.65V
2.5.3	-10°C capacity	≥85.Ah	25±2°C Temperature standard charge, discharge: -10°C, 1.0C, 2.0~3.65V
2.5.4	-20°C capacity	≥65.1Ah	25±2°C Temperature standard charge, discharge: -20°C, 1.0C,

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No.	Parameter	Product specification	Protective actions
6.1.4.1	Charge-cut off termination voltage	3.65V	Terminate the charge when the battery voltage reaches 3.65 volts
6.1.4.2	First level over-charge protection	More than or equal to 3.8 volts	When the battery voltage reaches 3.8V, the charging current is limited to 0
6.1.4.3	Second level over-charge protection	More than 4.0V	When the battery voltage reaches 4.0V, the charging current is limited to 0, and the battery management system is locked until the technician solves the problem
6.1.4.4	Discharge-Terminal	Less than 2.5V	Terminate the discharge when the battery voltage reaches 2.5 volts and the current is minimized
6.1.4.5	First-level over-discharge protection	Less than 2.0V	Terminate discharge when battery voltage reaches 2.0 volts, minimizing current
6.1.4.6	Second-level over-discharge protection	Less than 1.8V	When the battery voltage is below 1.8V, lock the battery management system until the technician solves the problem
6.1.4.7	Over-short-circuit	No Short-circuit	In the event of a short circuit, the battery (battery) is disconnected by the current interrupter
6.1.4.8	Over-discharge	Refer to Section 2.3 Discharge Requirements	Battery management system controls discharge current to specification
6.1.4.9	Over-heated	Refer to Section 2.2 and 2.3	Termination of charge/discharge when temperature exceeds the specification
6.1.4.10	Over-charging	Charging time within 8 hours	Charging time longer than 8 hours, then terminate the charge

Remarks: The above No. 6.1.4.2, 6.1.4.3, 6.1.4.5, 6.1.4.6 is a warning clause, reminding the customer that when the battery reaches the status of the indicators and parameters described in any of the above terms, it means that Delong battery has exceeded the According to the conditions stipulated in the specification, the customer shall take protective measures against the battery according to the "protective actions" and other relevant provisions of this specification, and at the same time, Delong battery shall not assume any guarantee responsibility for the battery quality of the above-mentioned state of use, and therefore Any damages caused to customers and third parties are not compensable.

6.1.5 Avoid battery over-discharge. When the battery voltage is lower than 1.5 volts, the internal battery may be permanently damaged. At this time, the product quality assurance responsibility of t Delong battery fails. According to Clause 2.3.5 of this specification, when the discharge cut-off voltage is lower than 2.5V, the internal power consumption of the system is reduced to a minimum, and the sleep time is extended before recharging. The customer needs to train the user to recharge in the shortest possible time to prevent the battery from entering the overdisposed state.

6.1.6 If the battery is expected to be stored for more than 30 days, the SOC should be adjusted to about 50%.

6.1.7 Batteries Avoid charging under the low temperature conditions forbidden in this specification (including standard charge, fast charge, emergency charge and regenerative charge), otherwise unexpected capacity reduction may occur. The battery management system should be controlled in accordance with the minimum charging and regenerative charging temperatures. It is forbidden to charge under temperature conditions lower than the temperature specified in this specification. Otherwise, Delong Battery will not be responsible for quality assurance.

6.1.8 The design of the electrical box should fully consider the heat dissipation problem of the cell. Due to the overheating damage of the cell or battery caused by the thermal design problem of the electrical cell, Delong battery does not assume the responsibility for quality assurance.

6.1.9 In the design of the electric box, the waterproof and dustproof problems of the battery should be fully considered. The electric box must meet the waterproof and dustproof grades specified by the relevant national standards. Due to the waterproof and dustproof problems caused by the damage of the cell or battery (such as corrosion, rust, etc.), Nissan Battery does not assume the responsibility of quality assurance.

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7. Security precautions

7.1 It is forbidden to immerse the battery in water.

7.2 It is forbidden to put the battery into fire or expose it to a high temperature environment which exceeds the temperature conditions specified in 2.1.7 and 2.1.8 of this specification for a long time, otherwise it may cause fire. In any normal use case, the battery cell temperature cannot exceed 55 degrees Celsius. If the battery cell temperature exceeds 55 degrees Celsius, the battery management system needs to shut down the battery and stop the battery operation.

7.3 Do not short-circuit the positive and negative electrodes of the battery. Otherwise, strong current and high temperature may cause personal injury or fire. Since the positive and negative electrodes of the battery are exposed in the plastic protective sleeve, sufficient safety protection should be provided when the battery system is assembled and connected to avoid short circuits.

7.4 Connect the positive and negative terminals of the battery strictly in accordance with the instructions and instructions. Reverse charging is prohibited.

7.5 Do not overcharge the battery. Failure to do so may cause the battery to overheat and cause a fire accident. In the installation and use of the battery, hardware and software need to implement multiple overcharge failure safety protection. The minimum protection requirements are described in 6.1.4.3 and 7.11 of this specification.

7.6 After charging according to Section 6.1.4.9 of this specification, normal charging should end. When the continuous charging time exceeds a reasonable time limit, the battery may overheat and may cause thermal runaway and fire. A timer should be installed to protect the charger. Once the charge current reaches an overshoot and cannot be terminated, the timer will be activated to terminate the charge. See clause 7.11 of this specification.

