Lithium-ion Rechargeable Battery Specifications

High Energy and Power Cylindrical Battery

VTC18650WT-2S1P 7.4V 2900mAh

Prepared by:	Discussion	Checked by:	Approved by:
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1. Scope

This specification describes the technological parameters and testing standards for the lithium-ion rechargeable cells, VTC18650 series, manufactured and supplied by VTC Power Co., Ltd. This specification mainly refer to GB 31241-2022

2. Products Specified

2.1 Type: Cylindrical Lithium Ion Rechargeable Battery

2.2 Name：VTC18650WT-2S1P 7.4V 2900mAh

3. Basic Characteristics

3.1 Capacity	Nominal Capacity：2900mAh (discharge with 0.58A to 5.5V） Minimum Capacity：2800mAh (discharge with 0.58A to 5.5V）	
3.2 Nominal Voltage	7.4V	
3.3 Internal Impedance	≤180mΩ	
3.4 Standard Charge	Constant current 0.2C(0.58A)	
	Constant voltage 8.4V	
	End condition(Cut off) 58mA	
3.5 Max. Charge Voltage	8.4V	
3.6 Rapid Charge Current	1C(2.9A)	
3.7 Standard Discharge	Constant current 0.2C(0.58A)	
	End voltage(Cut off) 5.5V	
3.8 Max. Discharge Current	1C(2.9A)	
3.9 Weight	100g	
3.10 Max. Dimension	20.0*37.5*68.0mm	
3.11 Operating Temperature (Charge)	Temperature	Max. Charge Current
	-20℃≤ T ≤ 0℃	0.1C
	0℃<T ≤ 15℃	0.2C
	15℃<T ≤ 35℃	1.0C
	35℃<T ≤ 60 ℃	0.5C
3.12 Operating Temperature (Discharge)	Temperature	Max. Discharge Current
	-40℃≤ T ≤-20℃	0.1C
	-20℃ <T ≤ 0℃	0.2C
	0℃<T ≤ 15℃	0.5C
	15℃< T ≤ 60℃	1C
	60℃<T ≤ 85℃	0.5C
3.13 Storage Temperature	Within one month: -20~ 50℃	
	Within six months: -20 ~ 45℃	
	Within one year: -20~ 25℃	
3.14 Overheat protection	70℃(The cells must stop discharging when surface temperature exceeds 70℃)	

4. Standard Conditions for Test

All the tests need to be done within one month after the delivery date under the following conditions: Ambient Temperature:25±2℃; Relative Humidity:≤75%

4.1 Standard Charge	Charge with constant current 0.2C and Constant Voltage (CC/CV) 8.4V, cut -off at the current of 0.01C.
4.2 Standard Discharge	Discharge with constant current 0.2Cand cut-off at the voltage of 5.5V

5. Characteristics

5.1 Electrical Characteristics

Items	Test Procedure	Requirement	
5.1.1 Nominal Voltage	The average value of working voltage during discharge with the current of 0.2C after charged under the condition of 4.1.	8.4V	
5.1.2 Discharge Character	Discharge with the current of 0.2C and cut-off at 5.5V after charged under the condition of 4.1	≥2800mAh	
5.1.3 Cycle Life	At the ambient temperature of 25±2℃, charge with constant current 0.2C and constant voltage (CC/CV) 8.4V, cut-off at current 0.01C. Rest 10 minutes. Discharge with 0.2C and cut-off at 5.5V. Rest 20 minutes. This is a cycle life. If discharge capacity is lower than 70% of the first cycle twice in series, cycle life testis over.	≥500 Cycles(70%)	
	At the ambient temperature of 25±2℃, charge with constant current 0.5C and constant voltage (CC/CV) 8.4V, cut-off at current 0.01C. Rest 10 minutes. Discharge with 0.5C and cut-off at 5.5V. Rest 30 minutes. This is a cycle life. If discharge capacity is lower than 80% of the first cycle twice in series, cycle life test is over.	≥300 Cycles(80%)	
5.1.4 Rate Character (cells)	Fully charge the cells under the condition of 4.1. Discharge the cells with constant current 0.2C and cut-off at 5.5V. Record this capacity as a standard. At the ambient temperature of 25±2℃, fully charge under the condition of 4.1. Rest 10 minutes. Discharge the cells with different constant current and cut-off at 5.5V. Calculate the ration of above capacity to the standard capacity.	0.2C/0.2C	=100%
		0.5C/0.2C	≥94%
		1.0C/0.2C	≥90%

