

Product Specification

Lithium Iron Phosphate (LiFePO₄) Cell

High Temperature Small Power / Energy Storage Version

Cell Type: 32700-6000mAh (A+/A version)

Nominal Voltage: 3.2V

Revision History

Version	Section	Modification	Date	Modified By
A0		First Version	2024-5-25	
A1	2.6	Adjust include screw on positive and negative and include screw on positive and studs on negative the cell Height size	2024-11-25	
A1		Adjust the dimensions of the flat head and screw column battery cell images in Figure 1-3	2024-11-25	
A1	6.6	Add acupuncture test	2024-11-25	
A1	10	Add reference file	2024-11-25	
A2	2.10	Adjust Charging Discharge Method	2024-12-19	
A2	2.12	Adjust Max continuous Charging Discharging Current	2024-12-19	
A2	17	Add Packaging Method For Battery Transportation	2024-12-19	
A3	2.15	Adjust Storage Temperature	2025-3-13	
A3	7	Adjust Storage Temperature	2025-3-13	
A4	2.5	Delete the standard for monthly self discharge rate	2025-6-5	
A5		Discharge curve of 6.0 Ah LiFePO ₄ cell at different temperatures(1C)	2025-11-12	

Content

1. General Information.....	4	.....
1.1 Scope.....	4	.....
1.2 Product Classification.....	4	.....
1.3 Model Name.....	4	.....
1.4 Characteristic.....	4	.....
1.5 Main Application.....	4	.....
1.6 Battery Assembly.....	4	.....
2. Nominal Specification.....	5	.....
3. Test Conditions.....	7	.....
3.1 Standard Test Conditions.....	7	 7
3.2 Standard Charging Method.....	7	.....
3.3 Standard Discharging Method.....	7	.....
5 Environment Characteristic.....	11	.....
6. Safety Characteristic.....	12	.....
7. Storage and Transportation.....	13	.....
8. Precautions and Safety Instructions.....	13	.....
9. Consultation.....	15	.....
Annex.....	17	.....

1. General Information

1.1 Scope

This specification describes the technical requirements, test methods and caution instructions of cylindrical lithium-ion cells. Please contact your sales representative if further technical information is needed.

1.2 Product Classification

Lithium LiFePO₄ Cell

1.3 Model Name

32700- 6000mAh

1.4 Characteristic

Pressure resistant and electroplating steel envelope

High capacity

Long cycle life

Remarkable high temperature performance

Steady output voltage

Low self-discharge

Double safety protection

- High resistance to vibration and shock

1.5 Main Application

- (AGV)Electric two-wheeled, three-wheeled and four-wheeled low-speed vehicles
- Storage energy(Industrial and commercial energy storage)

1.6 Battery Assembly

Individual cells should be integrated into specific battery packs according to customers' demands. The battery packs and the electronic system jointly participate in the performance management, thermal management and safety management.

2. Nominal Specification

Item	Condition/ Note	Specification	Remarks
Nominal Capacity	1C Discharge Capacity	$\geq 6.0\text{Ah}$ $\geq 6.2\text{Ah}$	
AC Impedance	At AC 1000 Hz	$\leq 8\text{m}\Omega$	
DC Impedance	DC Impedance Discharge Current	$\leq 16\text{m}\Omega$	50%SOC
Nominal Voltage		3.2V	
Cell Size	Cell diameter without pvc sleeve	$32.2\pm 0.3\text{ mm}$ Max. 32.5 mm	For details, please refer to Figure 1-3.
	Cell Height without pvc sleeve	$70.5+0.4/-0.3\text{ mm}$ Max. 70.9mm	
	Cell Diameter with PVC sleeve	$32.4\pm 0.3\text{ mm}$ Max. 32.7 mm	
	Height of cell include screw on positive and negative	$83.6+0.4/-0.3\text{ mm}$ Max. 84 mm	
	Height of cell include screw on positive and studs on negative	$82.8+0.4/-0.3\text{ mm}$ Max. 83.2 mm	
Cell Weight	Naked battery cells	$142\pm 5\text{ g}$	
End-of-charge Voltage	CC Mode	3.65V	
End-of-charge Current	CV Mode	$\leq 0.3\text{A}$	

Charging Discharge Method		Standard Charging Discharge	1 C at CC/CV、DC	Can support to $\leq 1C$ perform charging and discharging.
End-of-discharge Voltage		DC Mode	2.0V	
Max continuous Charging Discharging Current		CC/CV Mode DC Mode	18A	Only applicable to individual battery cells, it is recommended that the maximum continuous charging and discharging current of the battery pack be $\leq 1C$.
Max Pulse Discharging Current			60A	3s
Cycle Life		1 C/ 100 % DOD	2500cycles (A+) 2000cycles (A)	
Operating Temperature Range	Suggested charging Temperature		$<0^{\circ}\text{C}$	Not recommended for charging
			$0\sim 10^{\circ}\text{C}$	$\leq 0.2C$
			$10\sim 15^{\circ}\text{C}$	$\leq 0.5C$
			$15\sim 45^{\circ}\text{C}$	$\leq 1C$
			$45\sim 60^{\circ}\text{C}$	$\leq 0.5C$
	Discharging Temperature		$-20\sim 60^{\circ}\text{C}$	1C
	Storage Temperature		$0\sim 45^{\circ}\text{C}$	
Appearance		Without break, scratch, distortion, contamination, leakage and so on		

Notes:

The relevant testing standards and data in this specification are limited to individual batteries and are only for reference in module battery testing or use.

2.

The relevant testing standards and data in this specification should be distinguished between A+ and A products for reference. If A+ or A is not marked, it means that the standard is universal between A+ and A products.

3. Test Conditions

3.1 Standard Test Conditions

All tests stated in this Specification are conducted on condition of 28-30 °C, 15~90 %RH and atmospheric pressure of 86 kPa~ 106 kPa if no otherwise requirement.

3.2 Standard Charging Method

Standard Charging means that the cells are firstly charged till 3.65 V at 1C constant current, and then charged till current less than 0.05 C at 3.65 V constant voltage and finally shelved for 1 h on the standard test condition.

3.3 Standard Discharging Method

Standard Discharging means that the cells are discharged till 2.0V at 1C constant current on the standard test condition.

