



# Product Specification

Polymer Li-ion battery

Model: SRB Li-Pol 3.7V 452540P

Capacity: 400mAh

Approved by	Checked by	Prepared by

CUSTOMER APPROVAL	STAMP



### Revision History

Revision No.	Description.	Modify.	Approval.	Date.
A/0	First Issue			



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## Rechargeable Battery

### 1. Scope

This specification shall be applied to Li-ion polymer battery manufactured by Sonikcell Co.,Ltd

### 2. Performance

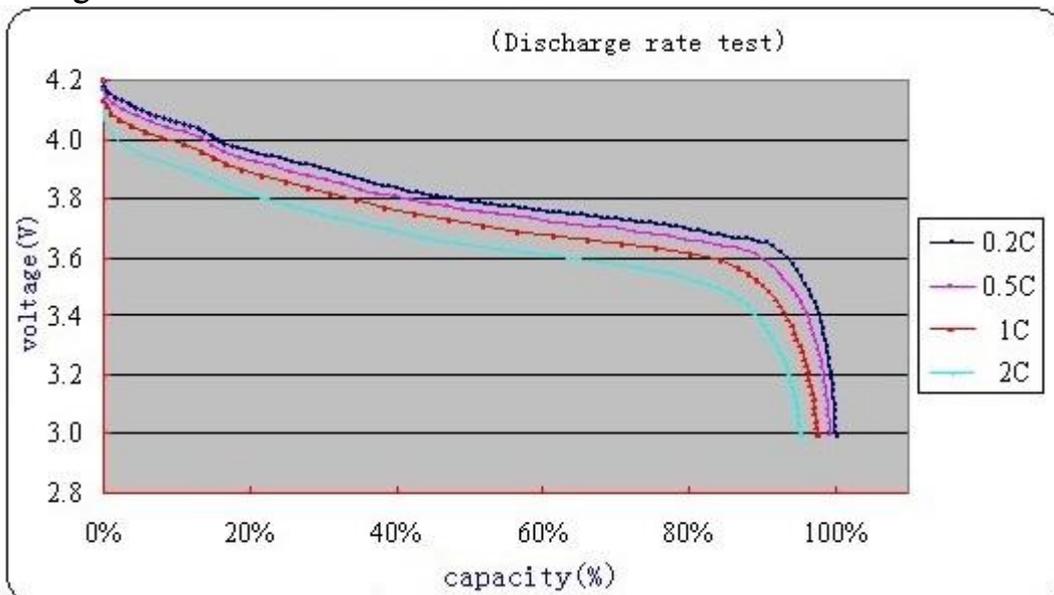
GB/T18287-2000

Issued by 'GB/T18287-2000' national standard of the People's Republic of China 《Li-ion battery general principle》

### 3. Parameter

NO.	Description.	Specification	Remark
1	Battery Model	PL452540	
2	Minimal Capacity	400mAh	0.2C
3	Rated Capacity	400mAh	0.2C
4	Nominal Voltage	3.7V	
5	Overcharge protect voltage	4.2±0.15V	
6	Overdischarge protect voltage	2.4±0.15V	
7	Overcurrent protection	2.0-3.5A	
8	Short circuit protection	Yes	
9	SCP Release condition	Instantly after the short circuit is cut off	
10	Storage Temperature	-5~35°C	one year
11	Inner Impedance	≤290mΩ	
12	pack weight		
13	Max continue discharge current	1C	
14	Max charge current	0.5C	

### 4. Cell discharge curves



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### 5. Operating Temperature

NO.	Unit	Min	Type	Max	Remark
Charge	°C	0	25	45	
Discharge	°C	-20	25	45	
Storage	°C	-20	25	45	1 month
	°C	-20	25	35	6 months

Remark: Before storage, should charge the battery to 40%~65% of its full capacity.

