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SPEC NO.	AS-401119-0050-112			DATE	2017-11-23

Dongguan A&S Power Technology Co., Ltd.

Lithium ion Polymer Battery Product Specification

Customer:ITGE

P/N: AS-401119-0050-112

Capacity: 50mAh

Voltage: 3.7V

Specification Approved (规格书审批项)	Prepared By(编制)	Qin Zun Ze
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Customer Approved (客户审批项)	Checked By(审核)	
	Approved By(批准)	
	Please sign and return one copy to us. 请签名盖章确认后回传我司.	Seal the (盖章处)

确认后请回传

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REVISION HISTORY

Revision number	Release Date	Revised items	Page
1.0	2017-4-12	First issue	
1.1	2017-8-01	The exposure length of the wire was modified	12
1.2	2017-11-23	wires direction change	10-13

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1 Scope

This specification is applied to Dongguan A&S Power Lithium Polymer Battery manufactured by Dongguan A&S Power Technology Co., Ltd.

2 Product and Model Name

2.1 Product: Lithium Polymer Battery

2.2 Model Name: AS 401119

3 Ratings

Item		Rating	Note
3.1	Capacity	Typical 50mAh	Discharge:0.2CmA cut off Voltage:3.0V for cell
		Minimum 50mAh	
3.2	Nominal Voltage	Average 3.7V	Discharge:0.2CmA cut off Voltage:3.0V for cell
3.3	AC Impedance Resistance	$\leq 480\text{m}\Omega$	cell
3.4	Discharge Cut-off Voltage	3.00V	
3.5	Charge Current	12mA	Standard Charge
3.6	Charge Voltage	4.20V	
3.7	Charge Time	Approx 6.0h	Charge: 0.2CmA
3.8	Max. Charge Current	50mA	1.0CmA
3.9	Max. Discharge Current	50mA	
3.10	Weight	Approx 1.8g	
3.11	Shipping Voltage	>3.80V	70 ~80% of full charged
3.12	Operating Temperature	Charge	+10~+45℃
		Discharge	+10~+50℃
3.13	Storage Temperature	less than 1 month	Get more than 50% discharge capacity in 10℃ or +50℃.
		less than 3 months	
			Recommended storage temp: 20℃,at the shipment state.

4 Outline Dimensions and Appearance**4.1 Outline Dimensions**

See attached drawing for 401119(Fig.1).

Thickness: 3.8mm max.(Measured with weighting 50gf at 25±2℃)

Width: 11.5mm max.(Measured with weighting 50gf at 25±2℃)

Length: 19.5mm max.

This thickness will be swelling when high temperature storage or operation in high temperature.

The battery pack See attached drawing for 401119 Assembly Drawing (Fig.2).

4.2 Appearance

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

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5 Performance

5.1 Standard Test Conditions

Test should be conducted with new batteries within one month after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of $25\pm 2^{\circ}\text{C}$ and relative humidity of 45~85%. The test results are not affected evidently by such conditions of temperature 15~30 $^{\circ}\text{C}$ or humidity 25~85%RH.

5.2 Measuring Instrument or Apparatus

5.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

5.2.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than 10 M Ω

5.2.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01 Ω .

5.2.4 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter).

5.3 Standard Charge

Test procedure and its criteria are referred as follows:

0.2CmA=10mA

- ① 0.2C discharge to 3.0V
- ② 0.2C constant current charging to 4.2 V
- ③ Constant voltage 4.2 V charging to 0.05 C
- ④ Rest for 5 minutes
- ⑤ 0.2C constant current discharging to 3.0 V(0.2C discharge capacity)

5.4 Rest Period

Unless otherwise defined, 30min, rest period after charge, 30min, rest period after discharge.

