



POLYMER BATTERY
P/N: T3.7V06000MAH1CP

DESIGNED BY	
CHECKED BY	
APPROVED BY	

Address: A3L1, Youpinyishu, Huanmei Rd., Dameisha, Yantian district, Shenzhen, China
Tel: (86) 13632770721



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1. Scope

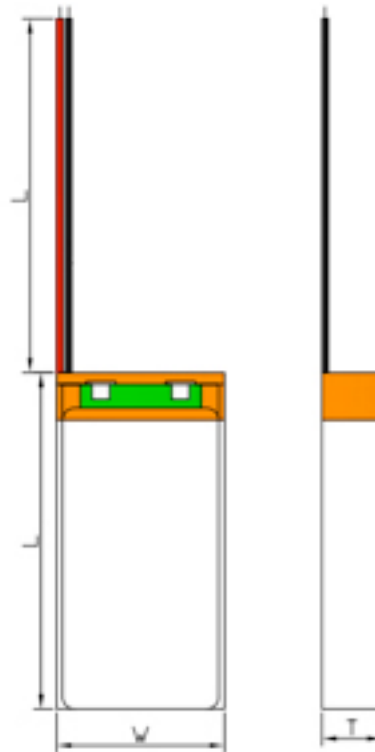
This document describes the Product Specification of the polymer battery cell supplied by Thunder Battery.

2. Model

T3.7V06000MAH1CP

3. Dimensions of battery pack

MAX. 9.5(T)* 57.5(W) * 101.0(L) (mm)

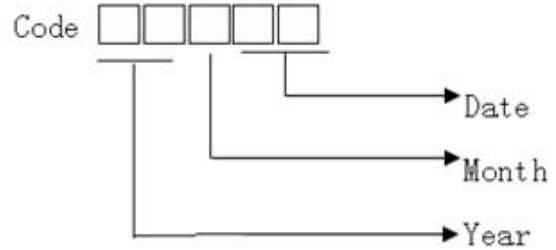


1600mAh-3.7V+PCB+connect	
T	9.5mm Max
W	57.5mm Max
H	101.0mm Max
IC	R5478N101CD
MOS	8205A
Wire	UL007, 24AWG
L	UL1007, 24AWG, L=150±2mm
Connector	None
Tape	Black
Adhesive	None



Print code:

	- 905798 22.2Wh
	- + 3.7V 6000mAh 16B19



4. Specifications of battery pack

No.	Item	Specifications	Test tools	Comments
4.1	Nominal Capacity	6000mAh @0.2C	Secondary batteries test equipment	Minimum 5500mAh @0.2C
4.2	Nominal Voltage	3.7V		
4.3	Dimensions	9.5(T)* 57.5 (W) * 101.0 (L) (mm)	Calipers	Exactitude 0.01mm
4.4	Approx. Weight	Approx. 120.0g	Electronic weighbridge	
4.5	Max Charge voltage	3.7V	Electronic voltage meter	Exactitude ±0.01V
4.6	AC Impedance of pack	≤120mΩ	Impedance test equipment	AC 1000HZ impedance exactitude ±1 mΩ
4.7	Fast Charge	1C mA	Secondary batteries test equipment	
4.8	Min Discharge	2.75V		
4.9	Fast current discharge	1C mA		
4.10	Charge temperature	0°C ~ + 45°C	Thermometer	
4.11	Discharge temperature	-10°C ~ + 50°C		
4.12	Storage	-10°C ~ + 35°C		
4.13	Storage humidity	< 75%RH	Hygrometer	
4.14	Standard Charge	0.2C CC (constant current) charge to Max Charge voltage (4.2V), then CV(constant voltage 4.2V) charge till charge current decline to ≤ 0.01C	Electronic Voltage Secondary batteries test equipment	
4.15	Charging item	Standard Charging: 6hours (Ref.)	Secondary batteries test equipment	
4.16	Standard discharge	0.2C CC (constant current) discharge to Min Discharge cut- off voltage (2.75V)	Voltage meter Secondary batteries test equipment	
4.17	Pack Voltage	As of shipment.	Electronic voltage	3.6V~3.8V



