

SPECIFICATION APPROVAL SHEET

XCell Akku 21700-4000 protected, Pluskopf

1. Scope

This document describes the product specifications for the rechargeable lithium battery cell.

2. Performance

Issued by national standard of the People's Republic of China 'GB31241-2014' Lithium ion cells and batteries used in portable electronic equipment safety requirements.

3. Battery Dimension and showing information

T Max 21.7 mm
W Max 43 mm
L Max 75.5 mm
FSJ-1S-R20-2
21700-4000mAh



4. Product Specification

NO.	Description	Specification	Remark
4.1	Typical Capacity	4000mAh	From 4.2V to 2.4V by discharge current 0.2C.
4.2	Minimum Capacity	3900mAh	
4.3	Weight	Approx: 142g	No Fire, No explosion
4.4	Shipment voltage	≥3.7V	No mass loss, No leakage, No short-circuit, No rupture, No explosion and No fire
4.5	Inner Impedance	≤70mΩ	No Fire, No explosion Surface temperature does not exceed 150
4.6	Nominal Voltage	3.7V	Measure Battery at standard testing condition.
4.7	FC Fully charge voltage(FC)	4.2V	
4.8	FD Fully discharge voltage(FD)	2.4V	
4.9	Charge Upper Limit Voltage		Ref 7.1
4.10	Discharge Lower Limit Voltage		Ref 7.1
4.11	Standard Charge Method	0.2C CC (constant current) charge to FC Voltage, then CV (constant voltage) charge till charge current decline to 0.01C	CC/CV
4.12	Standard Discharge Method	Using 0.2C constant current discharge to FD Voltage	
4.13	Max. Charge Current	0.5C	
4.14	Max. Discharge Current	10A	
4.15	Charge temperature	0°C ~ 45°C	
4.16	Discharge temperature	-10°C ~ 60°C	
4.17	Cosmetic Appearance	No gas, No rupture, No leakage.	
4.18	Storage Environment	≤1 month: -20°C ~ 60°C	Recommended storage temperature is 25±2°C of half charge state .
		≤3 months: -20°C ~ 45°C	
		≤1 year: -20°C ~ 30°C	
4.19	Standard testing condition	(Temperature)	25±2°C
		(humidity)	≤85% RH
		(Atmospheric Pressure)	86~106 kPa

5. Electrical Performance

NO.	Item	Testing Method	Requirements
5.1	Discharging Capacity	At 4.19 condition, after standard charging, rest for 10min, then discharge at 0.2C, 0.5C to voltage FD Voltage, record the discharge time.	0.2C: ≥300min (100%) 0.5C: ≥114min (95%) 1.0C: ≥54min (90%)
5.2	Cycle life	At 4.19 condition, constant current 0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.01C, rest for 10min, constant current 1C discharge to FD voltage, rest for 10min. Repeat above steps till continuously discharge capacity higher than 80% of the initial capacity of the battery.	≥500times
5.3	Temperature Characteristics	At standard testing condition, after standard charging, Stored the recharged battery for 3hrs at 60 ± 2°C, 25±2°C, 0 ± 2°C or -10°C, and discharged at 0.2C to FD Voltage at the same temp., record the discharge time.	
		Discharge Temperature -10°C / 0°C / 25°C / 60°C	
		Discharge Capacity (0.2 C) 60% / 70% / 100% / 95%	
5.4	Capability of keeping electricity	At standard testing condition, after standard charging, no outer loading circuit, store the battery 28days, discharge at 0.2C to FD voltage, record the discharge time.	≥240min