### 6. Characteristics

#### 6.1 Electro chemical performance characteristics

No.	content	Testing method	Requirements
1	Charge cut-off voltage	4.2±0.15V	
2	Discharge cut-off voltage	2.4±0.15V	
3	Standard charge	1. Charge the battery at constant current of 0.2C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C. 2. Charge the battery at constant current of 0.5C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C.	Charge time≤8 hours
4	Standard discharge	After the standard charging, rest for 1 hour then discharge to 2.4V@0.2C.	Discharging time≥300Min
5	Rate discharge	After the standard charging, rest for 1 hour then discharge to 2.4V@1C.	Discharging time≥51Min
6	High temperature characteristics	Fully charging, store them at (55±2)°C for 2 hours, then discharge to 2.4V@1C	Discharging time≥51Min No transform No explosion, No fire, No leakage.
7	Low temperature Characteristics	Full charging, store them at (-10±2)°C for 16~24 hours, then discharge to 2.4V@0.2C.	Discharging time≥210 Min No transform , No explosion, No fire, No leakage.
8	Capacity retention	Fully charging, store them at (20±2)°C for 28 days, then discharge to 2.4V@0.2C.	Discharging time≥255Min
9	Cycle Life @25°C	Discharge to 2.4V @0.5C, then Charge the battery @0.5C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C. Rest for 10 min. discharge to 2.4V@ 0.5C and rest for 10 min. Continue the charge/discharge cycles until discharge capacity lower than 80% of rated capacity.	Cycle life ≥300times
10	storage	Charge the battery to 40%~65% of its rated capacity using standard charging mode, then keep it in an 20°C±5°C, humidity 45%~85% room for 12 months. Discharge it @0.2C until voltage down to 3.0V. (The testing sample should be within 3 months dated from production date)	Discharge time≥240Min

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## Rechargeable Battery

### 6.2 Environment Characteristics

No.	content	Testing method	Requirements
1	Hot&Humidity test	Full charging, store it at 40±2°C with 90%~95RH% for 48 hours. Then put the battery at room temperature 20±2°C for 2 hours. Then discharge to 3.0V @1C	Discharging time≥36Min No explosion, No transform, No erosion No fire, No leakage.
2	Vibration Test	After Standard Charging, fixed the battery 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 leaking, No fire, No explosion Voltage≥3.7V
3	Shock test	After Standard Charging, test condition: Acceleration : 100m/s <sup>2</sup> Crash time per min: 40~80 times Pulse lasting time : 16ms Shock times : 1000±10times	No leaking, No fire, No explosion Voltage≥3.7V
4	Drop Test	After standard charging , drop the battery from 100cm height onto a 18mm~20mm thick hardwood. Two sides of X,Y,Z directions each (total 6 times) After the drop test, discharge the battery @1C to 3.0V. Then charge it @1C to full capacity. Continue the test, within 3 times the battery should reach the target once.	No leaking, No fire, No explosion Discharging≥51min

### 6.3

No.	content	Testing method	Requirements
1	Over charge protection test	After standard charging. Apply a 14.8V stable Voltage and 1C stable current to the battery for 8 hours.	No fire No explosion No leaking
2	Over discharge protection test	After discharged to the cut-off voltage, the battery shall be subjected to a short-circuit condition with a load of resistance less than 30Ω for 24 hours	No fire No explosion No leaking
3	Short circuiting protection test	After standard charging, the battery shall be subjected to a short-circuit condition with a wire of resistance less than 100mΩ for 1 hour. Cut off the circuit, Charge the battery with constant current at 1.0C for 5s	No fire No explosion Voltage≥3.7V
4	Impact Test	After standard charge, Place the battery on a flat surface. A 9.1 kg article is to be dropped from a height of 100cm onto the sample. The battery is allowed to transform.	No fire No explosion
5	Heating Test	30min. After standard charging, a battery is to be heated in an oven convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5±2°C/min to a temperature of 130±2°C and last for 30 minutes.	No fire No explosion
6	Over Charge	After standard charging, put the battery in fume hood. Add constant voltage & current 4.8V 3C to the battery. Charging it until the battery reaches 4.8V, charging current decreases to almost 0A. Record the temperature curve of the battery. When the battery temperature decreases to about 10°C lower after reaching the peak temperature. End the test. This test is performed without PCM	No fire No explosion
7	Short Circuiting Test	After standard charging, put the battery in fume hood. Connect the Negative Pole and Positive pole directly. (the wire's resistance should below 50mΩ. Record the battery's temperature curve during the test. When the battery temperature decreases to about 10°C lower after reaching the peak temperature. End the test. This test is performed without PCM	No fire No explosion Cell temperature < 150°C