5.5 Initial Performance Test

Item	Measuring Procedure	Requirements
(1) Open-Circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	$\geq 4.10\text{V}$
(2) AC Impedance Resistance	The Impedance shall be measured in an alternating current method (1kHz LCR meter) after standard charge at $25\pm 2^{\circ}\text{C}$.	$\leq 480\text{m}\Omega$
(3) Minimum Capacity	The capacity on 0.2CmA discharge shall be measured after standard charge at $25\pm 2^{\circ}\text{C}$ (specified C ₅).	C ₅ $\geq 50\text{mAh}$

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5.6 Electrical Performance

5.6.1 Temperature Dependence of Capacity (Discharge)

Cells shall meet the discharge capacity requirements listed in the below table under respective discharge temperatures. The capacities are to be measured with constant discharge current 0.2CmA (3.00V cut-off) after standard charge at $25 \pm 2^\circ\text{C}$.

Discharge Temperature	-20℃	25℃	50℃
Discharge Capacity	50%	100%	95%

5.6.2 Cycle Life

30min rest period after standard charge, 0.5CmA discharge to a cut-off voltage of 3.0V, 30min rest period, the capacity shall be measured after 50 / 500 cycles of standard charge and discharge at $25 \pm 2^\circ\text{C}$.

Capacity $\geq 80\%$ (300 cycles)

Capacity $\geq 65\%$ (500 cycles)

5.6.3 Shelf Life

Item	Measuring Procedure		Requirements
Storage Characteristics 1	1	The capacity on 1.0CmA discharge shall be measured after standard charge and then storage at $25 \pm 2^\circ\text{C}$ for 30 days.	Remaining Capacity $\geq 85\% C_5$
	2	After above measured Remaining capacity, the capacity on standard discharge shall be measured after standard charge.	Recovery capacity $\geq 90\% C_5$
Storage Characteristics 2	1	The capacity on 1.0CmA discharge shall be measured after standard charge and then storage at $50 \pm 2^\circ\text{C}$ for 7 days.	Remaining Capacity $\geq 50\% C_5$
	2	After above measured Remaining capacity, the capacity on standard discharge shall be measured after standard charge.	Recovery capacity $\geq 80\% C_5$

5.6.4 Long Time Storage Characteristics

After about half charge after a period of storage at $25 \pm 2^\circ\text{C}$ for one year(365 days). The remaining available capacity is $\geq 85\% C_5$. The capacity is determined with the capacity of the by the most of preceding three cycles.

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5.7 Mechanical Performance

Item	Measuring Procedure	Requirements
Vibration test	After standard charge, the battery is to be tested as following conditions: Amplitude:0.8mm Frequency:10~55Hz(sweep:1Hz/min) Direction: X/Y/Z axis for 90~100min. The battery is to be tested in three mutually perpendicular to each axis.	No fire, no explosion, no smoking is obtained.
Drop Test	Drop the battery in the shipment condition(full-charge)from 1m height onto 5cm or thicker concrete with p-tile on it 3 times each of X, Y, and Z directions at $25 \pm 2^{\circ}\text{C}$	No fire, no explosion, no smoking is obtained.

5.8 Safety Performance

Item	Measuring Procedure	Requirements
Short-Circuit Test	After standard charge, the battery is to be short-circuited by connecting the positive and negative terminals of the battery with copper wire having a maximum resistance load of 0.1Ω .	No explosion, no fire. The temperature of the exterior cell casing shall not exceed 150°C .
Heating Test	A battery is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5 \pm 2^{\circ}\text{C}/\text{min}$ to a temperature of $50 \pm 2^{\circ}\text{C}$ at which temperature the oven is to remain for 30 minutes before the test is discontinued.	No explosion, no fire.
Abnormal Charging Test	After standard charge, the battery is subjected to a charging current by connecting it to a dc-power supply. The beginning current is 3.0C, which is to be obtained by connecting a resistor of specified size and rating in series with the battery, the voltage of the dc-power supply is 4.8V. The test time is 2.5 hours. This does not require that the initial I_c be maintained for 2.5 hours.	No explosion, no fire.

5.9 The Energy Density value230 Wh/L ($\leq 400 \text{ Wh/L}$)

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6 Handling Instructions

Read and observe the following warnings and precautions to ensure correct and safe use of Li-ion batteries.

Danger!

Failure to observe the following precautions may result in battery leakage, overheating, explosion and/or fire.