6. Safety Performance

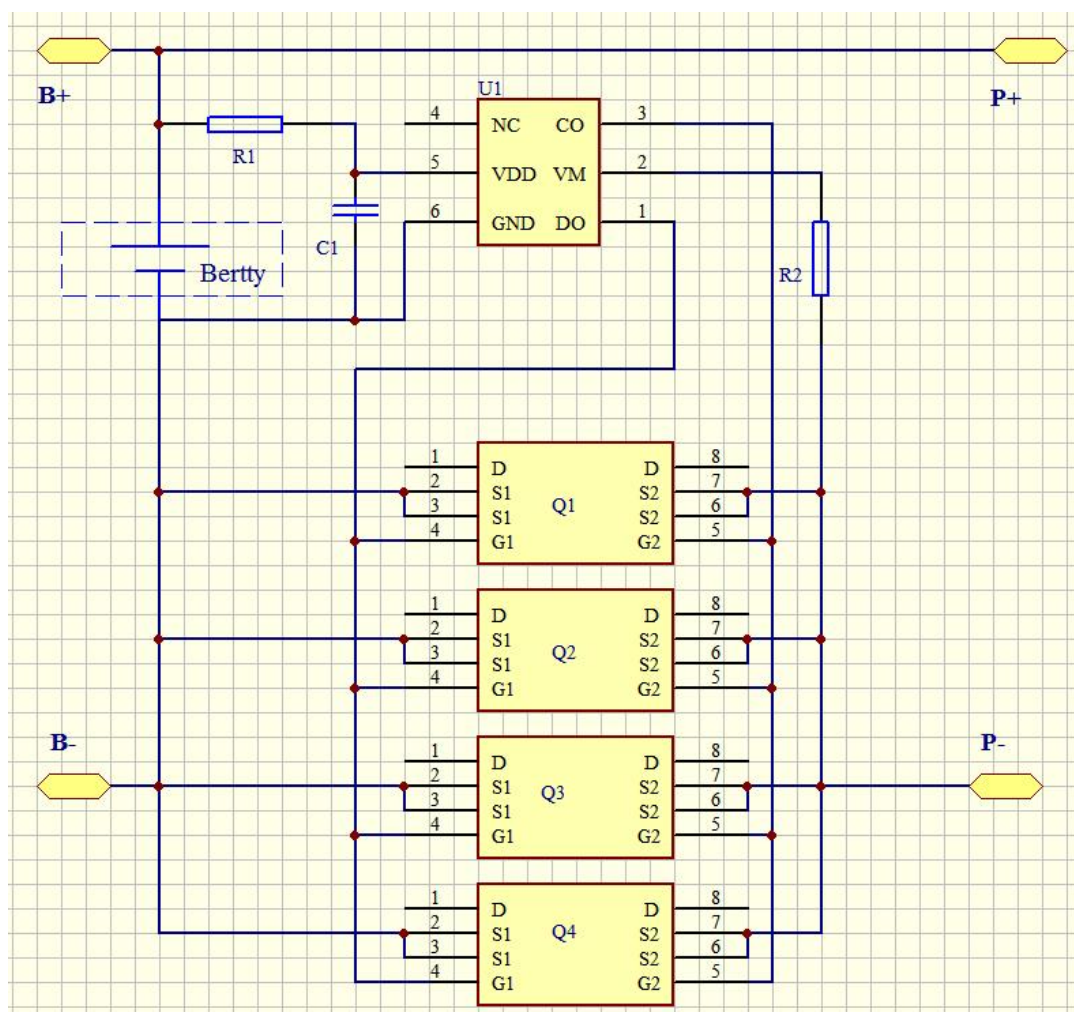
NO.	Item	Testing Method	Requirements
6.1	Overcharge Test (No PCM)	At standard testing condition, The cell is overcharged to 4.6V With a current of 3C and hold for 7 hours or the cell surface temperature reduce 20% than the maximum temperature.	No fire, No explosion
6.2	Short-Circuit Test (No PCM)	At standard testing condition, After full charge, the positive and negative polarities are connected together by a copper wire whose resistance is 60±20mΩ, hold for 24 hours or the cell surface temperature reduce 20% than the maximum temperature.	No fire, No explosion
6.3	Heating Test	At standard testing condition, after standard charging, Put the cells in the oven, the temperature of the oven is to be raised at 5±2°C per minute to a temperature of 130 ±2°C and remain for 10 minutes.	No fire, No explosion
6.4	Drop Test	Drop the battery in the shipment condition from 1 m height onto 18~20mm thick hard board on it 3 times each of X, Y and Z directions at 25±3°C	No fire, No explosion
6.5	Vibration test	After Standard Charging, fixed the cell to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes Frequency rate :1 oct/min Vibration frequency :10Hz-30Hz Excursion(single amplitude):0.38mm Vibration frequency:30Hz-55Hz Excursion(single amplitude):0.19mm	No fire, No explosion
6.6	Crush Test	At standard testing condition, after standard charging, Then the cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells' wide sides and the crushing is to be continued until an applied force of 13±1kN (3000 ±224 lbs) is reached. Once the maximum force has been obtained it is to be released, then rest for 1 hrs at 25±3°C.	No fire, No explosion