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## Rechargeable Battery

Remark: Standard environmental test condition

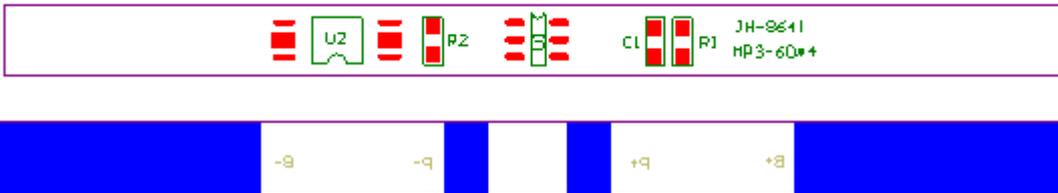
Temperature: 25±2°C; Humidity: 45±20%RH unless otherwise specified

Test condition: 1. for battery with PCM, all tests are tested with PCM except 6 and 7.

2. for battery without protect PCM, all tests without PCM.

### 7. PCM Specification and Characteristic

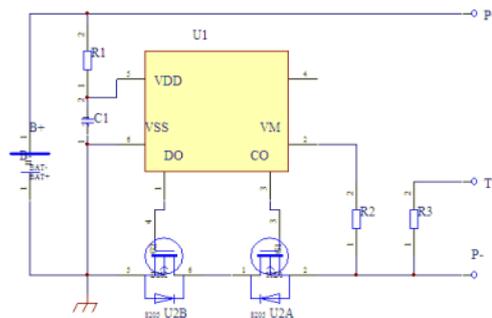
#### 7.1 PCM Diagram



#### 7.2 PCM Electrical Characteristics

	$V_{DET1}$	Over charge detect	$4.3\pm 0.05V$
	$tV_{DET1}$	delay time	200ms (MAX)
	$V_{REL1}$	release voltage	$4.1\pm 0.05V$
	$V_{DET2}$	over discharge detect voltage	$2.4V\pm 0.1V$
	$tV_{DET2}$	Delay time	60ms (MAX)
	$V_{REL2}$	Release voltage	$2.4V\pm 0.1V$
	$V_{DET3}$	Over current detect	$150\pm 30mV$
	$I_{DP}$	Over current protect	2.0-3.5A
	$tV_{DET3}$	delay time	20ms (MAX)
		Release condition	Cut off load

#### 7.3 PCM Schematic diagram



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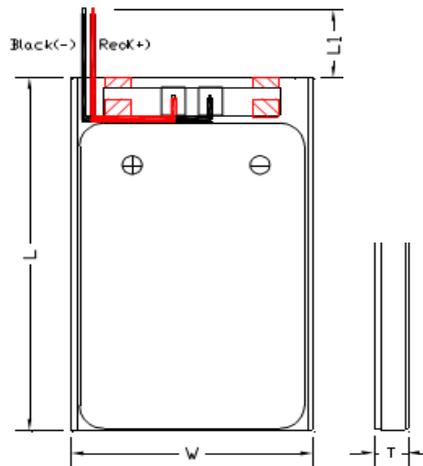
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### 7.4 PCM BOM

1	U1	IC	DW01+	SOT-23-6	1
2	U2	MOSFET	8205	TSSOP-8	1
3	R1	resistor	SMD 470Ω±5%	0603	1
4	R2	resistor	SMD 2KΩ±5%	0603	1
5	C1	capacitor	SMD 0.1μF-20%/80%	0603	1
6	PCB	PCB	18mm*3.6mm*0.6mm	1	

## 8. Assembly configuration

### 8.1 Battery Dimension Drawing



Item	Description	Dimension and specification
T	thickness	4.6mm(max)
W	width	25.5mm(max)
H	length	42mm(max)
L1	Cable length	150±5mm

### 8.2 Battery BOM

NO.	Title	Specifications	Quantity	Unit	Remark
1	Polymer battery	452040	1	PCS	Polymer battery
2	Cable	1571 26#	2	PCS	black、red
3	PCM	18*3.6*0.6MM	1	PCS	
4	connector	N/M			

## 9. Packing Instruction

The photo, size and color of the mark are all comply with the requirement of GP/T 191-2000.



