深圳市驰普电子科技有限公司 Shenzhen CTECHI Electronic Technology Ltd.
深圳市驰普科达科技有限公司 Shenzhen CTECHI Technology Co., Ltd.
深圳市南山区南山大道 1088 号南园枫叶大厦 7L　7L, Maple Plaza, #1088, Nanshan Avenue, Nanshan District, Shenzhen, PRC
深圳市宝安区燕罗街道燕川社区红湖东路西侧嘉达工业园 5 栋 6-8 楼　Floor 6-8, Building, 5, Jiada Industrial Park, Honghu East Road, Yanchuan Community, Yanluo Street, Baoan District, Shenzhen City，PRC
全国客服热线：400-90-18650　Oversea Call：+86 755-8258-1455
网址/Web：www.ctechibattery.com/　www.ctechigroup.com/　www.ctechigroup.cn/　www.szcpkd.com/

Lithium Ion Battery Specification

Model: CT_ NH-33138-HE_14.5Ah_LFP

Prepare	Lang Qi	Customer Approval	
Check	Peng Zheng	Signature/Date	
Approve	Shisen Wen	Company Name	
Date	2021.1.6	Signatory's Title	
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Revision History

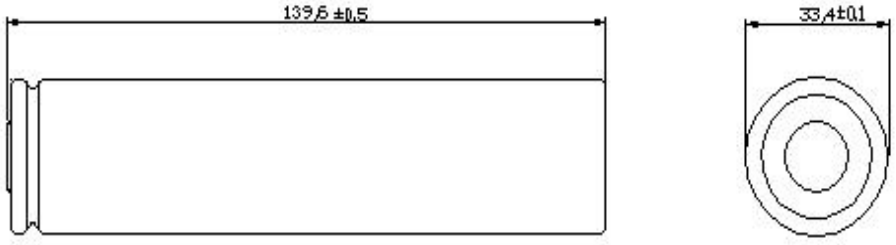
Version	Revision page	Revision description	Date	Prepare
A0	—	First edition	2020.10.26	Kaixin Yang
A1	1,2,3	Upgraded edition	2021.1.6	Lang Qi

CONTENS

1. General

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

2. Dimension



Note: Unit: mm

3. Product Specification

No.	Item	Standard	Remark
3.1	Nominal capacity	14.5Ah	25±3℃, 0.5C
3.2	Internal impedance	≤3.0mΩ	25±3℃, AC1000Hz
3.3	Nominal voltage	3.2V	
3.4	Weight	292±10 g	
3.5	Voltage range	2.50～3.65V	
3.6	Recommended charge current	0.5C	
3.7	Recommended discharge current	0.5C	
3.8	Max continuous charge current	1.0C	
3.9	Max continuous discharge current	1.0C	
3.10	Max interval discharge current	2.0C	25±3℃，interval，SOC>30%
3.11	Max pulse discharge current	4.0C	25±3℃，＜5s，SOC>30%

3.12	Cycle life	1500 cycles capacity retention≥80%	25±3℃, 0.5C, 100% DOD
3.13	Charging temperature	0～50℃	If the core temperature exceeds the charging temperature range, stop charging
3.14	Discharging temperature	-20～60℃	If the core temperature exceeds the discharge temperature range, stop the discharge
3.15	Storage temperature	-10～35℃	
3.16	Appearance	No break, scratch, distortion, contamination, leakage.	

4. Test Conditions

4.1 Standard Test Conditions

All tests defined in this Product Specification are conducted at temperature 25±3℃, humidity 15%～90%RH, atmospheric pressure 86～106kPa. Unless there are other special instructions, all performance was tested with unused cells within 1month after production date.

4.2 Standard Charge and Discharge Method

The "Standard Charge" means in an ambient temperature of 25±3℃, the cell was discharged with 0.5C constant current to cut-off voltage 2.5V, standing 30min. 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 30min.