5.1.5 Temperature Dependency of Capacity	Cells shall be charged per 4.1.at 25℃±2℃ and discharged per 4.2 at the following temperatures.	-10℃	≥70%
		0℃	≥80%
		25℃	≥100%
		50℃	≥95%
5.1.6 Charge Retain at Room temperatures	Charge the cells under the condition of 4.1. Store 28 days at the ambient temperature of 25±2℃. Discharge with 0.2C to 5.5V and calculate capacity retention (compare to the standard capacity in 4.2).Charge the cells under the condition of 4.1 and discharge with 0.2C to5.5V .Calculate capacity recovery (compare to the standard capacity in 4.2).	Retention ration≥90% Recovery ration ≥95%	
5.1.7 Charge Retain at High temperatures	Charge the cells under the condition of 4.1. Store 28 days at the ambient temperature of 45±2℃. Discharge with 0.2C to 5.5V and calculation capacity retention(compare to the standard capacity in 4.2). Charge the cells under the condition of 4.1 and discharge with 0.2C to 5.5V .Calculate capacity recovery (compare to the standard capacity in 4.2).	Retention ration≥85% Recovery ration ≥90%	

5.2 Electrical tests

5.2.1 Short Circuit (GB 31241:2014)	After fully charged under the condition of 4.1, cells is to be short-circuited by connecting positive and negative terminals with a circuit load having a resistance of 80±20mΩ at 20±5℃. The temperature of the case should be measured during the test. The cells should remain on test for 24 hours or until the temperature of the case declined by 20% of the maximum temperature.	No fire , no explosion and the maximum temperature of the surface should be lower than 150℃
5.2.2 Over charge (GB 31241:2014)	After fully discharged under the condition of 4.2 , the cells is subjected to a charging process to 4.6 V. The charging current should be the greater between the 3C and three times of the charging current recommended by the manufacturer. During the test, the temperature should be measured on the case. The test should be continued until the charging time reaches 7 hours or the temperature of the case declines by 20% of the maximum temperature.	No fire, no explosion
5.2.3 Forced-Discharge (GB 31241:2014)	After fully discharged under the condition of 4.2 , the cells is subjected a forced discharge at the current of 1C. The total duration for the test is 90min.	No fire, no explosion

5.3 Mechanical tests

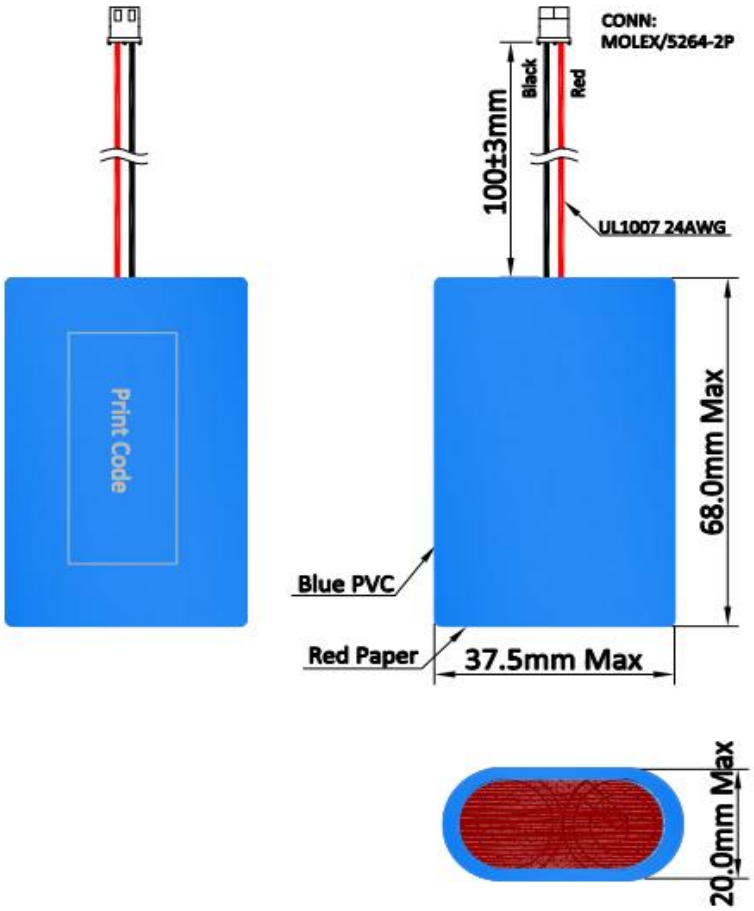
5.3.1 Vibration (GB 31241:2014)	After fully charged under the condition of 4.1, cells are firmly secured to the platform of the vibration machine. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200Hz. This cycle shall be repeated 12 times for a total of 3 hours for each of two mutually perpendicular mounting positions of the cells. One of the directions of vibration must be perpendicular to the terminal face.	No fire, no explosion, and no leakage.
5.3.2 Drop (GB 31241:2014)	After fully charged under the condition of 4.1, the cells should be dropped from a height of 1m onto a flat concrete floor. Each cells should be dropped four times. The positive and negative electrode side should be dropped once respectively and the cylindrical surface be dropped twice.	No fire, no explosion.
5.3.3 Crush (GB31241:2014)	After fully charged under the condition of 4.1, cells should be placed between two flat surfaces of the crushing apparatus, with its longitudinal axis parallel to the flat surfaces. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until the applied force 13KN± 0.78KN is reached. Once the maximum force has been obtained it is released. Each cells should be tested just once.	No fire, no explosion

