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EGbatt Energy

Specification

Product Specification

Cylindrical Lithium Ion Battery (General)

Lithium Ion Battery

Model: NCM14280-035

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Revision History

Version	Date	Originator	Description
A.0	2021.08.03	Name/Date	Initial release
A.1	2021.12.23	Name/Date	1. Company name change; 2. Document No. change; 3. Added rate discharge and post-storage electrical performance standards; 4. E-mail change
A.2	2023.08.08	Name/Date	Company logo style change

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1. General Information

1.1 Scope

This specification shall be applied to Lithium ion rechargeable battery supplied by EGbatt Energy Technology Co., Ltd.

1.2 Product Classification

Cylindrical Battery

1.3 Model Name

NCM14280-035

1.4 Definitions

Rate ("C"): The current required to discharge a fully charged battery to termination voltage in 1 hour.

2. Nominal Specification

2.1 Nominal Capacity

350mAh @0.2C discharge

2.2 Minimum Capacity

330mAh @0.2C discharge

2.3 End-of Charge Voltage

4.20V±0.05V

2.4 Nominal Voltage

3.7V@1C

2.5 Standard Charge@25±2°C

Item	Specification
Method:	CC-CV
Charging Voltage:	4.20V 4.20V
Charging Current:	0.5C (175mA) 0.5C (175mA)
Cut-off Current:	5mA 5mA

2.6 Maximum Charge Current

1C(350mA)

Not for cycle

2.7 Charging Time

Standard Charge: <3.5h

2.8 Standard Discharge@25±2°C

Item	Specification
Method:	CC
Discharge Cut-off Voltage:	2.75V 2.75V
Discharging Current:	0.2C (70mA) 0.2C (70mA)

2.9 Maximum Discharge Current

2C (700mA)

Not for cycle

2.10 Weight

11.0±2.0g

2.11 Operating Temperature

Cell surface temperature

Temperature	Current
Charge: 0~15°C	≤0.2C (70mA)
Charge: 15~45°C	≤1C (350mA)
Discharge: -20~60°C	

2.12 Storage Temperature

Storage time	Temperature
1 month	-20~45°C
3 months	-20~35°C
1 year	-20~25°C

3. Appearance and Dimension

3.1 Appearance

There shall be no such as deep scratch, rust, discoloration or leakage, which may adversely affect the commercial value of the cell.

3.2 Dimension

Diameter: 14.10 ± 0.20 mm; Height: 27.7 ± 0.3 mm.

4. Performance Specification

4.1 Testing Conditions

4.1.1 Test equipment

The slide caliper should have 0.01 mm scale.

The Internal resistance testing system with AC 1kHz should have an accuracy of 0.1mΩ and 0.5mV or higher.

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±2°C and humidity under 65%RH±20%RH.

4.2 Charge Mode

“Standard Charge” means charging the cell with charge current of 0.5C (175mA) and constant voltage 4.20V at 25±2°C, 5mA cut-off.

“Rapid Charge” means charging the cell with charge current of 1C (350mA) and constant voltage 4.20V at 25±2°C, 5mA cut-off.

4.3 Discharge Mode

“Standard Discharge” means discharging the cell with discharge current of 0.2C (70mA) at 25±2°C, 2.75V cut-off.

4.4 Ac Internal Resistance

Initial internal resistance (measured at AC 1kHz at shipping SOC) ≤120mΩ.

4.5 Temperature Dependence of Discharge Capacity

Charge the battery fully at 25±2°C according to the “standard charge”, after sitting at the test temperature for 4 hours, discharge the battery according to the discharge mode listed in the following table. Record the discharge capacity of the battery at different temperatures and calculate the percentage to the discharge capacity at 25±2°C.