4. Electrochemical Performance

Test Item	Test Method	Criteria
AC Impedance	Cell shall be measured at 1000 Hz after charged as per 3.2.	$\leq 8\text{m}\Omega$
DC Impedance	Firstly cell shall be charged according to the testing process in 3.2, Shelving for 5 minutes, Then discharge it according to 3.3 and record the discharge capacity, Shelving for 5 minutes, then charge the battery to 50% SOC at 1C (the charging current and cut-off capacity are set based on the actual discharge capacity after capacity division); 1C discharge for 10S: Record the voltage V1 before discharge; Voltage V2 after discharging for 10 seconds (the discharge current is set based on the actual discharge capacity after capacity sorting); Calculate the DC internal resistance: DC internal resistance $= (V1 - V2) / 1\text{C discharge current}$.	$\leq 16\text{m}\Omega$
Initial Capacity	Cell shall be charged per 3.2 and discharged per 3.3 within 1h after full charge.	Initial capacity: $\geq 6.0\text{ Ah}$ Initial capacity: $\geq 6.2\text{ Ah}$
Initial Capacity	Cell shall be charged as per 3.2 and discharged till 2.0 V at 3C constant current.	Discharge capacity: $\geq 99\%C_{\text{ini}}$

Voltage self discharge	At room temperature ($25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$): ① The individual battery is first charged to 3.16V at a constant current and voltage of 0.2C, with a cut-off current of $\leq 0.05\text{C}$; After storing the battery at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 5 hours, measure the voltage and use this voltage as the initial voltage; ② Open the fully charged battery and store it in an environment with a temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 10 days; ③ After standing for 5 hours at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, measure the voltage of the battery; The battery voltage K value is: (initial voltage - measured	25°C K value A+ (5% SOC): $\leq 0.5\text{ mV/d}$ 25°C K value A (5% SOC): $\leq 1.0\text{ mV/d}$
Normal Temperature 1C Cycle Life	Cell shall be firstly shelved for 10min after charged at CC/CV mode (CC: 1 C, CV: 3.65 V, End-of-charge current: 0.05 C) and then shelved for 10min after discharged at CC mode (1 C, End-of-charge voltage: 2.0 V). The next cycle will be tested again and continued for 2500 times (A+) / 2000 times (A) .	Capacity retention: $\geq 80\%$
Normal Temperature 3C Cycle Life	Cell shall be shelved for 30min after charged at CC/CV Mode (CC: 3 C, CV: 3.65 V, End-of-charge current: 0.05 C) and then shelved for 30min after discharged at CC mode (3 C, End-of-charge voltage: 2.0 V).The next cycle will be tested again and continued for 1100 times (A+) / 1000 times (A) .	Capacity retention: $\geq 80\%$

High Temperature 55°C 1C Cycle Life	Cell shall be shelved for 10min after charged at CC/CV mode (CC: 1 C, CV: 3.65 V, End-of-charge current: 0.05 C) and then shelved for 10min after discharged at CC mode (1 C, End-of-charge voltage: 2.0 V); The next cycle will be tested again and continued for 1500 times (A+) / 1300 times (A) .	Capacity retention: ≥ 80 %
High Temperature 70°C 1C Cycle Life	Cell shall be shelved for 10min after charged at CC/CV mode (CC: 1 C, CV: 3.65 V, End-of-charge current: 0.05 C) and then shelved for 10min after discharged at CC mode (1 C, End-of-charge voltage: 2.0 V); The next cycle will be tested again and continued for 1000 times.	Capacity retention: ≥ 80 %
High-rated Discharging Performance	Cell shall be charged as per 3.2 and then discharged at 6C till ending voltage at room temperature.	Discharge Capacity: ≥ 95% C_{ini}
Low Temperature Performance	Cell shall be stored in a low temperature environment for 4 h after charged as per 3.2 and then discharged at 1C till ending voltage.	Discharge Capacity: ≥ 55% C_{ini} (-20°C) ≥ 75% C_{ini} (-10°C) ≥ 90 % C_{ini} (-0°C) ≥ 92% C_{ini} (5°C) ≥ 94% C_{ini} (10°C)
Room Temperature Storage Test	Cell shall be stored at 25 °C ±2 °C for 28 days after charged as per 3.2 and then discharged at 1 C till ending voltage.	Capacity retention: ≥95% Capacity recovery rate: ≥97%
High Temperature Storage Test	Cell shall be shelved firstly at 60 °C ±2 °C for 10 days and then at room temperature for 5h after charged as per 3.2. Finally it's discharged as per 3.3.	Capacity retention: ≥ 93% Capacity recovery rate: ≥95%

5 Environment Characteristic

Test Item	Test Method	Criteria
Constant Temperature and Humidity Test	Cell shall be shelved firstly in 45 °C ±2 °C (90~95% RH) for 48h and then at room temperature for 2h after charged as per 3.2.Finally check it for 1h.	No distortion, no rust, no fume and no explosion.
Thermal Shock Test	Cell shall be charged as per 3.2 and then put into an oven. Temperature inside drops to -40 °C within 60min and remains for 90min. Then it rises to 25 °C within 60min,keeps rising to 85 °C within 90min and then remains for 110 min. Finally it drops to 25 °C within 70min. Repeat this process for 5 times and then check it for 1h.	No explosion, no fire, no leakage.
Low-pressure Test	Cell shall be charged as per 3.2 and then shelved for 6h at an absolute pressure of 11.6 kPa (RT). Check it for 1h.	No explosion, no fire, no leakage.
Drop Test	Cell shall be charged as per 3.2 and then dropped from a height of 1.5m onto the concrete ground. Positive and negative terminals of cells shall be towards the ground. Check it for 1h.	No explosion, no fire, no leakage.
Soaking Test	Cell shall be charged as per 3.2 and then completely soaked into NaCl solution (3.5 wt %) for 2h. Check it for 1h.	No explosion, no fire.

