Lithium ion battery specification

Model: TB_45173184AE_150Ah_LFP

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Date	2021.1.17	Signatory's Title	
Version	A5		

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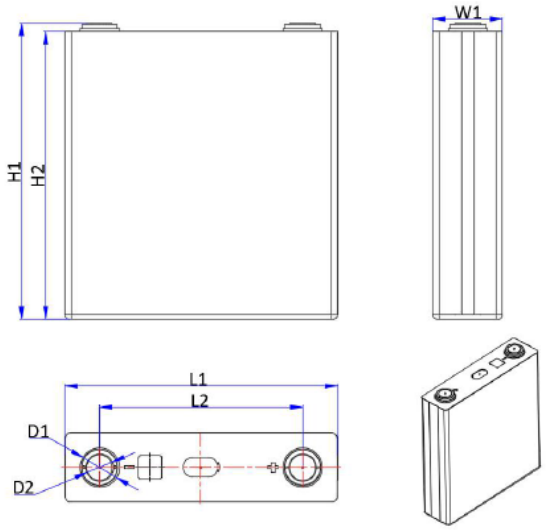
Revision History

Version	Revision page	Revision description	Date	Prepare
A0	—	First edition	2020.1.17	Ke Luo
A1		Standard：1、W1, 2、L2 3、D2 4、SOC	2020.9.3	Lang Qi
A2	3	Standard：1.W1,2. Nominal capacity 3. Min capacity	2020.9.30	Lang Qi
A3	3	Cycle life	2020.11.25	Lang Qi
A4	3	Weight	2020.12.16	Lang Qi
A5	3,4,7	1. Charging temperature,2. Discharging temperature,3. Storage temperature	2021.1.17	Lang Qi

1、General

This product specification describes the technique standards,test methods and precaution notes of prismatic type(Lithium ion) $LiFePO_4$ rechargeable cell,manufactured by Shenzhen Topband Battery Co.,Ltd.

2、Dimension（Unit：mm）

No.	Item	Standard	Remark	Figure
2.1	W1	45.3±0.7	SOC≤ 10%, with pressure 100± 10kgf	
2.2	L1	174.2±0.5		
2.3	L2	129.3±0.5		
2.4	H1	189.6±0.5		
2.5	H2	184.6±0.8		
2.6	D1	25.1±0.3		
2.7	D2	16.4±0.3		

3、Product specification

No.	Item	Standard	Remark
3.1	Nominal capacity	150Ah	25±2℃, 0.5C
3.2	Min capacity	150Ah	
3.3	Internal impedance	≤0.35mΩ	25±2℃, AC 1000Hz
3.4	Nominal voltage	3.2V	
3.5	Weight	3065±50g	
3.6	Voltage range	3.65～2.5V	T＞10℃
		3.65～2.2V	0℃＜T≤10℃
		3.65～2.0V	T≤0℃
3.7	Recommended charge current	0.5C	
3.8	Recommended discharge current	0.5C	
3.9	Max continuous charge current	1C	25±5℃, SOC＜80%
3.10	Max continuous discharge current	1.5C	25±5℃, SOC＞20%
3.11	Max pulse discharge current	2C	25±2℃, 50%SOC ,10S
3.12	Cycle life	2500 cycles capacity retention≥80%	25±2℃, 1C, 100%DOD
		5000 cycles capacity retention≥80%	25±2℃, 0.5C, 80%DOD

3.13	Charging temperature	0～45℃	Stop charging once the temperature of the cell exceeds the temperature range
3.14	Discharging temperature	-20～55℃	Stop discharging once the temperature of the cell exceeds the temperature range
3.15	Storage temperature	-10～35℃	
3.16	Appearance	No break,scratch,distortion,contamination,leakage.	

4、Test Conditions

4.1 Standard Test Conditions

4.1.1 All tests defined in this Product Specification are conducted at temperature 25±5℃,humidity 15%～90%RH,atmospheric pressure 86～106kPa.

4.1.2 Unless there are other special instructions,all performance was tested with unused cells within 1month after production date.

4.2 Standard Charge Method

The "Standard Charge" means in an ambient temperature of 25±2℃,the cell was discharged with 0.5C constant current to cut-off voltage 2.5V,standing 1hour.Then charged it with 0.5C constant current to 3.65V,then change into constant voltage charge mode,until the charging current down to 0.05C,then stop charging and standing 1h.