5. Specifications of Cell

No.	Items	Specifications	Test tools	Comments
5.1	Max Charge Voltage	4.2V	Electronic voltage meter	±0.01V
5.2	Min Discharge cut-off voltage	2.75V	Secondary batteries test equipment	Minimum 5500mAh @0.2C
5.3	Nominal Capacity	6000mSh @0.2C	Impedance test equipment	AC 1000HZ Impedance exactitude ±1 mΩ
5.4	AC Impedance	≤120mΩ		
5.5	Standard Charge	0.2C CC (constant current) charge to Max Charge voltage (5.1), then CV (constant voltage 4.2V) charge till charge current decline to ≤ 0.01C	Electronic voltage meter Secondary batteries test equipment	
5.6	Charging time	Standard Charging: 6hours (Ref.)	Secondary batteries test equipment	
5.7	Standard Discharge	0.2C CC (constant current) discharge to Min Discharge cut- off voltage (2.75V)	Electronic voltage meter Secondary batteries test equipment	
5.8	Rapid charge current	Rapid charge: 1C	Secondary batteries test equipment	
5.9	Rapid discharge current	1C		



6. Battery Cell Performance Criteria and Electrical Characteristics

No.	Items	Test Method and Condition	Test tools	Criteria
6.1	Rated Capacity	Discharge the cell with Standard discharge (5.7), after Standard Charge (5.5)	Electronic voltage meter Secondary batteries test equipment	≥Standard capacitance 95%
6.2	Cycle Life	The cell shall be test as Rated Capacity method (6.1), repeat 100 times		100 time of discharging capacities keep 90% 300 time of discharging capacities keep 80%
6.3	Self-discharge	After the standard charge (5.5), storied the cells under the condition as 20±5°C for 28 days, then measured the capacity with standard discharge (5.7)		Residual capacity: >90%
6.4	Temperature Characteristics	1. According to item 5.5, at 20±5°C. 2. Capacity comparison at each temperature, measured with standard discharge (5.7). Percentage as an index of the capacity compared with 100% at 20	Electronic voltage Secondary batteries test equipment	-10°C: ≥60% 20°C: 100% 50°C: ≥85%



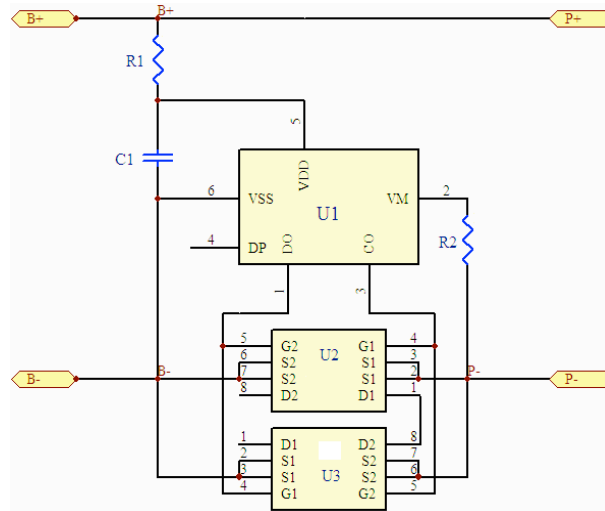
7. Mechanical Characteristics of Cell

No.	Items	Test Method and Condition	Test tools	Criteria
7.1	Vibration test	After standard charge (5.5), fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes.	Secondary batteries test equipment, Vibration platform	No fire No smoke No explosion
7.2	Over charge	Battery charged at 1.0C5mA current with a voltage limit of 4.8V. charging is continued for 8 hours.		No fire No explosion
7.3	Over discharge	After standard discharge (5.7), then connect cells terminals with 30Ω, Discharging is continued for 24 hours		
7.4	Heating test	The temperature of the oven is to be raised at a rate of 5±2°C/min. to a temperature of 120±2°C, and remains for 30 minutes at this temperature.	Hot box	No fire No explosion
7.5	Short-circuit test	The battery shall be subjected to a short-circuit condition with a wire of resistance less than 100mΩ for 1 hour.	Electronic voltage meter Secondary batteries test equipment	No fire No explosion
7.6	High temperature and high humidity test	Cell shall be charged in stored under 40°C±2°C and 90%RH-95%RH for 48 hours.	Thermometer Hygrometer	Discharge time ≥ 36mins No distortion No explosion