6. Safety Characteristic

Test Item	Test Method	Criteria
External Short-Circuiting Test	Cell shall be charged as per 3.2 and then short-circuited by connecting the positive and negative terminals with a resistance $<5\text{ m}\Omega$ for 10min. Check it for 1h.	No explosion, no fire.
Over-charge Test	Cell shall be charged as per 3.2, then charged at 1C to ending voltage of 5.5 V or charged at 1C for 1h. Check it for 1h.	No explosion, no fire.
Over-discharge Test	Cell shall be charged as per 3.2, then discharged at 2C for 90 min. Check it for 1h.	No explosion, no fire, no leakage.
Crush Test	Cell shall be charged as per 3.2, then crushed vertically to the cell plate at a rate of $(5\pm1)\text{ mm/s}$ with a semi-cylinder (radius of 75 mm). When any of the following criteria is met, stopping crushing and check it for 1h. 1. Voltage reaches 0V; 2. Deformation reaches 30%;	No explosion, no fire.
Heating Test	Cell shall be charged as per 3.2, then heated in an oven. Temperature rises to $130\text{ }^{\circ}\text{C}\pm2\text{ }^{\circ}\text{C}$ at a rate of 5°C/min . Stop heating after remaining for 30min. Check it for 1h.	No explosion, no fire.

Acupuncture Test	Cell shall be charged per 3.2, then acupuncture the cell perpendicularly to the cell plate at a rate of (25 ± 5) mm/s with a $\phi 5$ mm~ $\phi 8$ mm steel needle and remain it inside. The acupuncturing location shall be near the geometric center of plane. Check it for 1h.	No explosion, no fire.
------------------	---	------------------------

7. Storage and Transportation

Based on the cells' characteristics, proper packaging is necessary for protecting them during transportation. (Blue PVC film and PET white surface pad insulation protection, 25pcs/small box, 4 small boxes per box, 50-100 boxes/pallet, 4 sides packaged with stretch film, corner protectors, and strapping at each corner)

During transportation, it is recommended that the battery cells have a charged capacity of 5% -30% SOC to ensure they are not damaged by short circuits and liquids.

Cell should be kept at 0°C-45°C in warehouse where it's dry, clean and well-ventilated.

During loading and unloading, attention must be paid against dropping, turning over and serious stacking.

8. Precautions and Safety Instructions

In order to prevent the battery from leakage, getting hot and explosion, please pay attention to following points.

Warning!

Never throw the battery into water. Store it under dry, shady circumstance when not use.

Never misidentify the positive and negative terminals.

Never connect the positive and negative terminals of battery with metal to prevent short-circuiting.

Never ship or store the battery together with metal.

Never knock, throw or trample the battery.

Never cut through the battery with nail or other edge tool.

Tips!

Never use or store the battery under the over-high temperature. Otherwise it will lead to battery over-heating, which might lose some function and reduce life, even getting fire. The proposed temperature for long-term storage is 10~45°C.

Never throw the battery into fire or heating machine to avoid fire, explosion and environment pollution; scrap battery should be returned to the supplier and handled by the recycle station.

Never use the battery under strong static electronic and magnetic field, otherwise it will destroy the protecting device.

Never knead eyes if leakage electrolyte gets into eyes. Wash eyes by water and seek medical advice ASAP.

If battery emits peculiar smell, over-heating, distortion or any unconventionality happens during using, storage or charging process, please stop using and take it out of the device.

Never cut the battery in socket directly, please use the stated charger when charging.

Check the voltage of battery and relevant connectors before using. Do not use until everything turns out to be normal.

Prior to charging, fully check the insulation, physical condition and aging status. The pack voltage must not be less than the cut-off voltage. If any abnormality is found, label the pack and contact qualified service personnel before charging.

The battery should be stored in 5%-30% SOC. It needs to be charged again if out of use for one month under 10%SOC. If 10% -30%SOC is not used for 3 months, it should be recharged and discharged.

Clean the dirty electrode with a clean dry cloth if any contamination appears, otherwise poor contact or operation failure may occur.

9. Consultation

For technical inquiries, please contact your sales representative.

10. Reference files

QC/T 743-2006

Lithium ion batteries for electric vehicles

Safety technical specification of lithium-ion battery for electric bicycle

GBT 31486-2015

Electrical performance requirements and test methods for traction battery of electric vehicle

GBT 31484-2015

Cycle life requirements and test methods for traction battery of electric vehicle

GBT 38031-2020

Electric vehicles traction battery Safety requirements

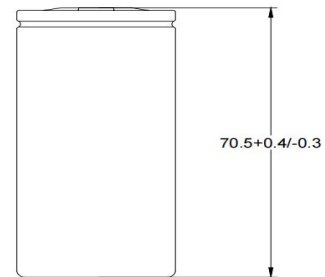
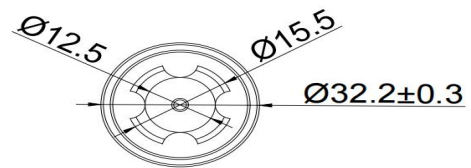
HX-TS-047

Technical standard for testing lithium iron phosphate battery cells

Annex

Figure 1

Cell's appearance and dimension



Cell's appearance and dimension with PVC sleeve

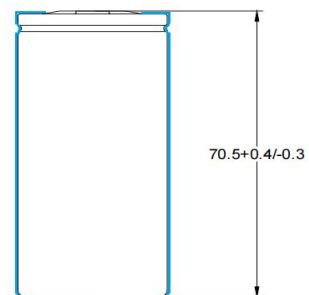
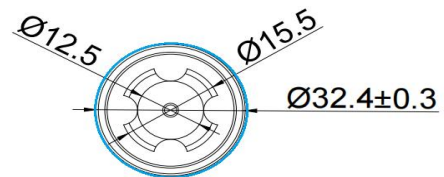
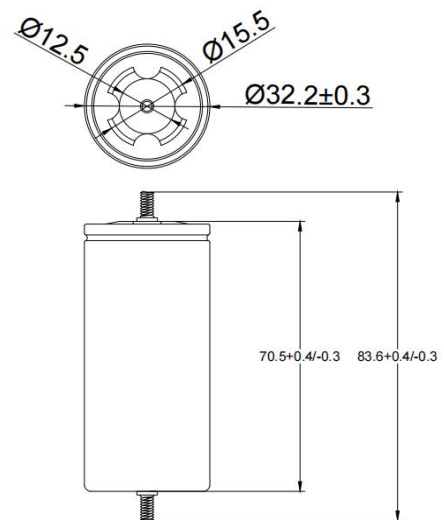


