



Lithium-ion Polymer 1100mAh Battery Datasheet

Distributed by TinyCircuits:

TinyCircuits Part Number: ASR00008

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Battery Connector Part: JST SHR-02V-S-B

Battery Mating Connector Part: JST SM02B-SRSS-TB(LF)(SN)

Manufacturing Information:

Company: Shenzhen Hondark Electronics Co., Ltd.

Product Type: Lithium-ion Polymer Battery

Model Name: 604040-1100mAh

USHTS: 8507600020

ECCN: EAR99

Country of Origin: China

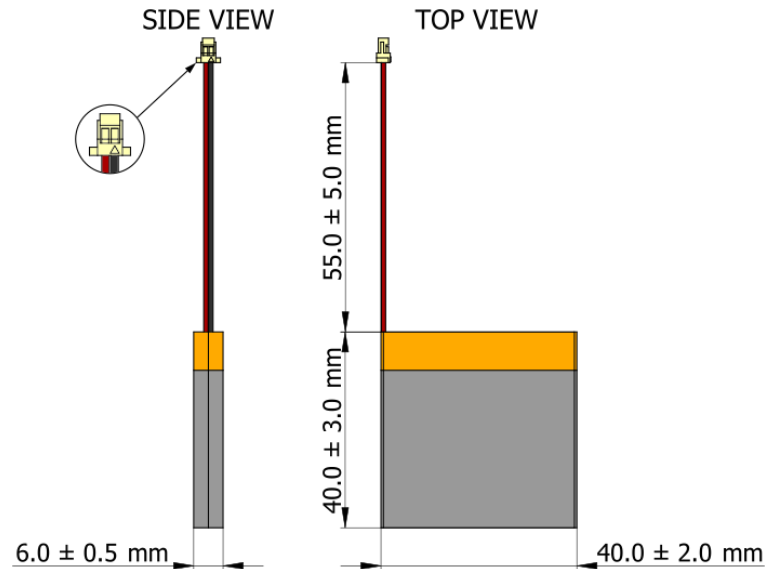


Figure 1: 1100mAh Battery Drawing & Dimensions

1. Dimensions and Appearance

1.1 Outline Dimensions: See attached drawing, Figure 1, for dimensions.

Note: The thickness of the battery will swell when stored or used at high temperatures.

1.2 Appearance: The outer surface of the battery is clean, no electrolyte leakage, no obvious scratches and mechanical damage, no deformation, no other appearance defects that affect the value of the battery.

2. Battery Specifications

Table 1: Ratings

| No. | Item | Specification | Unit | Notes |
|------|----------------------------------|---------------|------|---|
| 2.1 | Normal Capacity | 1100 | mAh | 0.2C Discharge |
| | Minimum Capacity | 1100 | mAh | |
| 2.2 | Nominal voltage | 3.70 | V | |
| 2.3 | AC Impedance Resistance | ≤110 | mΩ | (with PCB) 25 °C |
| 2.4 | Discharge Cut-off Voltage | 3.0 | V | |
| 2.5 | Overcharge Protection Voltage | 4.28±0.025 | V | |
| 2.6 | Overdischarge Protection Voltage | 3.0±0.05 | V | |
| 2.7 | Maximum Charge Voltage | 4.20 | V | |
| 2.9 | Standard Charge Current | 550 | mA | 0.5C |
| 2.10 | Maximum Charge Current | 1100 | mA | 1.0C, (10 - +45 °C) |
| 2.11 | Maximum Discharge Current | 1100 | mA | 1.0C |
| 2.10 | Weight | Approx 20 | g | |
| 2.12 | Charge Temperature | 10 - +45 | °C | |
| | Discharge Temperature | -10 - +45 | °C | |
| 2.13 | Storage Temperature (≤ 1 month) | -10 - +45 | °C | |
| | Storage Temperature (≤ 3 months) | -10 - +40 | °C | |
| | Storage Temperature (≤ 6 months) | -0 - +25 | °C | |
| 2.14 | Storage Humidity | ≤ 75% | RH | |
| 2.15 | Standard Testing Condition | | | Temperature: 25±2 °C, Humidity: 45%-75%RH |