8. Protection Functions

8.1 Circuit Diagram



8.2 PCM BOM

Item	Reference	Description	Type	Qty
8.2.1	U1	Protection Ic	R5478N101CD	1
8.2.2	U2	Power Mosfet	8205A	2
8.2.3	R1	Resistor	330Ω ±5%	1
8.2.4	R2	Resistor	1KΩ ±5%	1
8.2.5	C1	Capacitor	0.1uF±20%	1
8.2.6	PCB	PCB LWS-1S5A-027	FR4 ±0.1mm Operating Temperature -40°C~+85°C	1

8.3 PCM Parameter

No.	Items	Criteria
8.3.1	Over -charge Protection voltage	4.25±0.025V
8.3.2	Over -charge Protection voltage	2.5±0.05V
8.3.3	Over -current Protection	3A-8A(Max)
8.3.4	Current consumption in	6uA Max



9. Visual inspection

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.

10. Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature: $20\pm 5^{\circ}\text{C}$

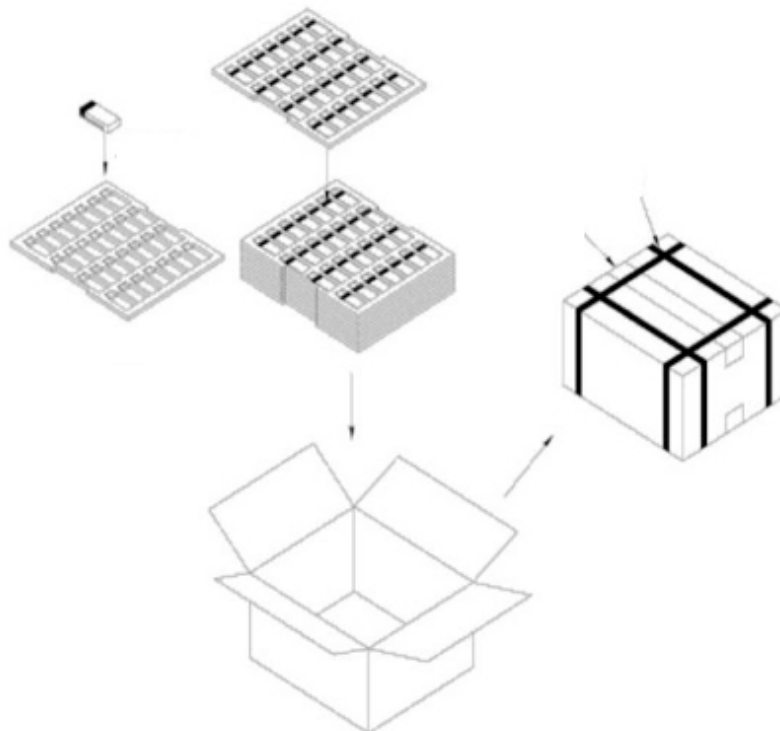
Humidity: $60\pm 15\% \text{RH}$

Barometric: 86kpa-106kpa

11. Pack

The sketch, size, color of marking should match GB/T191-2000 requests.

- Model and specification of product
- Quantity
- Measure up marking
- Make date
- Other markings, like color.



12. Storage

Long Time Storage

If the Cell is stored for a long time, the cells storage should be 3.8-4.2V and the cell is to be stored in a condition as No.6.6

Strongly recommend that every six months the stock battery make charging once.



13. Dangers

13.1 Don't disassemble or modify the battery

The battery has safety function and protection circuit to avoid the danger. LWS cell is packaged by Aluminum laminated plastic film which is easy to be damaged by sharp edge such as pin, needle, edge of devices like nickel tabs, etc. If they have serious damage, electrolyte leakage, short-circuit between positive and negative tabs, etc. It would cause the generation, smoke, rupture, or flaming with mishandling.