Figure 2

The Cell's with welded screw appearance and dimension



The Cell's with welded screw appearance and dimension with PVC sleeve

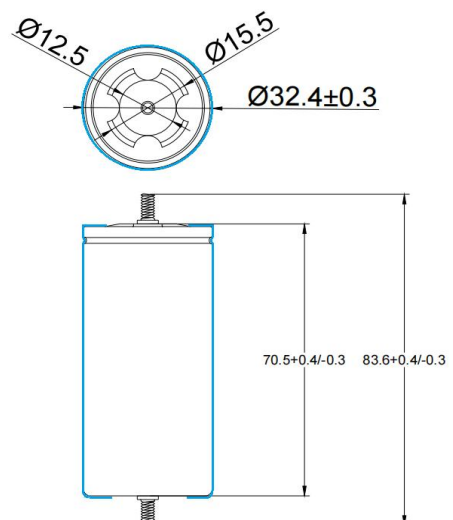
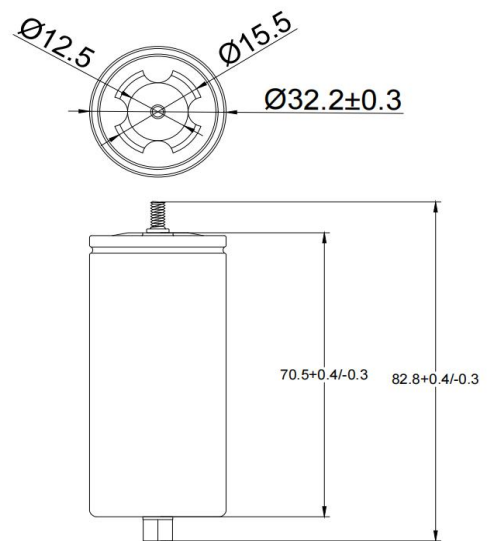