5.4 Environmental tests

5.4.1 Temperature Cycling (GB31241:2014)	After fully charged under the condition of 4.1, cells are to be stored at 72 ± 2 ℃ for at least 6 hours, then followed by storage at -40 ± 2 ℃ for at least 6 hours. The maximum time interval between two test temperature is 30 minutes. The procedure is to be repeated for 10 times. Then all tested cells should be stored at ambient temperature(20± 5 ℃） for 24 hours.	No fire, no explosion and no leakage
5.4.2 Low Pressure (GB31241:2014)	After fully charged under the condition of 4.1, cells are stored at an absolute pressure of 11.6kPa (1.68 psi) and a temperature of 20 5°C for 6 hours, which is followed by 1 hour's observation.	No fire, no explosion and no leakage
5.4.3 Thermal abuse (GB31241:2014)	After fully charged under the condition of 4.1, cells are placed in a gravity or circulating air convection oven, in an ambient temperature of 20±5 ℃. Then the oven temperature is raised at a rate of 5±2 ℃/min to the test temperature 130±2 ℃. Cells should be remained at 130±2 ℃ for 30 minutes before the test ends.	No fire, No explosion.

6. Finished product Assembly

6.1 Outline dimensions



Print Code:

VTCBATT 18650WT-2S1P

7.4V 2900mAh 21.46Wh 2606

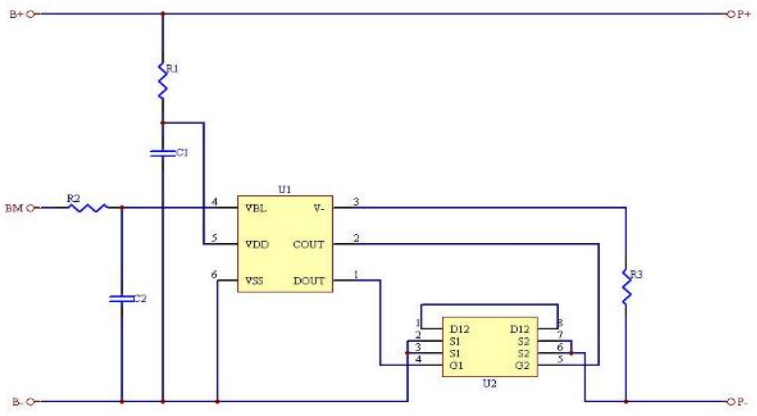
6.2 Electrical Characteristics

Item	Symbol	Content	Criterion
Over Charge Protection	V_{DET1}	Over charge detection voltage	4.300±0.025V
	tCU	Over charge detection delay time	0.50~1.50s
	V_{REL1}	Over charge release voltage	4.100±0.050V
Over Discharge Protection	V_{DET2}	Over discharge detection voltage	2.40±0.080V
	tDL	Over discharge detection delay time	50ms~150ms
	V_{REL2}	Over discharge release voltage	3.00±0.100V
Over Current Protection	V_{DET3}	Over current detection voltage	0.200±0.015V
	I_{DP}	Over current detection current	4.5±1.5A
	tIOV1	Over current detection delay time	5.0ms~15ms
		Release condition	Cut load
Short Protection		Detection Condition	Exterior short circuit
		Release condition	Cut short circuit
	tIOV2	Shot circuit detection delay time	100-600uS
Interior Resistance	R_{DS}	Main loop electrify resistance	VC=8.4V,R_{DS}≤50mΩ
Balance of cell	Vb	Balance voltage of cell	/
	Ib	Balance current of cell	/
Current Consumption	I_{DD}	Current consume in normal operation	3.5μA Type 8μA Max

6.3 BOM of PCBA

No.	Location	Part name	Specification	Package	Q'ty	Remark
1	U1	Protection IC	S-8252AAC-M6TIU	SOT-23-6	1	SEIKO
2	U2	MOSFET	DP8205	TSSOP-8	1	DP
3	R1,R2	Resistor	SMD 470Ω±5%	0603	2	
4	R3	Resistor	SMD 2KΩ±5%	0603	1	
5	C1,C2	Capacitor	SMD 0.1uF/16V	0603	2	
6	PCB	PCB	FR-4	-	1	

6.4 Application Circuit



7. Caution

Please read this specification carefully before testing or using the cells since improper handling of a Li-ion cells may lead to loss of efficiency, heating, ignition, electrolyte leakage and explosion.

7.1 Caution in use :

7.1.1Abnormal operating conditions such as overcharge (voltage > 4.25V/CELL), over discharge (voltage<5.5V/CELL) and over current charge-discharge (maximum current allowed at current temperature) cannot occur during the operation of the cells. It is strictly prohibited to use the cells in the environment which is easy to generate static electricity and poor sealing (water and dust entering).

7.1.2 More than 0.5c current charging, use in high-temperature/low-temperature environment, use in vibration environment, not match well cells and use in humid environment will reduce the cycle life of the cells.

7.1.3 The battery shall not be used in the environment of high frequency microwave and ultrasonic wave. When the battery is used in multiple S and P module, it is recommended to coat the electromagnetic insulation cover of high-voltage wire to prevent the electromagnetic wave from damaging adjacent devices and human body.

7.1.4 There should be no overlapping or contact between the positive and negative terminal wires of the battery to reduce the risk of short circuit.

7.1.5 The battery shall be designed for charging and discharging in strict accordance with the current specification to ensure the battery's cycle life and safety.

7.1.6 When the battery is assembled module for use, the cells with the same capacity, internal resistance position, same batch and same charged state shall be used. The standard of the battery should be strictly in accordance with the technical agreement. The working process of the battery module, the battery pack inside temperature difference should be less than5℃.

7.1.7 Do not charge the cells when cells temperature less than 0℃, please standby before charging when cells exposure at under-zero environment. Time standby as follows:

Outside Temperature	-5℃≤ T ≤0℃	-10℃≤ T ≤-5℃	-15℃≤ T ≤-10℃	-20℃≤ T ≤-15℃
Time	2h	5h	8h	10h

7.2 Safety Caution

7.2.1 The cells should be placed away from the babes. If there is any deglutition、 scald or explosion caught by babes， please go to the hospital immediately.

7.2.2 When testing the cells by charging or discharging, please use professional test equipment specially designed for Li-ion batteries. Do not use ordinary constant current or constant voltage (CC/CV) power supplies. These do not protect the cells from being overcharged and over-discharged, and may lead to possible loss of efficiency or danger.

7.2.3 When charging or discharging, or assembling, reversing the positive and negative terminals would lead to overcharge and over-discharge of the cells(s). This could lead to serious loss of efficiency and even explosions.

7.2.4 Do not solder the cells directly. Do not resolve the cells.

7.2.5 Do not put the cells(s) in pockets or bags with metal products, such as necklaces, hairpins, coins, screws, etc. Neither storing them without proper isolation. Do not connect the positive and negative electrodes directly with conductive materials. This could lead to a short-circuit of the cells.

7.2.6 Do not hammer, throw or trample the cells. Do not put the cells into washing machines or high-pressure containers.

7.2.7 Keep the cells away from heat sources, such as fires, heaters, etc. Do not use or store cells(s) at locations where the temperature could exceed 60℃, such as in direct sun lights. This may lead to the generation of excessive heat, ignition and lose of efficiency.

7.2.8 Do not get the cells wet or throw them into water. When not in use, place the cells in a dry environment at low temperatures.

7.2.9 When in use, testing or storing, if the cells become hot, distributing a smell, changing color, deformation or showing any other abnormalities, please stop using or testing immediately. Attempt to isolate the cells and keep it away from other cells.

7.2.10 Should electrolyte get into the eyes,do not rub the eyes.Rinse the eyes with clean water and seek medical attention if problems remain. If electrolyte gets onto the skin or clothing, wash with clean water immediately.

8. Packing

Batteries are at half-charged state when packed. The surface of the packing boxes contain the following information: name, type, nominal voltage, quantity, gross weight, date, capacity and impedance.

9. Transportation

During transportation, do not subject the cells(s) or the box (es) to violent shaking, bumps, rain or direct sun lights. Keep the cells(s) at half-charged state.

10. Long-term Storage

When delivery, cells will be charged to the voltage of 3.45V~3.7V. Long-term storage at more than 80% SOC will lead to capacity loss and cycle life loss, please keep cells in use when cells capacity more the 80%.

If Cells are delivered at ≤20% SOC, cells may be capacity empty due to the self-discharge. Do not use or storage the cells when voltage less than 2.5V/CELL.

11. The warranty period of this product is 12 months from the date of delivery from the factory.

12. Warranty will be void if the cells are used outside these specifications.

13. The information in this specification is subject to change without prior notice.

14.For those applications not described here, please consult VTC Power Co., Ltd

Data Sheet Modified List

Revision	Modified content	Mark	Date	Approved by
1.0	The first release		2026.6.23	Youman Zhao