- Do not immerse the battery in water or allow it to get wet.
- Do not use or store the battery near sources of heat such as a fire or heater.
- Do not use any chargers other than those recommended by A&S Power.
- Do not reverse the positive(+) and negative(-) terminals.
- Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
- Do not put the battery into a fire or apply direct heat to it.
- Do not short-circuit the battery by connecting wires or other metal objects to the positive(+) and negative(-) terminals.
- Do not carry or put the battery together with necklaces, hairpins or other metal objects.
- Do not strike, throw or subject the battery to sever physical shock.
- Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
- Do not directly solder the battery terminals.
- Do not attempt to disassemble or modify the battery in any way.
- Do not recharge the battery near a fire or in extremely hot conditions.

Warning!

Failure to observe the following precautions may result in battery leakage, overheating, explosion and/or fire.

- Do not place the battery in a microwave oven or pressurized container.
- Do not use the battery in combination with primary batteries (such as dry-cell batteries) or batteries of different capacity, type or brand.
- Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, 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.
- Keep the batteries out of the reach of children. If a child somehow swallows a battery, seek medical attention immediately.
- If the battery leaks or emits an odor, immediately remove it from the proximity of any exposed flame. The leaking electrolyte can ignite and cause a fire or explosion.
- If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.

Caution!

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.

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Use the battery only under the following environmental conditions. Failure to do so can result in reduced performance or a shorten service life. Recharging the battery outside of these temperatures can cause the battery to overheat, explode or catch fire.

Operating environment:

When charging the battery: 10℃～45℃

When discharging the battery: 10℃～50℃

When stored up to 30 days: 10℃～45℃

When stored up to 90 days: 10℃～35℃

In cases where children use the battery, instruct them on the contents of the user's guide and keep an eye on them to ensure that the battery is being used correctly.

If the battery leaks and electrolyte gets your skin or clothing, immediately rinse the affected area with clean running water. If left as is, skin inflammation can occur.

For directions on battery installation and removal, read the instruction manual that accompanies the equipment in which the battery will be used.

If a device is not used for an extended period, the battery should be removed and stored in a cool, dry place. Otherwise, resting or reduced performance may occur.

If the terminals of the battery are dirty, wipe them clean with dry cloth before use. Otherwise, solid electrical contact may not be charged with the equipment, and this can cause power outages or charging to fail.

7 Period of Warranty

The period of warranty is one year from the date of shipment. A&S Power guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

8 Shipment

Partial charged condition.

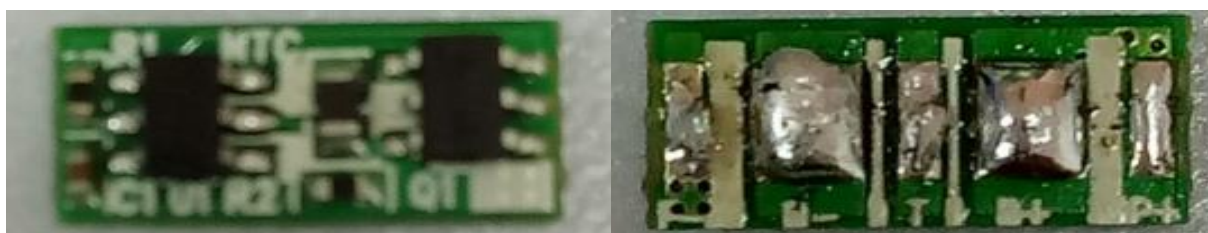
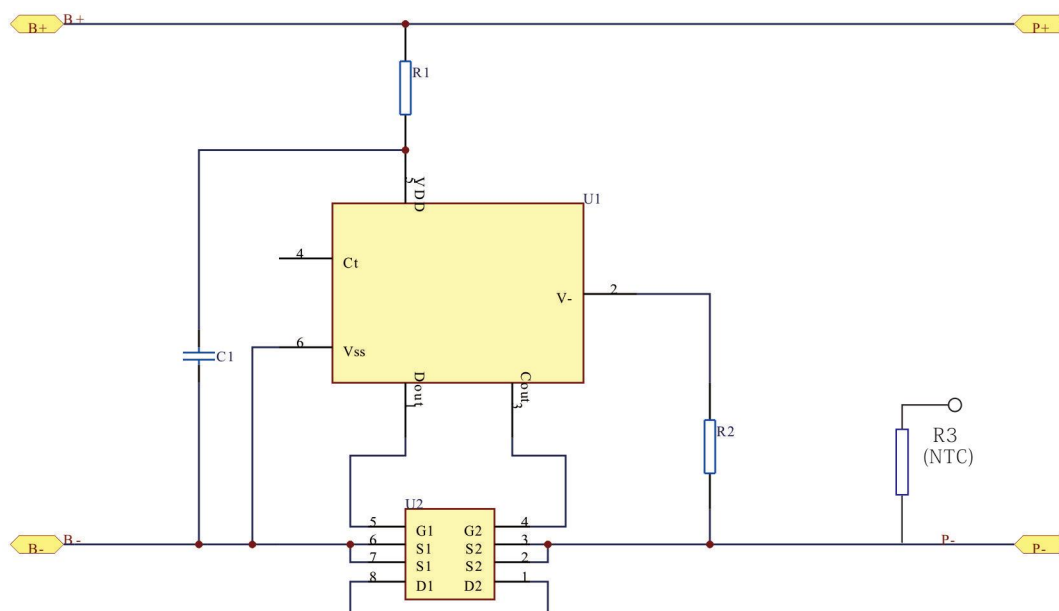
9 Amendment of this Specification