Figure 3

The Cell's with welded screw appearance and dimension



The Cell's with welded screw appearance and dimension with PVC sleeve

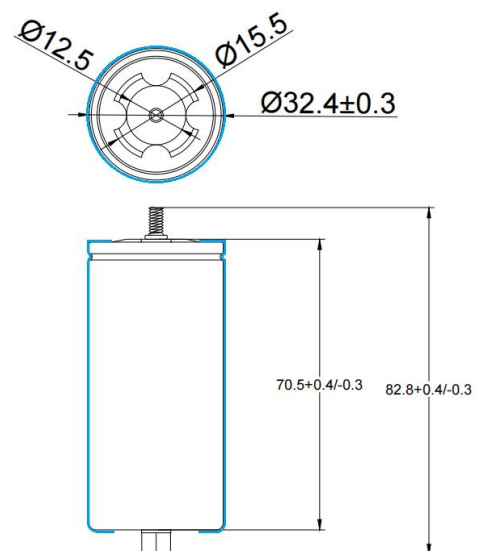


Figure 4

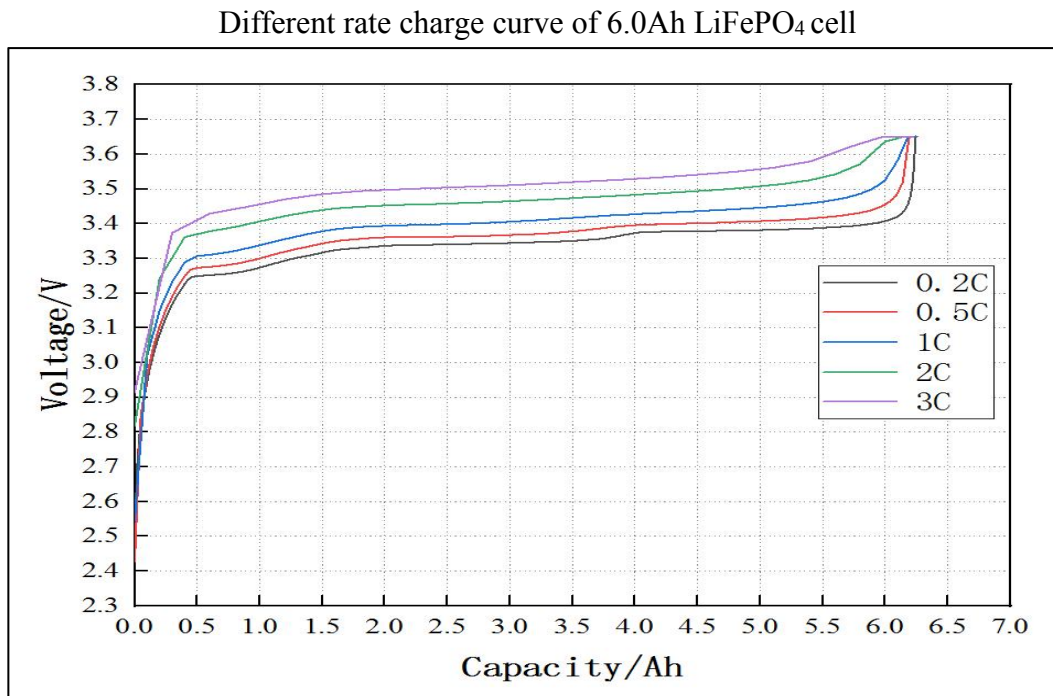


Figure 5

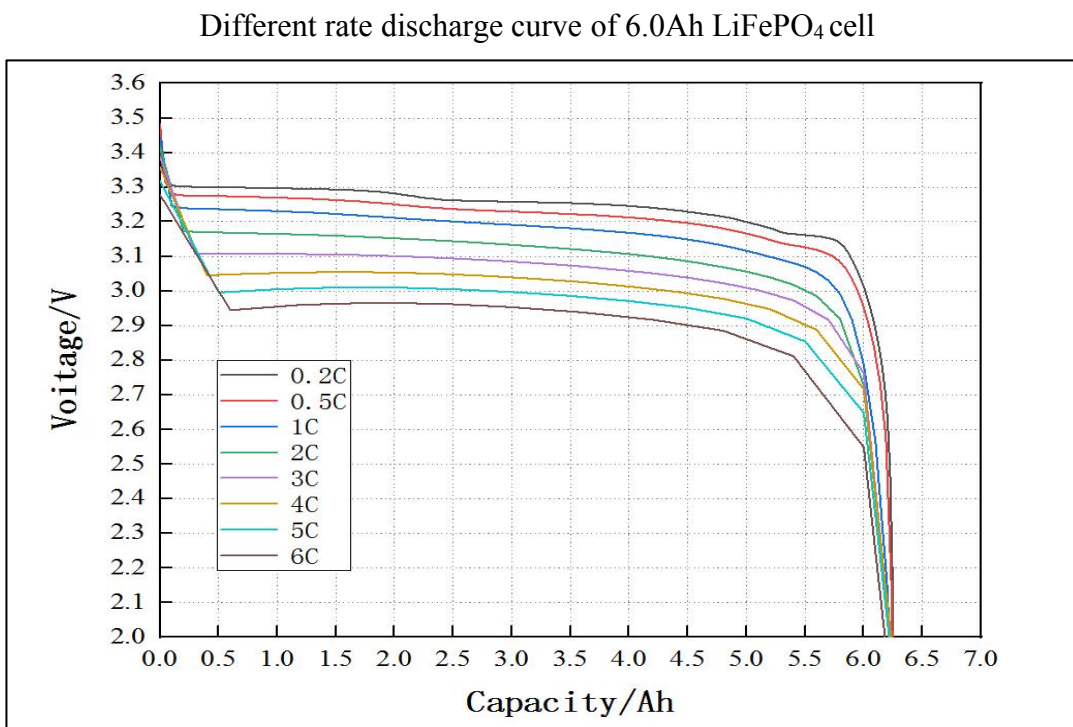


Figure 6

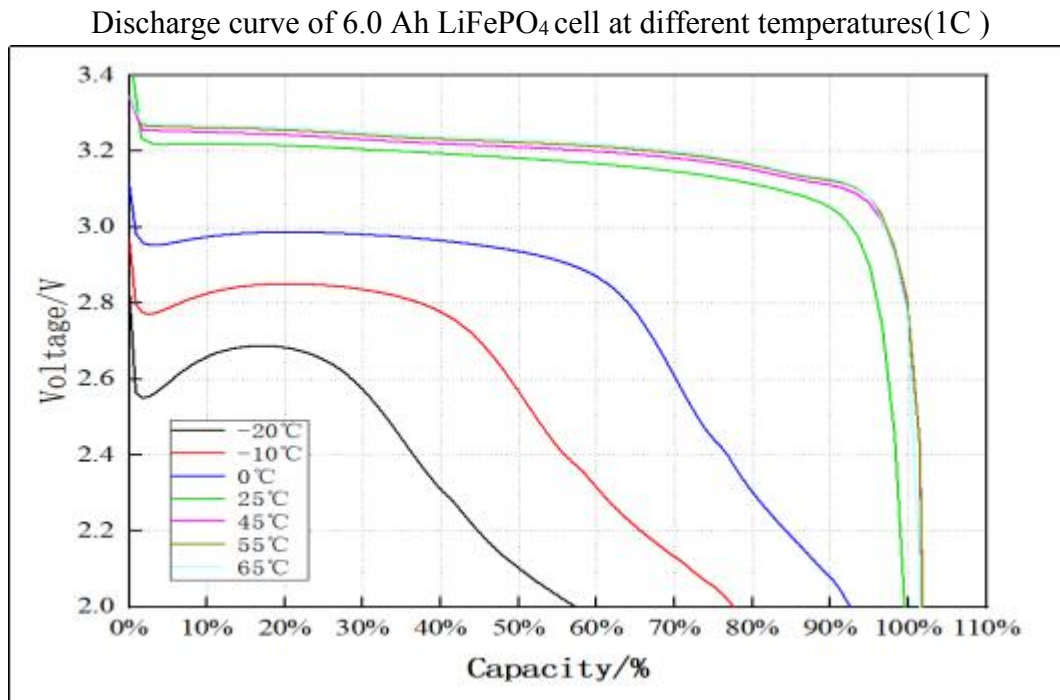


Figure 7

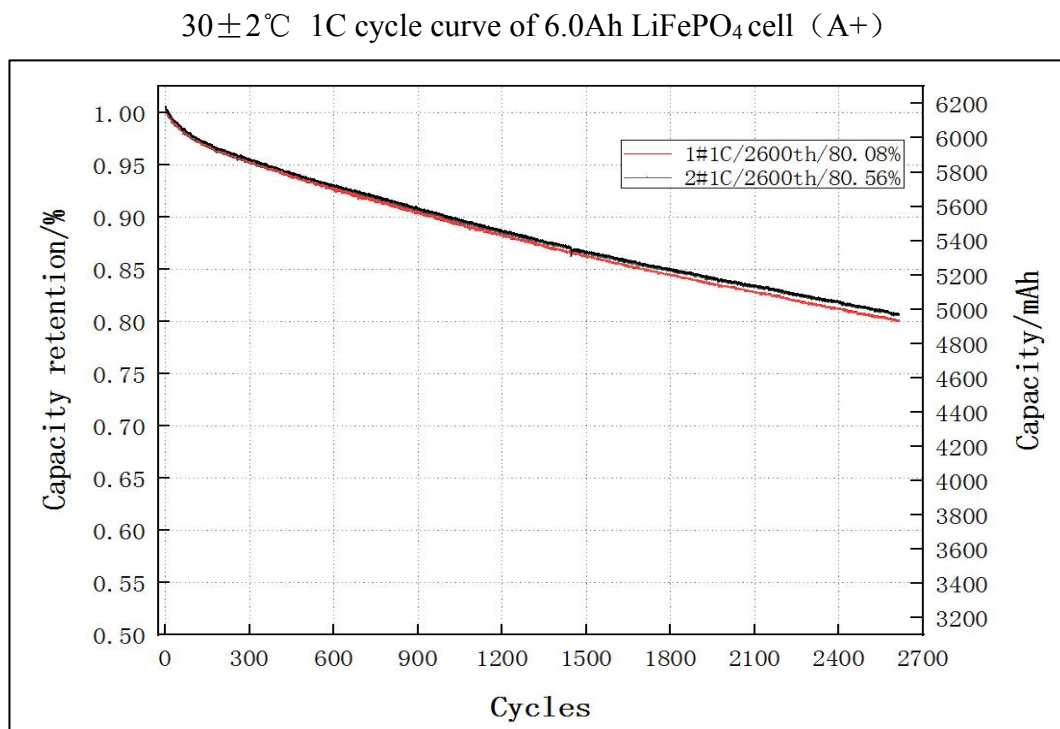


Figure 8

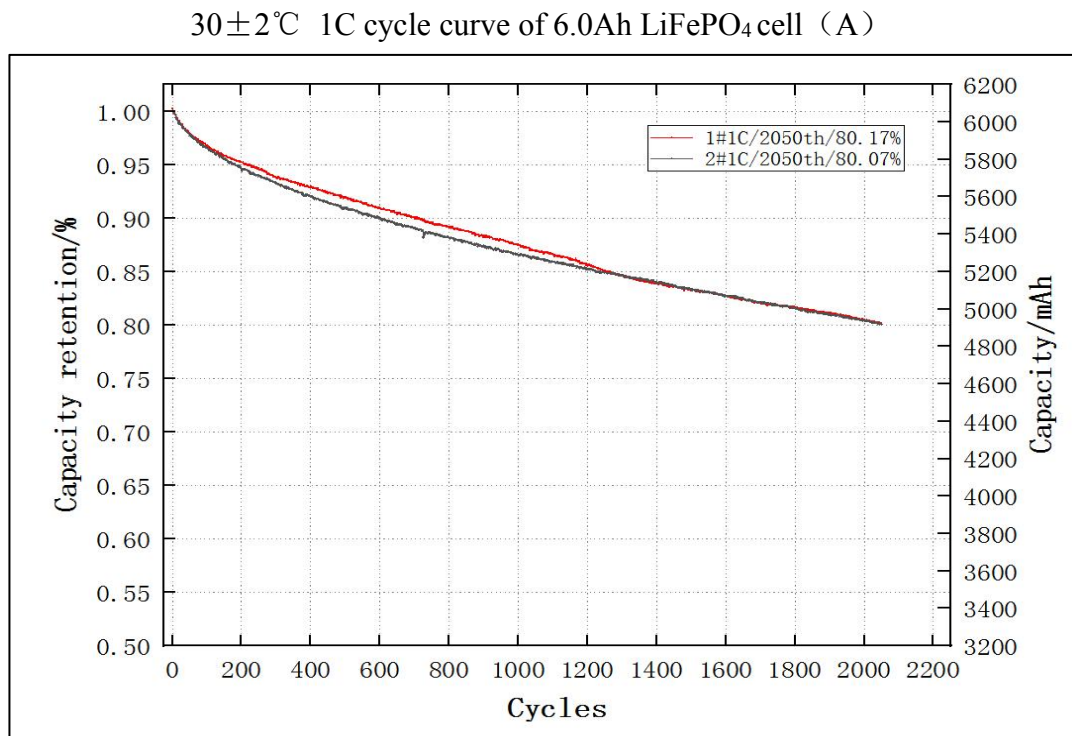


Figure 9

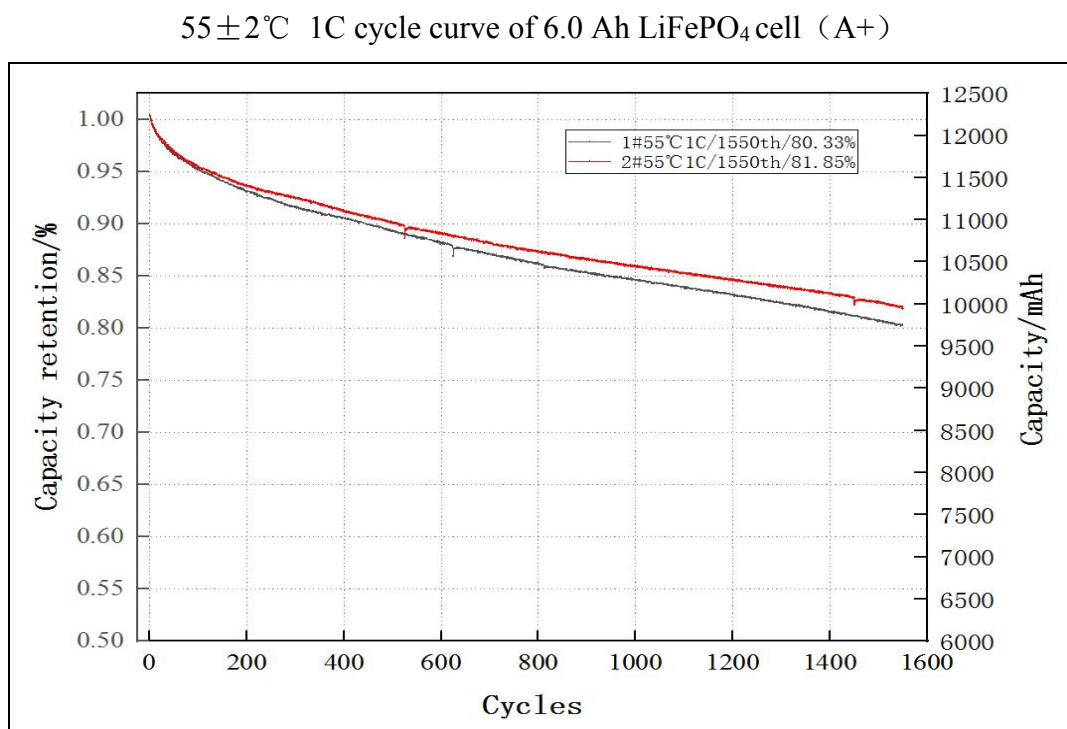


Figure 10

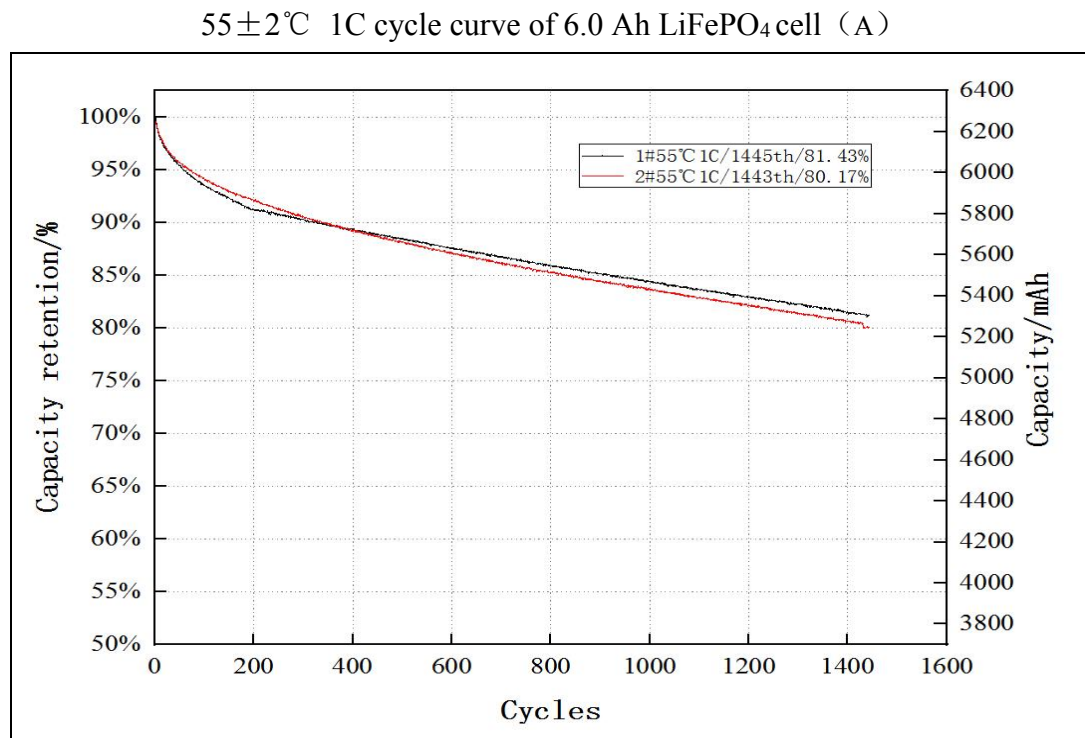


Figure 11

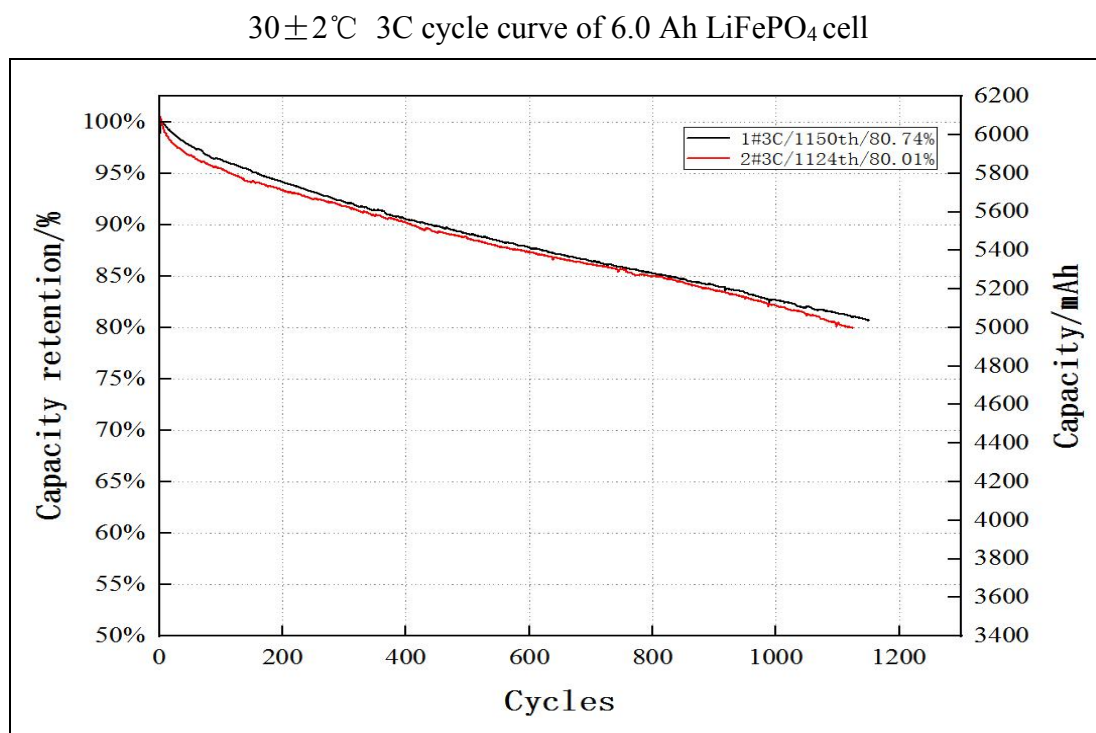


Figure 12

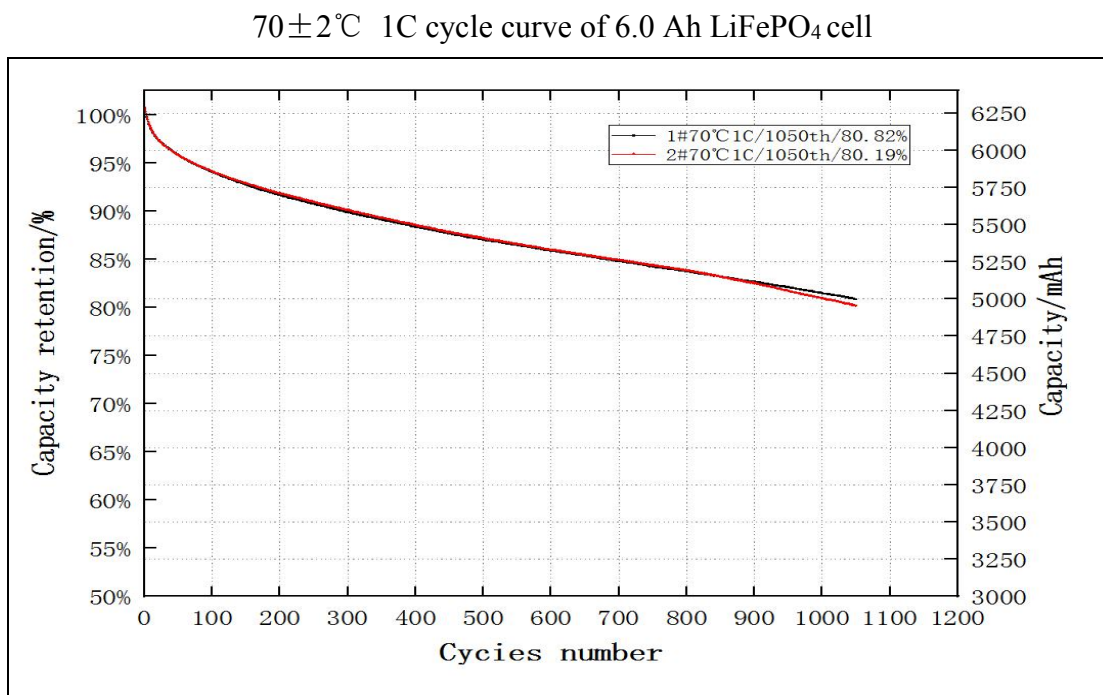


Figure 13

Different temperature capacity differences (For reference only)

Number/Te mperature	Capacity	Capacity	15°C and 5°C Differenc e	Capacity	20°C and 15°C Differenc e	Capacity	25°C and 20°C Differenc e	Capacity	28°C and 25°C Differenc e
1	5518.2	5727.9	209.7	5864.5	136.6	6001.4	136.9	6094.1	92.7
2	5512.8	5725.5	212.7	5878.9	153.4	6014	135.1	6105.5	91.5
mean value	5515.5	5726.7	211.2	5871.7	145	6007.5	136	6089.8	92.1