Temperature	-20°C	0°C	25°C	60°C
Discharging rate	0.2C (70mA)	0.5C (175mA)	0.2C (70mA)	0.5C (175mA)
Capacity ratio	≥60%	≥80%	100%	≥95%

4.6 Rate Discharge Performance

Charge the battery fully at 25±2°C according to the “standard charge”, discharge the battery in the following way, record the discharge capacity and calculate the percentage to the 0.2C capacity of the battery.

discharge rate	0.2C (70mA)	1C (350mA)	3C (1050mA)
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Capacity ratio	100%	≥90%	≥80%
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4.7 Storing Performance

4.7.1 Room temperature storage

Test Condition	Test Procedure	Standard
25±2°C, 28days	Standard charge and discharge, recorded as Initial capacity	Residual capacity/ Initial capacity≥90% Recovery capacity/ Initial capacity≥95%
	Standard charge and then storage at 25°C±2°C for 28 days	
	Standard discharge, recorded as Residual capacity	
	Standard charge and discharge, recorded as Recovery capacity	

4.7.2 High temperature storage

Test Condition	Test Procedure	Standard
60±2°C, 7days	Standard charge and discharge, recorded as Initial capacity	Residual capacity/ Initial capacity≥90% Recovery capacity/ Initial capacity≥95%
	Standard charge and then storage at 60°C±2°C for 7 days	
	Standard discharge, recorded as Residual capacity	
	Standard charge and discharge, recorded as Recovery capacity	

4.8 Cycle Lives

Test Environment	Test Procedure	Number of cycles	Standard
25±2°C	Standard charge, and then rest 10min; 1C discharge to 2.75V, and then rest 10min;	300 cycles	The ratio of the 300th discharge capacity and the initial capacity ≥70% *The initial capacity is the mean value of first three cycles capacity.

Note: Frequently be charged and discharged at high temperature (≥35°C) and high rate or high voltage will shorten the cycle life of the battery; Frequently be charged and discharged at high temperature (≥60°C), which may cause potential safety problems.

4.9 Safety Performance

Item	Test Condition	Specification
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Over discharge Test	The cell shall be standard charged, and discharged at 1C for 2.5 hours.	No fire, No explode, No leakage
Overcharge Test	After standard charged, the cell shall be charged for 2.5 hours using 10V, 350mA.	No fire, No explode
External Short-Circuiting Test	The cell shall be standard charged. The plus and minus terminals of the cell shall be short circuited with a wire having $80\pm 20\text{m}\Omega$ or less resistance, and left for 1 hour.	No fire, No explode
Drop Test	The cell shall be standard charged and then dropped onto hard wood from the height of 100 cm in 3 directions X, Y, and Z once at each direction.	No fire, No explode
Heating Test	The charged cells are heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^\circ\text{C}$ per minute. The oven is to remain for 30 minutes at $130\pm 2^\circ\text{C}$ before the test is discontinued	No fire, No explode
Crush test	The force for the crushing is to be applied by a hydraulic ram with a 32mm diameter piston. The crushing is to be continued until a pressure reading of 17.2MPa is reached on the hydraulic ram, applied force of 13kN.	No fire, nor explosion

5. Welding Allowable Part on a cell

Welding is not allowed on cell side and wall, only be allowed on the top and end of the cell.

6. Charge State of Battery Before Shipment

The batteries delivered to the client are in a state of 40%~ 60% SOC. Due to self-discharging, the cells delivered to the client cannot fully guarantee 40%~ 60% SOC. During transportation, violent vibration, impact, sun and rain should be prevented.

7. Package

Packing: 50 cells to a carton, 10 cartons to a big box, 500 cells in total.

8. Warranty

The period of warranty is one year from the date of shipment. Guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

9. Handling Precaution and Prohibitions of Lithium Ion Rechargeable Cells and Batteries

9.1 Charging

The cell should be charged using constant current - constant voltage charging. The charging voltage of a single cell should not exceed 4.20V, Charging voltage higher than 4.20V will shorten the cycle life of the cell.

The charger shall be equipped with a complete charging detection device. The charging detection device detects when the battery is fully charged through a timer, current detection, and open circuit voltage detection. When one of the charging time, current, or voltage detects that the battery is fully charged, the charging circuit should be completely cut off to avoid generating trickle charging.

The battery shall be charged at the specified current with the temperature between 0~45°C.

When the battery temperature exceeds this range, it shall be placed for a while until the battery temperature reaches the above range before charging.