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 0.5C constant current. Remove the cell and stand for 4h at an ambient	1. Capacity ≥95%C_0. 2. No deformation, No crack.

		temperature of 25 ± 3 ℃ .After that, check its appearance.	
5.2	Low Temperature Discharge Performance	The cell was charged in accordance with 4.2, and stored in an ambient temperature of -10±2℃ for 4h, then discharged to 1.8V with 0.5C constant current. After that, check its appearance.	1. Capacity ≥60%C_0. 2. No deformation, No crack.
5.3	Rate Discharge Performance	The cell was charged in accordance with 4.2, then discharge to 2.5V with 1C current in an ambient temperature of 25±3℃.	Capacity≥95%C_0
5.4	Retention capacity and recovery capacity	The cell was charged in accordance with 4.2, and stored in an ambient temperature of 25±3℃ for 28 days, and then discharged to 2.5V with 1C constant current (retention capacity).	1. Retention Capacity ≥97%C_0. 2. No deformation, No crack.
5.5	Cycle Life（25±3℃）	The cell was charged to 3.65V with 0.5C CC/CV cut off 0.05C, stayed for 30min. Subsequently, the cell was discharged to 2.5V with constant current 0.5C, and stayed for 30min. Prior to next charge-discharge cycle. Record all the cycles until the discharge capacity＜80%C_0.	≥1500cycles

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 20±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 5.5V, 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 is placed on the crush machine, the axis is parallel to the crush equipment, and it is crushed between two flat surfaces till the crushing force is gradually approaching 200 kN, or voltage reaches 0V,or reaches 30% distortion, then observe for 1h.	No fire, no explosion
6.5	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
6.6	Low-pressure Test	The cell was charged in accordance with 4.2, then stored for 6h at a vacuum of 11.6KPa, then check the cell's appearance.	No fire, no explosion, no leakage

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.

8. Warranty

(1) In this specification, quality assurance protocol is the main quality assurance protocol if it conflicts with the quality assurance protocol.

(2) If customers due to abuse or misuse, Shenzhen CTECHI Technology Co., Ltd will not be free replacement.

(3) Shenzhen CTECHI Technology Co., Ltd will not undertake any responsibility for breach

of safety operation problems.

(4) Shenzhen CTECHI Technology Co., Ltd shall be exempt from warranty for fault cells come from by matching electric circuit connection, other battery packs and charger.

(5) It's out of guarantee service by Shenzhen CTECHI Technology Co., Ltd after customer assemble the cell (if the cell is bad in the process of assembly).

(6) This specification was developed after consultation between the parties. For projects not included in this specification, Shenzhen CTECHI Technology Co., Ltd does not undertake quality assurance.

9. Precautions and Safety Instructions

Abusive use of (lithium-ion) LiFePO4 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

(1) Do not expose the cell to extreme heat or flame.
(2) Do not short circuit, over-charge or over-discharge the cell.
(3) Do not subject the cell to strong mechanical shocks.
(4) Do not immerse the cell in water, or get it wet.
(5) Do not disassemble or modify the cell.
(6) Do not handle or store with metal objects like necklaces, coins or hairpins, etc.
(7) Do not use the cell with conspicuous damage or deformation.
(8) Do not connect cell to the plug socket.
(9) Do not touch a leaked cell directly.
(10) Do not mix the new and old Lithium-ion cell and use together.
(11) Do not expose the cell to blazing sun (or in heated car by sunshine).
(12) Keep cell away from children and pet.
(13) Do not nail into the cell, strike it by hammer or tread it.
(14) Do not impact or throw the cell.
(15) Do not direct contact the cell positive and negative electrode with aluminum case.

9.2 Cell Operation Instructions

9.2.1 Charging

(1) Charge the cell in a temperature range of 0°C to 50°C.

(2) 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. Over 1C Charge rate is not allowed. (C: Rated Capacity of cell)

(3) Use a matched or recommend (CC/CV) lithium-ion (Li+) battery charger.

9.2.2 Discharging

(1) Recommended cut-off voltage is 2.5V. Recommended max continuous discharge current is 1C.

(2) For maximum performance, the cell should be discharged in a temperature range of -20°C to 60°C.

9.2.3 Storage Recommendations

(1) 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.

(2) Charge and discharge the every 3months is recommended, charge and discharge the cell every 6months is obligatory. Charge and discharge steps as bellow:

In temperature of 25±3℃, 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 to 2.5V, stay for 30min , 0.5C charge for 30%SOC.

(3) To protect the cell, good storage environment is necessary.

Note:

(1) The customer is required to contact Shenzhen CTECHI Technology Co., Ltd in advance, if and when the customer needs other applications or operating conditions beyond those described in this document.

(2) Shenzhen CTECHI Technology 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 CTECHI Technology 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.