Number/Te mperature		Capacity	30°C and 28°C Differenc e	Capacity	32°C and 30°C Differenc e	Capacity	35°C and 32°C Differenc e	Capacity	40°C and 35°C Differenc e
1	/	6110.2	16.1	6118.4	8.2	6122.8	4.4	6126.2	3.4
2		6123.8	18.3	6135.5	11.7	6140.8	5.3	6145.1	4.3
mean value		6107	17.2	6116.95	9.95	6121.8	4.85	6125.65	3.85

Figure 14

5%SOC Capacity decay rate at different temperatures								
temperature	28℃	State of Charge		5%				
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	99.55%	99.26%	99.53%	99.12%	99.53%	99.55%	99.13%	99.03%
2.5 cycle capacity recovery rate	99.47%	99.12%	99.38%	99.07%	99.41%	99.34%	99.01%	99.07%
temperature	35℃	State of Charge		5%				
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	99.70%	99.54%	99.41%	99.05%	99.53%	98.87%	99.75%	99.51%
2.5 cycle capacity recovery rate	99.55%	99.46%	99.52%	98.93%	99.51%	98.66%	99.67%	99.47%
temperature	45℃	State of Charge		5%				
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	99.47%	99.13%	99.30%	98.93%	98.89%	98.25%	97.68%	97.29%
2.5 cycle capacity recovery rate	99.36%	99.03%	99.14%	98.85%	98.67%	98.02%	97.48%	97.11%
temperature	60℃	State of Charge		5%				
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	98.56%	97.61%	97.56%	96.70%	97.03%	96.66%	97.07%	96.96%