3. General Performance

3.1 Initial Performance Test

| Item | Measuring Procedure | Requirements |
|-----------------------------|---|--|
| (1) Open-Circuit Voltage | The open-circuit voltage should be measured within 24 hours after standard charge. | $\geq 4.15V$ |
| (2) Internal Resistance | The Impedance shall be measured at 50% charge in an alternating current method (1kHz LCR meter) after standard charge at $25\pm 2^{\circ}C$ | $\leq 100m\Omega$ |
| (3) Minimum Capacity | After standard charging, put it aside for 30 minutes, discharge 0.5C to 2.75V, and test the cell capacity (The capacity is defined as C5) | C5 $\geq 1100mAh$ |
| (4) 0.5C Discharge Capacity | After standard charging, test 0.5C discharge capacity | Discharge Capacity $\geq 95\%$ C5 |

3.2 Electrical Performance

| Item | Measuring Procedure | Requirements |
|------------------------------------|---|--|
| Cycle Life (25°C) | Charge the battery: 0.2C to 4.2V; Discharge: 0.2C to 3.0V; When the discharge capacity drops to 80% of the initial capacity, the number of cycles completed is defined as the cycle life of the battery. | Cycle life ≥ 300 cycles |
| Long Term Storage Performance | The battery for this experiment should be a battery less than 3 months from the date of production to the date of the experiment. Charge the battery with 50% of its capacity before storage, then leave it open for 365 days, and cycle at 0.2C at $25\pm 2^{\circ}C$. 3 Second, test the recovery capacity (the maximum discharge capacity in a 3-week cycle). | Capacity recovery $\geq 85\%$ C5 |
| Self-discharge at room temperature | Charge the battery at a constant current and constant voltage of 0.2C for 360 minutes, with a cut-off voltage of 4.0V. Then place the battery in a normal temperature environment, leave it open for 24 hours. | Battery will lose up to 10 millivolts of voltage |

4. Environmental Performance

Mechanical Properties

| Item | Measuring Procedure | Requirements |
|-----------------------------|--|---|
| Vibration test | After standard charging, the battery is to be tested under the following conditions: Displacement Amplitude: 0.19mm Frequency: 10-55Hz (sweep:1Hz/min) Direction for vibration: X/Y/Z axis for 30min. The battery is to be tested in three mutually perpendicular axes. | The battery has no leakage, smoke, or explosion. |
| Drop test | After standard charging, the drop test shall be carried out according to the following conditions: Drop height: 1.5m Surface: 18-20mm or more thick hardwood or concrete Falling direction: fall once along the front and back sides of the horizontal direction | The battery has no leakage, smoke or explosion. |
| Thermal-shock 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 $130\pm 2^{\circ}\text{C}$ where the battery is to remain for 30 minutes. | No explosion, no fire |
| Temperature Characteristics | 1. Under the condition of $25\pm 5^{\circ}\text{C}$, use the method 4.2.5 to charge the battery. 2. Under different temperature conditions, discharge with a constant current of 0.2C to a cut-off voltage of 3.0V. Calculate the percentage based on the discharge capacity at 25°C . | -10°C: $\geq 50\%$ 0-25°C: 100% 45°C: $\geq 85\%$ |

5. Safety Performance

| Item | Measuring Procedure | Requirements |
|-------------------------|---|--|
| 5.1 Over-Charge Test | After standard charging, the battery and the sliding rheostat are connected in series with a constant current and constant voltage source, the voltage is adjusted to 4.6V, the current is adjusted to 3.0C through the sliding rheostat, and then the battery is charged at 3.0C. The test time is 2.5H. | No explosion, no fire |
| 5.2 Over-Discharge Test | The fully discharged cell is continually discharged for 24h with the (30×n) load at 23±2°C | No explosion, no fire |
| 5.3 Short-Circuit Test | After standard charge, short-circuit the battery 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 external temperature of the battery shall not exceed 160°C |