5、Electrical Characteristics

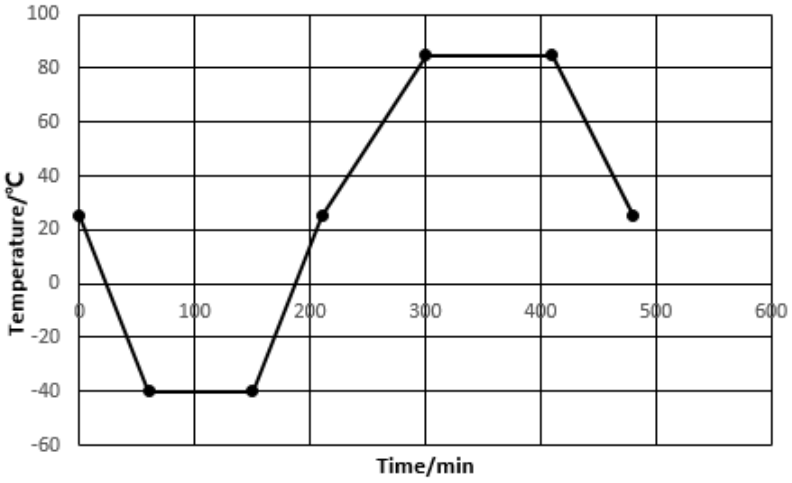
No.	Item	Test method	Criteria
5.1	High Temperature Discharge Performance	The cell was charged in accordance with 4.2, and stored in an ambient temperature of 55±2℃ for 5h, then discharged to 2.5V with 1C constant current. After that, then place the cell in the ambient temperature of 25±2℃ for 4h then check its appearance.	1. Capacity retention ≥95% 2. No deformation, No crack.
5.2	Low Temperature Discharge Performance	The cell was charged in accordance with 4.2, and stored in an ambient temperature of -20±2℃ for 20h, then discharged to 2.0V with 1C constant current. After that, place it in the ambient temperature of 25±2℃ for 4h, then check its appearance.	1. Capacity retention ≥70% 2. No deformation, No crack.
5.3	Rate Discharge Performance in Normal Temperature	The cell was charged in accordance with 4.2,then discharge to 2.5V with 1.5C current in an ambient temperature of 25±2℃.	Capacity retention ≥95%
5.4	Charge Retention	The cell was charged in accordance with 4.2,and stored in an ambient temperature of 25±2℃ for 28 days,and then discharged to 2.5V with 1C constant current.	Capacity retention ≥90% Capacity recovery ≥95%

5.5	Cycle Life （25±2℃）	The cell was charged to 3.65V with 1C CC/CV cut off 0.05C,stayed for 30min;Subsequently,the cell was discharged to 2.5V with constant current 1C,and stayed for 30min;Prior to next charge-discharge cycle.Record all the cycles until the discharge capacity＜80%. During the cycle, 300±20kgf pressure should be applied to the cell by a fixture with an area not less than the size of the cell, recommended the length of 250mm and height of 185mm.	≥2500cycles

6、Safety test

All below tests are carried out on the equipment with forced ventilation and explosion-proof device.Before test, all cells are charged in accordance with 4.2, and stored 24h prior to test.

No.	Item	Test Method	Criteria
6.1	Short- circuit Test	The cell was charged accordance with 4.2, after that the cell is short-circuited by connecting the positive and negative terminals with a wire for 10min, the wire has a maximum resistance load of 5mΩ,then observe for 1h.	No fire, no explosion
6.2	Overcharge Test	The cell was tested in accordance with 4.2, then 1C constant current charged till the voltage reaches 1.5 times of the specified end-off charge voltage, or the charge time reaches 1h, then stop charge, and observe for 1h.	No fire, no explosion
6.3	Over discharge Test	The cell was tested in accordance with 4.2, then 1C discharge for 90min, then observe for 1h.	No fire, no explosion, no leakage
6.4	Crush Test	The cell was tested in accordance with 4.2, and then compress two of the largest surface areas of the cell, the compressive force is put by a hydraulic piston with a diameter of 32 mm. The compression is continued until the pressure reaches 17.2 MPa, the pressure reaches 13 kN, and the pressure is released when the maximum pressure is reached.	No fire, no explosion
6.5	Nail Test	a) The cell was tested in accordance with 4.2 b) use φ5mm～φ8mm high temperature resistance steel needle, with speed of 25±5mm/s, to go through the cell from vertical direction of pole plate, the penetrate position should be close to the geometric center of plate surface, the steel needle remains in the cell;	No fire, no explosion
6.6	Drop Test	The battery is freely dropped from a height of 1.5 m onto the concrete floor for three times.	No fire, no explosion
6.7	Temperature cycle	The cell was charged in accordance with 4.2,and then repeat the following procedures for 5 cycles,then check the cell's appearance. Temperature ℃ / Time increment min / Delta time min / Temperature alteration ratio ℃/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	No leakage,no fire,no explosion, no vent