2.5 cycle capacity recovery rate	98.61%	97.47%	97.57%	96.58%	96.91%	96.60%	96.90%	96.50%

Figure 15

30%SOC Capacity decay rate at different temperatures								
temperature	28℃	State of Charge			30%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	98.78%	98.25%	97.94%	97.64%	97.34%	97.07%	96.95%	96.42%
2.5 cycle capacity recovery rate	98.74%	98.20%	98.03%	97.66%	97.37%	97.14%	97.03%	96.44%
temperature	35℃	State of Charge			30%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	98.73%	98.27%	97.99%	97.58%	97.19%	96.76%	96.65%	96.55%
2.5 cycle capacity recovery rate	98.67%	98.18%	98.03%	97.60%	97.16%	96.59%	96.71%	96.60%
temperature	45℃	State of Charge			30%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	97.61%	96.86%	96.07%	95.06%	94.09%	92.67%	93.56%	87.73%
2.5 cycle capacity recovery rate	97.56%	96.84%	96.16%	95.06%	94.09%	92.68%	93.48%	87.69%
temperature	60℃	State of Charge			30%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	95.91%	93.01%	92.13%	89.81%	86.97%	86.26%	86.00%	83.49%
2.5 cycle capacity recovery rate	96.04%	92.99%	92.22%	89.75%	87.00%	85.92%	85.96%	83.45%

Figure 16