This specification is subject to change with prior notice.

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10 Protection Circuit

10.1 Circuit Diagram



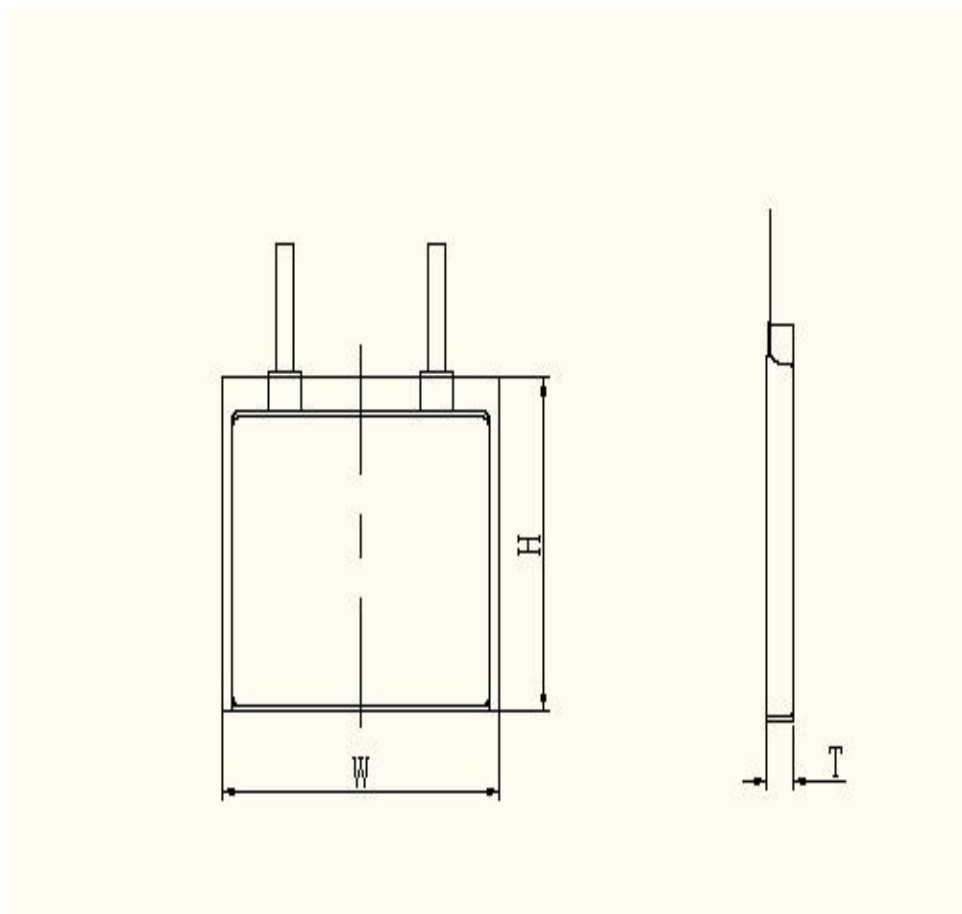
10.2 PCM BOM

NO	Item	Spec	Unit	Quantity	Remark
1	PCB	FR4 (LP10040: 10.0*4.0*0.4mm)	PC:	1	
2	IC1(U1)	S-8261-G3J	PC	1	Seiko
3	IC2(U2)	8205A	PC	1	
4	NTC	10k(NCP18XH103J03RB)	PC	1	Murata

10.3 PCM Parameter

NO	Item	Criteria
1	Over Charge Protection Voltage	4.28±0.025V
2	Over Discharge Protection Voltage	3.00±0.005V
3	Over Current Protection	1.00~1.50A
4	Current consumption in normal operation	7uA MAX

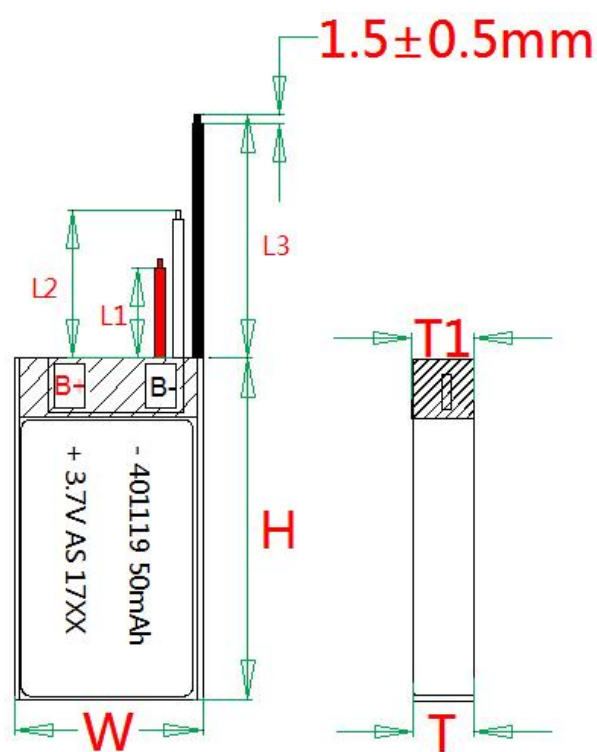
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Fig.1 Dimensional Drawing of 401119

Item	Cell-Specifications
T	3.8 mm max.
W	11.5 mm max.
H	19.5 mm max.

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Fig.2 Dimensional Drawing of 401119



Item	Final Product Outline Specification	
T	4.0 mm max.	
W	11.8mm max.	
H	22.0 mm max.	
L1 Red Wire	4±2 mm max.	UL3302 32AWG
L2 White Wire	8±2 mm max.	UL3302 32AWG
L3 Black Wire	12±2 mm max.	UL3302 32AWG
After 500 cycles battery pack size		
Item	Specifications	
T	4.20mm max.	
W	11.8 mm max.	
H	22.0mm max.	

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AS-401119-0050-1 1 2															
															(Digit 1, 2) A&S Power (Company Name)
															(Digit 3,4,5,6,7,8) Model No. Of single cell
															(Digit 9,10,11,12) Capacity
															(Digit 13) In Series QTY
															(Digit 14) In Parallel QTY
															(Digit 15) Series No.

- 401119 50mAh
+3.7V AS17XX

- a) UL 1642 completed. File # MH 60807;
- b) CE, completed
- c) 2013/56/EU passed
- d) IEC 62133, completed
- e) UN 38.3, completed

- f) ROHS Pass
- g) REACH Pass
- h) Halogen Free Pass

Two photographs of a small, rectangular, white lithium polymer battery. The left image shows the battery with its gold-colored terminals and a yellow protective tape. The right image shows the battery from a different angle, highlighting its thin profile and the yellow tape. The battery is labeled with the text: 401119 50mAh, 3.7V, AS1747.

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