7.7 The customer should securely hold the battery on a solid surface and securely constrain the power cord in place to avoid arcing and sparking caused by friction.

7.8 It is forbidden to pack batteries with plastic or to make electrical connections with plastic. Improper electrical connection may cause overheating of the battery during use.

7.9 When electrolyte leaks, contact with skin and eyes should be avoided. If there is contact, use plenty of water to wash the exposed area and seek medical advice. Any person or animal is prohibited from swallowing any part of the battery or the contents of the battery.

7.10 Do your best to protect the battery from mechanical shocks, impacts and pressure shocks. Otherwise, the battery may be short circuited inside, resulting in high temperature and fire.

7.11 Improper charge termination may occur during battery charging. Such as: charging beyond the allowable charging time, the charging voltage is too high to terminate the charging or the charging current is too strong to terminate the charging. The above phenomenon is defined as "inappropriate termination of charging." When the above phenomenon occurs, it may mean that the battery system is leaking or some parts are malfunctioning. Charging the battery before it can be found and resolved completely may cause the battery to overheat or cause a fire. When the above phenomenon occurs, the battery management system should disable the subsequent charging through the automatic lock function, and remind the user to return the vehicle loaded with the battery to the dealer for system maintenance. The battery can only be fully inspected by qualified technicians, and the root cause can be determined and thoroughly resolved and improved.

7.12 The test experiment described in Article 2.6 of this specification may cause the battery to catch fire or explode if it is improperly handled. The test experiment can only be conducted in a professional laboratory by professionals equipped with appropriate protective equipment. Otherwise, serious personal injury and property damage may result.

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8. Risk warning

8.1 Warning statement

Warning

The battery is potentially dangerous and proper protective measures must be taken during operation and maintenance!

Incorrect operation of the test experiment described in Article 2.6 of this specification may result in serious personal injury and property damage!

The battery must be operated using the correct tools and protective equipment.

The maintenance of the battery must be performed by a person who has battery expertise and is trained in safety.

Failure to comply with the above warnings can result in multiple disasters.

8.2 Types of danger:

The customer is aware of the following potential hazards during battery use and operation:

8.2.1 The operator may be exposed to chemicals, electric shock, or arcing during operation. Although the human body reacts differently to direct and alternating currents, the DC voltage above 50 volts is as severe as the AC. Therefore, the customer must take a conservative posture during operation to avoid current damage.

8.2.2 There is a chemical risk from the electrolyte in the battery.

8.2.3 When operating batteries and selecting personal protective equipment, customers and their employees must take into account the above potential risks to prevent accidental short-circuits, resulting in arcs, explosions or thermal runaway.

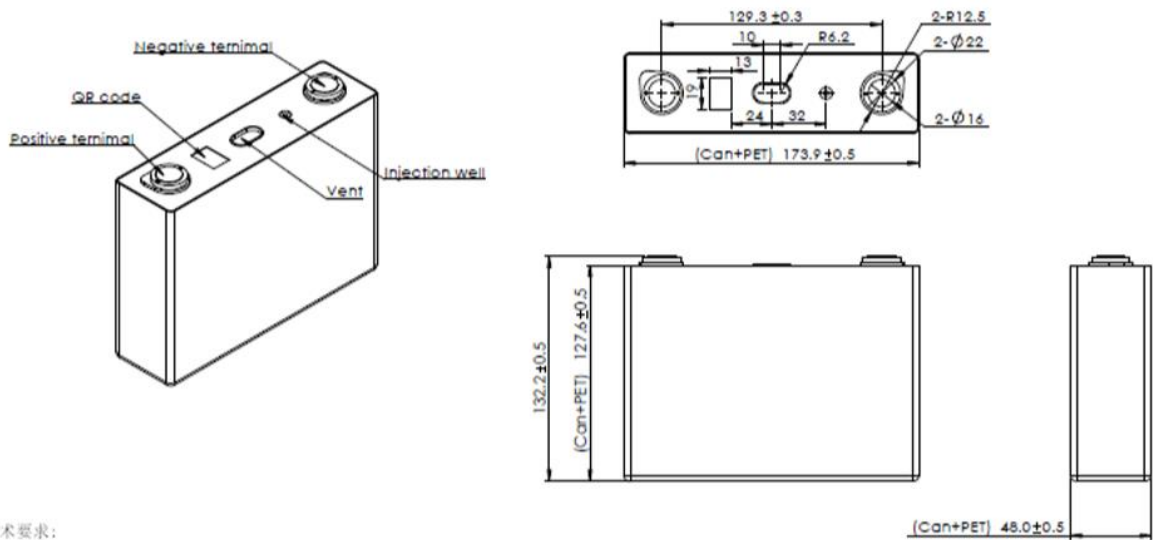
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9. Battery (cell) Drawing



技术要求:

Notes:

1. 壳体和极柱材质:

壳体: AL3003-H14 正极柱: AL1060-H12 负极柱: Cu T2+AL1060-H12

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Customer's Requests

Code:

Version: A0

We can design/manufacturing as requested products according to customer's special requirements, if your company has other performances features different as our catalogue, pls write down and re-signate to our company.

	Details Requirements	Standards
1		
2		
3		
4		
5		

Company Name: Signature: Date: