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Technical Specification for LiNiCoMn2O4 Cell

Name of products: LiNiCoMnO2 Single Cell

Model : 18650S

Specification : 2Ah/3.6V

Address : No. 59, Road Taoyuan, Tian He District, Guangzhou, Guangdong, China

Design	Check	Audit
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1、Range of application

This Specification is applied to the LiNiCoMnO2 battery which is manufactured by Freego Power Co., Ltd.

2、kinds of models

2.1 kind：Cylindrical LiNiCoMnO2 Cell

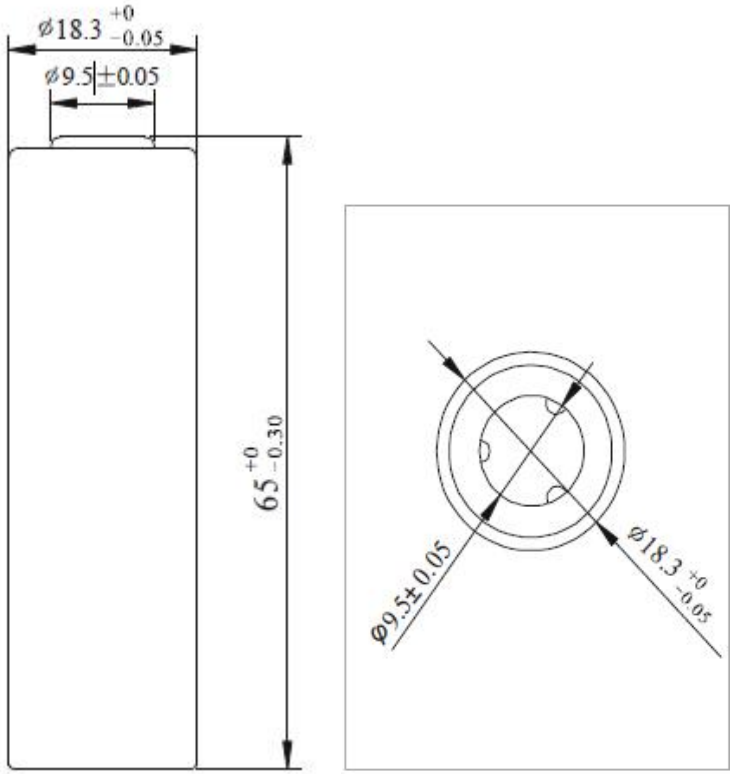
2.2 model：18650C1

3、technoolgy parameter

No.	Item		specification
3-1	normal capacity		2000mAh (0.5c)
3-2	normal voltage		3.6V
3-3	Inter impedance		≤40mΩ
3-4	Maximum Charge Current		2A
3-5	Maximum Charge Voltage		4.2±0.05V
3-6	Max Discharge Current		8A
3-7	discharge stop voltage		3.0V
3-8	dimension	diameter	18.3mm
		height	65mm
3-9	weight		Appro. 42g
3-10	Work temperature	charge	0~45℃
		discharge	-10~60℃
3-11	Store temperture	In one month	-20~45℃
		In sit month	-10~35℃

*The battery need to be in the condition of half full charge or the voltage about 3.6-3.7V

3.12. dimension:



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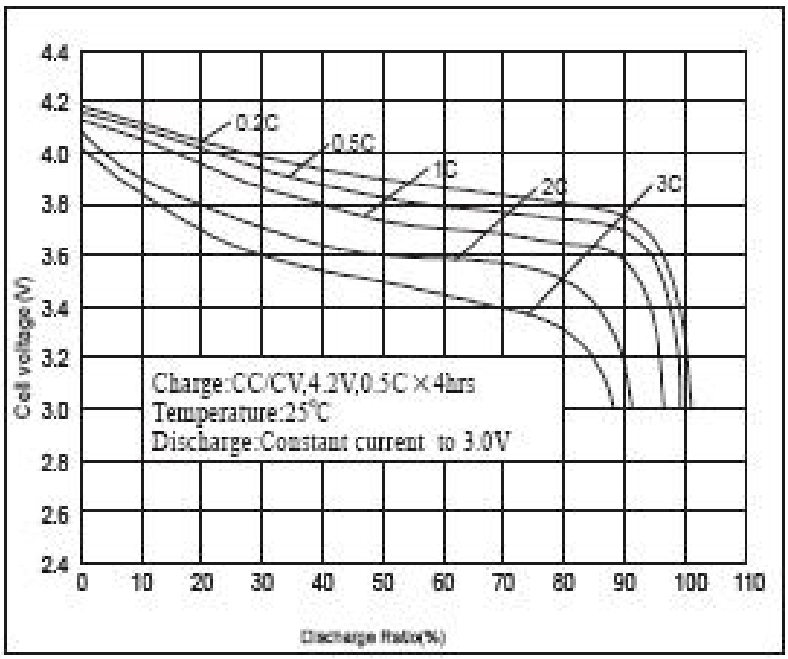
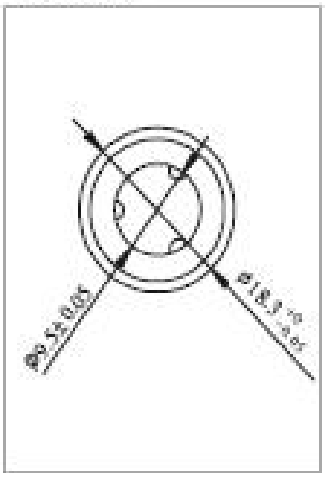
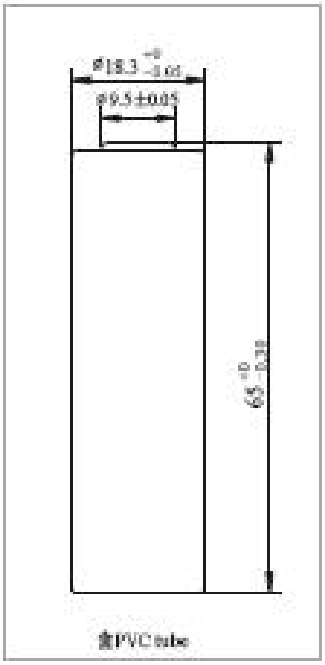
3.13 curve

Discharge characteristics

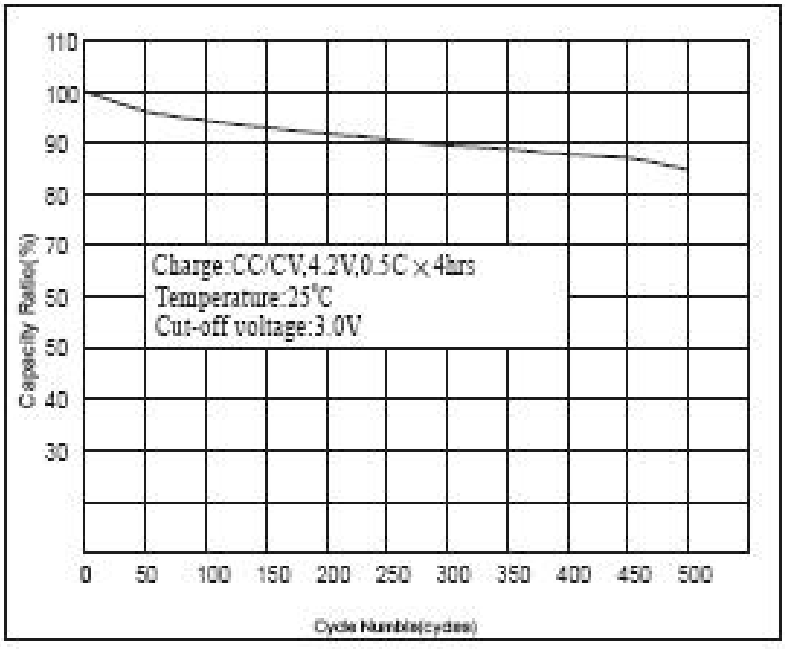


Dimensions





Cycle Characteristics



Standard test conditions

Measurements are carried out at 20±5℃ and relative humidity of 65±20%. Accuracy of voltmeters and ammeters used in test is equal to or better than the grade 0.5

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4. Test conditions

4.1 experiment and test should at the normal temperature (20±5℃) or the normal humidity (65±20%).
Normal charge: adopt to constant current then constant voltage: constant current is 0.5C(2000mA), constant voltage is 4.2V, charge is stopped when the current low to 200mA during constant voltage process.
Normal discharge: discharge with constant current 2000mA and discharge to 3.0V.

4.2 **the equipments of Test**

Voltmeter Impedance >1000Ω/one
Ammeter total resistance (ammeter and line) <0.01Ω
Vernier caliper precision 0.02mm

5. Li-ion Battery Characteristics

Test item	Test conditions	Requirements
(1)Outside Appearance	Visual check	No abnormal stain, Deformation nor damage
(2) starting voltage	Starting voltage in an hour After the normal charge	≥3.6V
(3) Standard charge	Battery shall be charged continuously at the constant current of 0.5C5mA to 4.2V, then charge at the constant voltage of 4.2V until the end current of 0.01C5mA	
(4)Standard discharge	Battery shall be discharged continuously at the constant current of 0.5C5mA to 3.0V	
(5)Rated Capacity	Battery shall be charged in Item (3) and discharged in Item (4) within 10 minutes after full charged. If the discharge capacity does not reach the specified value, the test may be repeated up to three times in total.	Capacity≥2000mAh
(6)Cycle Life(20℃)	Battery shall be charged continuously at the constant current of 0.5C5mA to 4.2V then charge at the constant voltage of 4.2V until the current of 200mA and discharged continuously at the constant current of 0.5C5mA to 3.0V. A cycles defined as one charge and discharge, carry out cycles until discharge capacity <80% C5mAh.	≥800cycles
(7)High temperature discharge	Battery shall be charged in Item (3) and discharged at the constant current of 1.0C5mA to 3.0V within 10 minutes after full charged. If the discharge capacity does not reach the specified value, the test may be repeated up to three times in total.	Capacity≥1975mAh
(8)Low temperature discharge	Battery shall be stored under -10℃±2℃ for 4h after charged in Item (3), then discharged at constant current of 0.5C5mA to 3.0V	Capacity≥1500mAh

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(9)Drop Test	Drop 100% charged test sample from 1 meter above onto concrete board with more than 18mm thickness two times each for every direction after rated charge. After test , cells are discharge at constant current of 0.5 C_5mA	No rupture, fire, smoke, Nor critical damage≧90% C_5mAh
(10)Vibration Test	Vibrate test sample for 90minutes per each of the three mutually perpendicular axis(x,y,z)after rated charge. Amplitude: 0.38mm(10-30Hz) ; 0.19mm (30-55Hz) Frequency: 10-55Hz(1oct/min)Direction: X, Y,Z.	No rupture, fire, smoke, Nor critical damage ≧90% C_5mAh
(11)Hot Oven Test	The charged batteries are to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5±2℃ per minute. The oven is to remain for 30 minutes at 130±2℃ before the test is discontinued.	No fire, Nor explosion
(12)Over charge	Battery should be tested at 20±5℃,Battery shall be discharged at 3C5mA current until end voltage. then connect cathode on DC power, adjust the output current to 15I5A , output voltage shouldn't lower than 10V .charging is continued for 7 hours or voltage will not improve and the current will reached 0.	No fire, Nor explosion
(13)Over discharge	Battery is tested at 20±5℃, Battery discharged continuously with I5A to end voltage.then Reverse charge 90 min. with 5I5A.	No fire, Nor explosion
(14)Short Circuit Test	Battery shall be charged in item(3),Connect battery terminals with electric wire(electric resistance: 50mΩ or less),short circuit , when the temperature will be lower than 10, the test will be end.	No fire, Nor explosion
(16)Storage characteristics	Battery shall be charged in Item (3) ,and stored in a temperature-controlled environment at 20±5℃ for 30 days. After storage, Battery shall be discharged in Item (4) to obtain the remaining capacity.	Remaining capacity ≥ 90%C_5mAh

6. Remark

6.1 please don't let the battery near to hot, fire etc.

6.2 please use special charger.

6.3 polarity is not reversed.

6.4 The battery has the safe equipment, please don't dissect the battery or change the structure of battery for your safe.

6.5 Ban to connect directly anode and cathode of battery with the metal.

6.6 Ban to beat or throw the battery.

6.7 Battery should keep it in the dry and cool place. ban to put the battery into the water

6.8 Charging before using if the battery haven't be used in 6 month.

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7. Quality guarantee period

7.1 quality guarantee period: 1 years from the date of original shipment.

7.2 our company has no responsibility, if using the battery without regulation ways,

5. transport

battery should be avoid to Vibration , impact , exposed to the sun and rain. And battery is half-full capacity on passage.