7. PCM Specification and Characteristics

7.1 PCM Electrical Characteristics

Item	Symbol	Content	Criterion
Over charge Protection	VDET1	Over charge detection voltage	4.28±0.05V
	tVDET1	Over charge detection delay time	160ms max
	VREL1	Over charge release voltage	4.08±0.05V
Over discharge protection	VDET2	Over discharge detection voltage	2.5±0.1V
	tVDET2	Over discharge detection delay time	80ms max
	VREL2	Over discharge release voltage	3±0.1V
	IDP	Over current detection current	8.5-13A
	tVDET3	Detection delay time	10ms max
		Release condition	Cut load
Short protection		Detection condition	Exterior short circuit
	TSHORT	Detection delay time	600uS max
		Release condition	Cut short circuit
Interior resistance	RDS	Main loop electrify resistance	VC=4.2V,RDS≤65mΩ
Current consumption	IDD	Current consume in normal operation	6μA Max

7.2 PCM Schematic Diagram



7.3 Billof PCM

序号	物料名称	物料代号	物料规格	用量	厂商/备注
1	贴片电阻	R1	100Ω / ± 5% / 0603 / 环保	1	国巨 / 华新科
2	贴片电阻	R2	1KΩ / ± 5% / 0603 / 环保	1	国巨 / 华新科
3	贴片电容	C1	0.1uF / 50V / Y5V ± 10% / 0603 / 环保	1	国巨 / 华新科
4	IC	U1	FHDW01-ED / SOT-23-6 / 环保	1	鑫飞宏
5	MOS	Q1Q2 Q3 Q4	8205A / TSSOP-8 / 环保	4	迪浦 / 鑫飞宏
6	PCB	FSJ-1S-R21	Φ 20.8*0.6mm，FR-4 双面喷锡， 绿油白字，双工艺边，环保	1	
7	镍片	B+，B-	4*4*0.3mm	2	
8	钢片		Φ 20.2*0.3mm 亚光	1	
9	镍带	B+	4*106*0.12mm	1	
10	镍带	B-	4*25*0.12mm	1	

8. Warnings

Load circuit may cause voltage and current, and the voltage or current may add to pack, the voltage or current must be controlled as lower than RWV and RWI, larger voltage or current may damage the PCM of pack.

To prevent the possibility of the pack from leaking, heating, fire .please observe the following precautions:

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles .Do not strike at pack with any sharp edge parts.

Do not immerse the pack in water and seawater

Do not use and leave the pack near a heat source as fire or heater

When recharging, use the battery charger specifically for that purpose

Do not reverse the positive and negative terminals

Do not connect the pack to an electrical outlet

Do not discard the pack in fire or heat it

Do not short-circuit the pack by directly connecting the positive and negative terminal with metal object such as wire

Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.

Do not strike or throw the pack.

Do not directly solder the pack or battery and pierce the battery with a nail or other sharp object.

9. Cautions

Do not use or leave the pack at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions).Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.

Do not use it in a location where static electricity is great, otherwise, the safety devices in the pack may be damaged, which will cause hidden trouble of safety.

If the pack leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

If the pack takes off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

In case the pack terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

Be aware discharged battery may cause fire or smoke, tape the terminals to insulate them.

The pack should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, pack should be charged for one time every 3 months while storing and batteries should be discharge and charge after being stored more than a year in order to activate it and restore energy.

10. Notice for Designing Battery Pack

10.1 Pack toughness

Battery pack should have sufficient strength and the LIP cell inside should be protected from mechanical shocks.

10.2 Cell fixing

The LIP cell should be fixed to the battery pack by its large surface area. No cell movement in the battery pack should be allowed.

10.3 Inside design

No sharp edge components should be inside the pack containing the LIP cell.

10.4 Tab connection

Ultrasonic welding or spot welding is recommended for LIP tab connection method. Battery pack should be designed that shear force are not applied to the LIP tabs.

If apply manual solder method to connect tab with PCM, below notice is very important to ensure battery performance.

The solder iron should be temperature controlled and ESD safe; Soldering temperature should not exceed 350°C;

Soldering time should not be longer than 3s;

Soldering times should not exceed 5 times, Keep battery tab cold down before next time soldering;

Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx. 100°C

11. Handling of Battery

1 Soft Aluminum foil

Easily damaged by sharp edge parts such as pins and needles, Ni-tabs, comparing with metal-can-cased LIB.

Don't strike battery with any sharp edge parts

Trim your nail or wear glove before taking battery

Clean worktable to make sure no any sharp particle

Sealed edge may be damaged by heat above 100°C, bend or fold sealed edge.

Prohibition short circuit

Never make short pack circuit. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous. The LIP tabs may be easily short-circuited by putting them on conductive surface. Such outer short circuit may lead to heat generation and damage of the cell.

Mechanical shock

LIP cells have less mechanical endurance than metal-can-cased LIB.

Falling, hitting, bending, etc. may cause degradation of LIP characteristics.