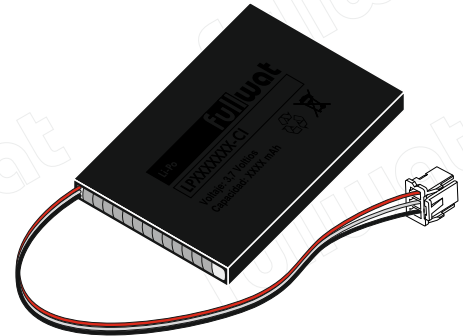


INTRODUCTION

This specification governs the performance of the following FULLWAT Lithium soft bag prismatic cell.

SPECIFICATIONS

Item	Parameter	Remark
Nominal Capacity	390 mAh	0.2C ₅ A discharge, 25°C
Nominal Voltage	3.7 V	Average Voltage at 0.2C ₅ A discharge
Standard Charge Current	78mA	Working Temperature: 0~45°C
Max Charge Current	390mA	Working Temperature: 0~45°C
Charge cut-off Voltage	4.20 ± 0.05V	CC/CV
Constant discharge current	780mA	Working Temperature: -10~60°C
Maximum discharge current	780mA	Working Temperature: -10~60°C
Discharge cut-off Voltage	2.75V	
Cell Voltage	3.76~3.9V	When leave factory
Impedance	≤ 80mΩ	AC 1KHz after 50% charge 25°C
Weight	Approx: 10g	
Storage Temperature	≤ 1 month	-10~45°C
	≤ 3 month	0~30°C
	≤ 6 month	20±5°C
Storage Humidity	65±20% RH	Best 20±5°C for long-time storage



PCM SPECIFICATIONS

	Item	Parameter
Over charge protection	Over charge detection voltage	4.25 ± 0.025V
	Over charge detection delay time	0.96 ~ 1.5S
	Over charge release voltage	4.05 ± 0.025V
	Maximum charge current	≤ 1.5A
Over discharge protection	Over discharge detection voltage	2.5 ± 0.07V
	Over discharge detection delay time	20 ± 10mS
	Over discharge release voltage	3.0 ± 0.075V
Over current protection	Over current detection voltage	0.15 ± 0.015V
	Over current detection current	5.0 ~ 8.0A
	Detection delay time	6 ~ 12mS
	Release condition	Self recovered
	Maximum continuous current	≤ 2.0A
Short protection	Detection condition	Exterior short circuit
	Detection delay time	220 ~ 380uS
	Release condition	Cut short circuit
Interior resistance	Main loop electrify resistance	V _c =4.2V; R _{ss} ≤ 70mΩ
Current consuption	Current consume in normal operation	3.5μ A Type 7.0μ A Max
NTC	Resistance	10KΩ ± 5%
	β	3435

GENERAL PERFORMANCE

Definition of standard charging method: At 20±5°C, charging the cell initially with constant current 130mA till voltage 4.2V, then with constant voltage 4.2V till current declines to 32.5mA.