In order to ensure the life of battery, it is recommended to use standard charging method or low current to reduce fast charging.

Don't charge the battery reversely.

9.2 Discharging

The end-off voltage should be above 2.75V.

The discharge temperature range is -20°C~60°C, according to the specified current during the discharge process, discharge must be terminated when the temperature exceeds 60°C during discharging process.

9.3 Storing

The cell should be stored in a dry non-corrosive gas environment, do not let the battery under any pressure, and there is no condensation liquid attached to the surface of the cell. The best long-term storage temperature is -20°C~25°C, and the cell shall be in 25%~35%SOC state, and the voltage should be test before use.

9.4 Protective Circuit

For safety reasons and cycle life, the maximum cell voltage within each module should be below 4.25V (including tolerances).

Over discharge protection: if the single cell voltage reaches 2.75V, we suggest that over discharge protection should cut off the discharge current, the consumption current of the circuit should be as small as possible.

Overcurrent protection: if the cell discharge exceeds about 3C, the overcurrent protection should cut off the discharge circuit.

External short circuit protection: The battery module should have the function to prevent external short circuit.

To avoid overdischarge in long-term storage, the consumption current of the battery pack protection line should be set as small as possible. If the battery is not used for a long time, periodically check the remaining battery power and ensure that the single battery cannot be overdischarged state.

9.5 Environmental Misusage

Don't throw the battery into the fire.

Don't immerse, throw, wet the battery in water / seawater.

9.6 Warning

Don't use or assemble old and new batteries together.

Stop charging the battery if charging isn't completed within the specified time.

Stop using the battery if the battery becomes abnormally hot, discoloration, deformation, or abnormal conditions is detected during use, charge, or storage.

Keep away from fire immediately when leakage or foul odors are detected.

If liquid leaks onto your skin or cloths, wash well with fresh water immediately. If liquid leaking from the battery gets into your eyes, don't rub your eyes and wash them with clean water and go to see a doctor immediately.

If the terminals of the battery become dirty, wipe with a dry cloth before using the battery.

9.7 Caution

9.7.1 Electrical misuse

Charge current must be controlled by specified value in Cell specification.

Discharge current must be controlled by specified value in Cell's specification.

Before using the battery, be sure to read the user's manual and precaution of it's handling.

Cover terminals with insulating tape before proper disposal.

While the battery is charged, used and stored, keep it away from object materials with static electric chargers.

Design of positioning the battery pack in application and charger

To prevent the deterioration of the battery performance caused by heat, battery shall be positioned away from the area where heat is generated in the application and the charger.

9.8 Others

Don't store the battery in a pocket or a bag together with metallic objects such as keys, necklaces, hairpins, coins, or screws, to avoid short circuit (+) and (-) terminals.

Don't heat partial area of the battery with heated objects such as soldering iron.

Don't hit with heavy objects such as a hammer, weight.

Don't step on the battery and throw or drop the battery on the hard floor to avoid mechanical shock.

Don't disassemble the battery or modify the battery design including electric circuit.

Don't put the battery into a microwave oven, dryer or high-pressure container.

Don't use or assemble the battery with other makers' batteries, different types and/or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries.

9.9 Disclaimer

EGbatt Energy shall not assume corresponding responsibilities under the following circumstances:

The company shall not be liable for any loss or problems caused by violation of the notes and operations in the specification;

No liability for any problems caused by the design and collocation of circuits, battery packs, electric vehicles and chargers;

Do not accept abnormal batteries caused by improper assembly process;

No liability for any problems caused by force majeure (such as lightning, storm, flood, fire, earthquake, etc.).

In order to standardize the use of batteries, the rights, obligations and responsibilities of each customer and EGbatt Energy are clearly defined. Please read and understand the specifications carefully before using the battery.

If you choose to use this battery, your use will be deemed to endorse the entire content of this statement.

For safety reasons, please consult EGbatt Energy for packs design, lithium ion cell system protection circuit or high current, fast charging and other special applications.

EGbatt Energy reserves the right to modify, update and final interpretation of this statement.

This Specifications is still in its preliminary state. The contents are subject to change.

Please contact us when you need any help including safety concerns.

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