13.2 Don't incinerate or heat the battery

Don't use or leave battery nearby fire, stove or heated place (more than 130°C). These occur the melting of insulator, damage of safety function, or ignition on electrolyte. In case that separator made of polymer is melted by high temperature, the internal short-circuit occurs in individual cells and then it would cause the generating, smoke, rupture or flaming.

13.3 Don't use any damaged battery

Don't use the battery that are dented or bent on their edge part. LWS batteries are possible to be damaged by strong mechanical shock and it would cause wire break, short-circuit inside the cell, leakage of electrolyte, etc.

13.4 Don't drive a nail into a battery, strike it by hammer, or tread it

As the battery might be broken or deformed and then it will be short-circuited, it would cause the generating, smoke, rupture or flaming.

13.5 Don't give battery impact or fling it

If the protection circuit assembled in the battery is broken, the battery will be charged at abnormal voltage or current and abnormal chemical reaction will occur. It may cause the generating, smoke, rupture or flaming.

13.6 Don't make the direct ultrasonic wave power to the battery or soldering near the battery

It may cause serious damage to the batteries. Soldering near the battery may cause damage of the components, such as separator and insulator, are melted by heat, it would cause the gas generating, smoke, rupture or flaming.

13.7 Don't use battery nearby the high temperature place or under the blazing sun

LWS batteries have possibility to be degraded its performance such as capacity, thickness increase, impedance, etc. The battery will be charged at the abnormal chemical reaction occurs in the high temperature place. The thickness change may lead to stressing on battery case/ device, wiring or cell which may have possibility to lead to damage performance.



13.8 Don't use the unspecified charger

If the battery is charged with unspecified condition (under high temperature over the regulated value, excessive high voltage or current over regulated value, or remodeled charger with PCM failed or disassemble), there are causes that it will be overcharged or the abnormal chemical reaction will occur in cells. It causes the gas generating, smoke, rupture or flaming.

13.9 Don't reverse polarity (and terminals)

If the protection circuit assembled in the battery is broken. On charging, the battery is reversed- charged and abnormal chemical reaction occurs. There may be case that unexpected large current flows on discharging. There causes the generating, smoke, rupture or flaming.

13.10 Don't reverse-charge or reverse-connect

The battery has polarity. In case the battery is not connected with charger or equipment smoothly do not force them to connect and do check polarity of battery. If the battery is connected to opposite polarity with charger, it will be reverse-charged and abnormal chemical reaction will occur. If the protection circuit assembled in the battery is broken, it would cause the generating, swelling, smoke, rupture or flaming.

13.11 Don't connect battery to the plug socket or car-cigarette-plug

Added high voltage to the battery, if the protection circuit assembled in the battery is broken, the excessive current will flow in it and then it may cause the generating, swelling, smoke, rupture or flaming.

13.12 Don't use battery for another equipment

If the battery is used for unspecified equipment, it will deteriorate its performance and cycle-life.

13.13 Don't touch a leaked battery directly

In case the leaked electrolyte gets into eyes, wash them with fresh water as soon as possible without rubbing eyes. And then, see a doctor immediately. If leave damaged eyes undone, it will cause eye-trouble.



14. Warnings

14.1 Keep the battery away from babies

Keep the little battery out of the reach of babies in order to avoid troubles by swallowing. In case of swallowing the battery, see a doctor immediately.

14.2 Don't get into a microwave or a high-pressure container

Because of sudden heat or damage of sealing condition of battery, it may cause the generating, smoke, rupture or flaming.

14.3 Don't use a leaked battery nearby fire

If the liquid leaks from the battery (or the battery gives out bad smell), let the battery leave from flammable objects immediately. Unless do that, the electrolyte leaked from battery may catch fire and it would cause the smoke, flaming or rupture of it.

14.4 Don't use an abnormal battery, such as leakage, swelling, deformation, etc.

In case the battery has bad smell, it generates, its color change or it is warped in using (includes charging and storage), let it take out from equipment or charger and do not use it. If an abnormal battery is used, it may generate bad performance or damage the device or pack.

15. Cautions

15.1 Don't use or leave the battery under the blazing sun (or in 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.