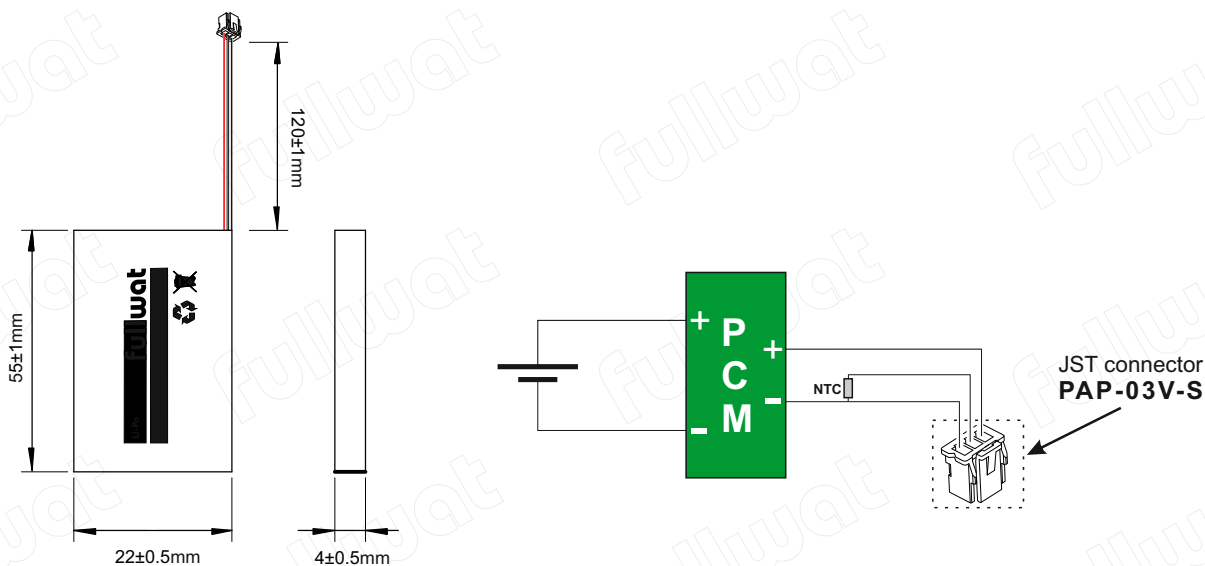
Item	Test Methods	Performance
0.2C Capacity	After standard charging, laying the battery 0.5h, then discharging at 0.2C _s A to voltage 2.75V, recording the discharging time.	≥300min
1.0 Capacity	After standard charging, laying the battery 0.5h, then discharging at 1C _s A to voltage 2.75V, recording the discharging time.	≥54min
Cycle life	Constant current 1C _s A charge to 4.2V, then constant voltage charge to current declines to 0.05 C _s A, stay 5 min, constant current 1C _s A discharge to 2.75V, stay 5 min. Repeat above steps till continuously discharging time less than 36 min.	≥300min
Capability of keeping electricity	20±5°C, After standard charging, laying the battery 28 days, discharging at 0.2 C _s A to voltage 2.75V, recording the discharging time	≥240min

SAFETY TEST

Test conditions: The following tests must be measured air and safety protection conditions. All batteries must standard charge and lay 24h.

Item	Test Methods	Performance
Over charge	At 20±5°C, charging batteries with constant current 3C _s A to voltage 5V then with constant voltage 5V till current decline to 0. Stop test till batteries temperature 10°C lower than max temperature.	No explosion or fire
Over discharge	At 20±5°C, discharge battery with 0.2C _s A continuously 12.5h.	No explosion or fire
Short circuit	At 20±5°C, connect batteries anode and cathode by wire which impedance less than 50m Ω, keep 6h.	No explosion or fire
Extrusion	20±5°C, put the battery in two parallel steal broad, add pressure 13kN.	No explosion or fire
Thermal shock	Put the battery in the oven. The temperature of the oven is to be raised at 5±1°C per minute to a temperature of 130±2°C and remains 60 minutes.	No explosion or fire

SCHEMATIC BATTERY



CAUTIONS

Cautions of batteries operation: The batteries must be careful of proceed the operation for it is soft package.

Aluminum packing materials: The aluminum packing material was easily damaged by the sharp edge part, such as nickel-tabs.

- 1 Forbid to use the sharp part touching the battery.
- 2 Should cleaning working condition, avoiding the sharp edge part existence.
- 3 Forbid to pierce the battery with nail and other sharp items.
- 4 The battery was forbidden with metal, such as necklace, hairpin etc in transportation and storage.

Sealed edge:

- 1 Sealed edge is very easily damaged and don't bend it.
- 2 The aluminum interlayer of package has good electric performance. It's forbidden to connect with exterior component for preventing short-circuits. (Short the anode and the aluminum interlayer of package will cause corrosion or swollen of the cell).

Folding edge:

- 1 The folding edge is formed in batteries processes and passed all hermetic test, don't open or deform it.
- 2 The aluminum interlayer of package has good electric performance. It's forbidden to connect with exterior component for preventing short-circuits. (Short the anode and the aluminum interlayer of package will cause corrosion or swollen of the cell).

Tab: The cathode is aluminum tab and the anode is Nickel tab.