## 10. Cautions

### 10.1 Danger Warning

To prevent the battery from leaking, heating or explosion, please observe the following precautions:

10.1.1 Do not immerse the battery in water or seawater, and keep the battery in a cool and dry environment if it stands by.

10.1.2 Do not use or leave the battery near a heat source as fire or heater.

10.1.3 Use the Lithium-ion battery charger specifically for that purpose when recharging.

10.1.4 (+) (-) Do not reverse the position and negative terminals.

10.1.5 Do not connect battery to the plug socket or car-cigarette-plug

10.1.6 Do not use or leave battery nearby fire, stove or heated place.

10.1.7 (+) (-) Do not short-circuit the battery by directly connecting the positive and negative terminals with metal objects.

10.1.8 Do not strike, trample or throw the battery.

10.1.9 Do not drive a nail into the battery. Strike it by hammer, or tread it.

10.1.10 Do not make the direct soldering on battery.

10.1.11 Do not disassemble or reconstruct battery.

10.1.12 Do not charge battery nearby the fire or under the blazing sun.

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

10.1.14 Do not use or leave the battery under the blazing sun (or heated car by sunshine). The battery may smoke, heat or flame. And also, it might cause the deterioration of battery's characteristics or cycle life.

10.1.15 Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety

10.1.16 If the battery leaks, and the electrolyte get into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.

10.1.17 If the battery gives 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 charger and stop using it.

10.1.18 In case the battery terminals are dirty, clean the terminals with a dry cloth before using.

10.1.19 Be aware discarded batteries may cause fire or explosion, tape the battery terminals to insulate them

### 10.2 warning

10.2.1 In order to ensure the safe, battery should be installed safety device, in static than manufacturing request when electrostatic when do not use, otherwise, safety device would failure, battery overheat, rupture, explosion and fire.

10.2.2 In the normal use of the following conditions, otherwise they will overheat and catch fire, performance and shorten the life

Ambient condition: (T temperature)

charging: 0~+65°C

discharging: -20~+65°C

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storage within 30 days: -20~+60°C

storage within 180 days: -20~+45°C

10.2.3 If children use the battery, you should specify them by using the instructions for use, and ensure the battery at any time must be in normal use;

10.2.4 If the battery leaks, electrolytes stick to the skin or clothing, wash off with water or fluid washing clothes or skin corrosion will die.

10.2.5 In order to not install error or loss of the battery, please carefully read the operating instructions, and follow the instructions for installation and removal (from device)

10.2.6 If the battery is not used, please take the battery out and placed in a dry place or electrical appliances will be corrosion of battery performance and reduce life.

10.2.7 If it is polluted battery terminal, please before you use it with a dry cloth to wipe clean, otherwise will result in poor contact with the device, power shortage or charge failure.

10.2.8 warranty period

Warranty period of this product is 12 months from manufacturing code

10.2.9 Product responsibility

You must strictly adhere to our specifications and documentation comment later, due to the misuse of batteries can cause the battery to overheat, fire or explosion. For the specification for any accidental, I Secretary does not bear any responsibility.

If the specification, raw materials, production processes or production control system is changed, the change of information will vary depending on the quality and reliability data to inform consumers in writing.

10.2.10 Storage

Battery if long-term storage, should be charge the battery to 50% of its full capacity.

Batteries should be saved in low temperature dry environment.

Battery storage should be added every three months, the electric charge to a 50% charge status.

10.2.11 Packaging label on the battery.

10.2.12 The following warnings should be indicated on the packaging of battery.

Use a specified charger.

Do not place the battery into a fire or heating.

Do not short-circuit the battery at both ends.

Do not disassemble the battery.