			
6.8	Low-pressure Test	The cell was charged in accordance with 4.2,then stored for 6h at a vacuum of -90KPa,after that put the cell in room temperature for 6h,then check the cell's appearance.	No leakage,no fire,no explosion, no vent
6.9	Heating Test(130℃)	The cell was tested in accordance with 4.2, and then heated in a circulating air oven.The temperature of the oven is raised at a rate of 5℃ per minute to 130±2℃ and remain for 30 min.	No fire, no explosion

7、Shipment

The Cell shall be shipped by insulated packaging at SOC in accordance with customers' requirement.The remaining capacity before charging shall depends on the storage time and conditions.To ensure the cells in a good transport environment is necessary.

8、Warranty

8.1 In this specification, quality assurance protocol is the main quality assurance protocol if it conflicts with the quality assurance protocol.

8.2 If customers due to abuse or misuse, Shenzhen Topband Battery Co.,Ltd will not be free replacement.

8.3 Shenzhen Topband Battery Co.,Ltd will not undertake any responsibility for breach of safety operation problems.

8.4 Shenzhen Topband Battery Co.,Ltd shall be exempt from warranty for fault cells come from by matching electric circuit connection, other battery packs and charger.

8.5 It's out of guarantee servie by Shenzhen Topband Battery Co.,Ltd after customer assemble the cell(if the cell is bad in the proces of assembly).

8.6 This specification was developed after consultation between the parties.For projects not included in this specification, Shenzhen Topband Battery Co., Ltd.does not undertake quality assurance.

9、Precautions and Safety Instructions

Abusive use of (lithium-ion) $LiFePO_4$ rechargeable batteries would cause damage to the cell and/or personal injury.Please read the precautions and safety instructions below before using.

9.1 Standard cell precautions

a.Do not expose the cell to extreme heat or flame.
b.Do not short circuit, over-charge or over-discharge the cell.
c.Do not subject the cell to strong mechanical shocks.
d.Do not immerse the cell in water, or get it wet.
e.Do not disassemble or modify the cell.
f.Do not handle or store with metal objects like necklaces, coins or hairpins, etc.
g.Do not use the cell with conspicuous damage or deformation.
h.Do not connect cell to the plug socket.
i.Do not touch a leaked cell directly.
j.Do not mix the new and old Lithium-ion cell and use together.
k.Do not expose the cell to blazing sun (or in heated car by sunshine).
l.Keep cell away from children and pet.
m.Do not nail into the cell, strike it by hammer or tread it.
n.Do not impact or throw the cell.
o.Do not direct contact the cell positive and negative electrode with aluminum case.

9.2 Cell Operation Instructions

9.2.1 charging

a.Charge the cell in a temperature range of 0°C to 45°C, recommended 10°C to 35°C .
b.Charge the cell at a constant current of 0.5C until 3.65V, and then at a constant voltage of 3.65V until current is 0.05C.
c.Use a matched or recommend (CC/CV) lithium-ion (Li^+) battery charger.

9.2.2 Discharging

a.Recommended cut-off voltage is 2.5V.
b.For maximum performance, the cell should be discharged in a temperature range of 10°C to 35°C.

9.2.3 Storage Recommendations

a.In case of long period storage (more than 3 months), storage the cell at temperature range of 10~30°C, low humidity, no corrosive gas atmosphere.
b.Charge and discharge the every 3months is recommended, charge and discharge the cell every 6 months is obligatory. Charge and discharge steps as bellow:
In temperature of 25±2℃, 0.5C discharge to 2.5V, stay for 30min, 0.5C CC/CV charge to 3.65V cutoff 0.05C, stay for 30min, 0.5C discharge to2.5V, stay for 30min , 0.5C charge to about 50%SOC.
c.To protect the cell, good storage environment is necessary.

Note 1.The customer is required to contact Shenzhen Topband Battery Co.,Ltd in advance, if and when the customer needs other applications or operating conditions beyond those described in this document.
Note 2.Shenzhen Topband Battery Co.,Ltd shall take no responsibility for any accident when the cell is used under other conditions than those described in this specification.

10、Requirement for safety assurance

For safety assurance, please discuss with Shenzhen Topband Battery Co.,Ltd in advance for your equipment design, the circuit protection of battery/cells, high rate discharge, rapid charge and other aspects of special application.