- 1 The batteries tabs are not so stubborn specially for aluminum tab. Don't bend tabs.
- 2 The tab-tapes are used to isolate. The anode/cathode tabs from aluminum packing materials to prevent short-circuit, so prohibit manicuring of the tab-tapes.

Mechanical shock:

- 1 Don't fall, hit, bent the batteries body.
- 2 Don't knock on by sinker or trample the batteries.
- 3 Don't sling the batteries.

Short circuit: Short circuit is strictly prohibited. It should damage batteries badly.

- 1 Don't connect the anode and cathode of the batteries to avoid short-circuit.
- 2 Prohibit short-circuit of the anode (or cathode) and aluminum layer of aluminum packing materials.

Standard test environment for polymer lithium-ion batteries:

Environment temperature:

- 1 20±5°C

Humidity:

- 1 45~85%

Cautions of charge and discharge:

Charge: Charging current should be lower than values that recommended below. Higher current and voltage charging may cause damage to cell electrical, mechanical, safety performance and could lead heat generation or leakage.

- 1 Batteries charger should charging with constant current and constant voltage mode.
- 2 Charging current should be lower than (or equal to) 1C_{5A}.
- 3 Temperature 0~45°C is preferred when charging.
- 4 Charging voltage must be lower than 4.25V.

Discharge:

- 1 Discharging current must be lower than (or equal to) 2C_{5A}.
- 2 Temperature -10~60°C is preferred when discharging.
- 3 Discharging voltage must not be lower than 2.75V.

Over discharge: It should be noted than the cell would be at an over-discharge state by its shelf-discharge. In order to prevent over-discharge, the cell shall be charged periodically to keeping voltage between 3.6-3.9V. Over-discharge may cause loss of the cell performance. It should be noted that the cell would not discharge till voltage lower than 2.75V.

Storage of polymer lithium-ion batteries:

The battery should be stored with 40-60% charge state.

The environment of long time storage.

Temperature: 20±5°C.

Humidity: 45-85%.

Batteries were 40~60% charged.

The battery had better charge a time per three month during its storage for avoiding over discharge.

Please charge the battery with constant current 0.5C₅A for 1 hour once every three month when is storage so that it has some storage of charge for properly using.

Charge and discharge afresh to active and renew battery energy after storage above 1 year.

Transportation of polymer lithium-ion batteries:

The batteries must be transported with 10~50% charged states.

Others:

Please note cautions bellow to prevent cells leakage, heat generation and explosion.

- 1 Prohibit disassembled cells.
- 2 Prohibit immerse cells into liquid such as water or seawater.
- 3 Prohibit dumping the battery into fire.
- 4 Prohibit soldering directly the battery.
- 5 Prohibit charging the battery near fire or in the hot circumstance.
- 6 Prohibit place the battery in a microwave oven or pressurized container.
- 7 Prohibit use or store the battery where is exposed to extremely hot, such as under window of a car in directly sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.
- 8 If the battery leaks and electrolyte gets in your eyes, don't rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.
- 9 Prohibit using the battery if it gives off an odor, generates heat, becomes discolored or reformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue use. If the battery leaks or gives off an odor, move it away from a fire source to avoid fire or explosion.

CELL PACKING AND FIXING

Notice of designing battery pack: Battery pack should have sufficient strength and battery should be protected from mechanical shock. No sharp edge components should be inside the pack contain the battery.

PCM design:

The overcharge threshold voltage should not be exceed 4.25V.

The over-discharge threshold voltage should not be lower than 2.3V.

The PCM should have short protection function built inside.

Cell connection:

Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.

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

- 1 The electric iron should be temperature controlled and ESD safe.
- 2 Soldering temperature should not exceed 350°C.
- 3 Soldering time should not be longer than 3 s, keep battery tab cold down before next soldering.
- 4 Soldering times should not exceed 5 times.
- 5 Soldering spot location should be away from the tab film to ensure the sealing of the tab film.
- 6 The soldering spot should be smooth should be no acumination.

Cell fixing:

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

Cell replacement:

The cell replacement should be done by professional people.