100%SOC Capacity decay rate at different temperatures								
temperature	28℃	State of Charge			100%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	97.02%	95.73%	94.60%	94.37%	94.11%	93.03%	93.41%	92.10%
2.5 cycle capacity recovery rate	97.20%	95.80%	94.88%	94.51%	94.27%	93.28%	93.54%	92.28%
temperature	35℃	State of Charge			100%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	96.92%	95.68%	94.70%	94.35%	93.70%	93.49%	92.97%	92.73%
2.5 cycle capacity recovery rate	97.06%	95.86%	94.90%	94.55%	93.81%	93.62%	93.11%	92.89%
temperature	45℃	State of Charge			100%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	94.10%	92.99%	90.43%	87.41%	83.97%	79.67%	76.09%	69.84%
2.5 cycle capacity recovery rate	94.23%	93.06%	90.71%	87.64%	84.09%	79.90%	76.22%	69.88%
temperature	60℃	State of Charge			100%			
								
Storage days	30d	60d	90d	120d	150d	180d	240d	360d
1.5 cycle capacity recovery rate	90.22%	88.05%	84.81%	79.40%	74.81%	72.55%	73.61%	57.69%
2.5 cycle capacity recovery rate	90.43%	88.21%	85.03%	79.51%	74.94%	72.82%	73.78%	57.67%

Figure 17

Packaging Method For Battery Transportation



Domestic Transportation



Foreign Transportation