6. Protection Circuit Characteristics

Table 2: PCM Standard (Protection Board Standard)

| Item | Details | Standard |
|--------------------------|------------------------------------|-------------------------|
| Overcharge Protection | Overcharge detection voltage | 4.30±0.05V |
| | Overcharge detection delay time | 1.0s±0.5s |
| | Overcharge release voltage | 4.10±0.05V |
| | Maximum Charge Current | - |
| Overdischarge Protection | Overdischarge detection voltage | 2.4±0.1V |
| | Overdischarge release voltage | 3.0±0.1V |
| | Overdischarge detection delay time | 100±50ms |
| Overcurrent Protection | Overcurrent detection voltage | 0.2±0.025V |
| | Overcurrent detection current | 2.0A - 5.0A |
| | Overcurrent detection delay time | 10±5ms |
| | Protection release condition | Disconnect load |
| Short Circuit Protection | Max. continuous current | ≤2.5A |
| | Detection condition | Exterior short circuit |
| | Detection delay time | 150μs - 500μs |
| | Protection release conditions | Break the short circuit |

7. PCM Schematic Diagram & Table

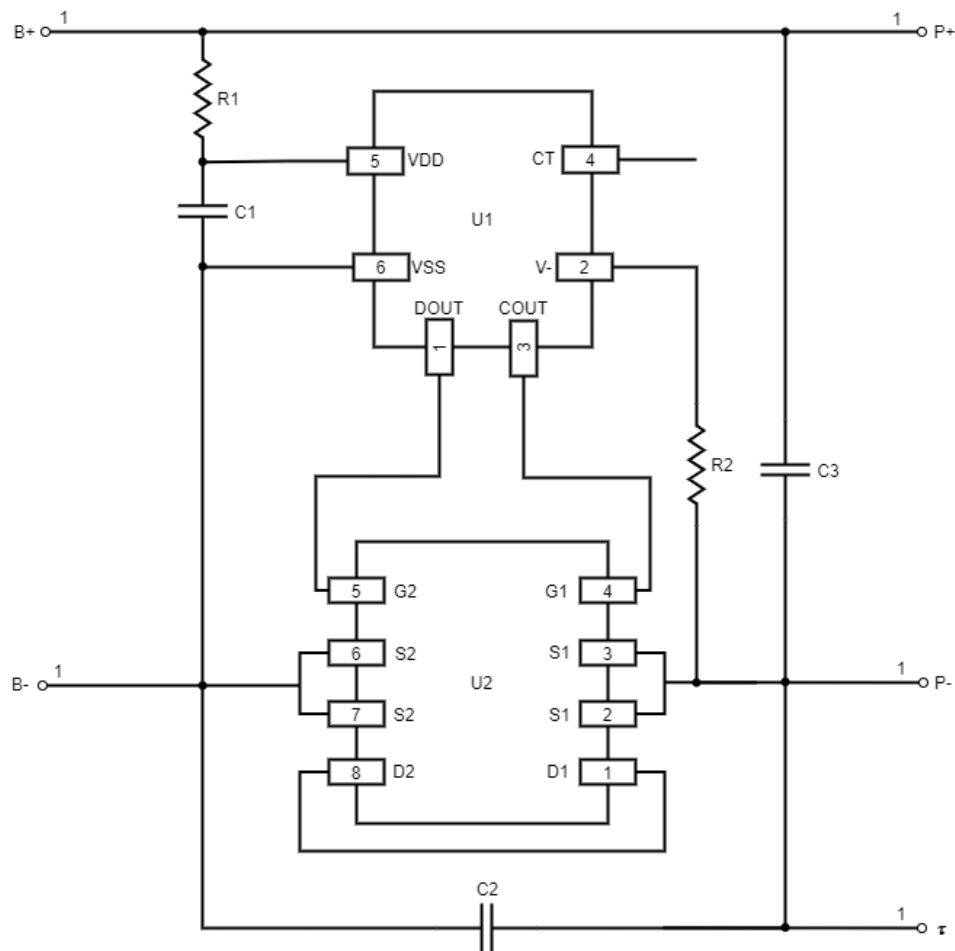


Figure 2: 1100mAh Battery Schematic

Table 3: PCM BOM List

| No. | Label | Component | Specification | Unit | Qty. |
|-----|-------|-----------------------|---------------|------|------|
| 1 | U1 | Silicon MOSFET | 8205A | pcs | 1 |
| 2 | U2 | Battery Protection IC | DW01 | pcs | 1 |

Reference Battery Charging Schematic Diagram & Table

The following schematic and list of parts is implemented in a lithium ion polymer battery charging diagram that is a simplified version of the TinyCircuits Battery Charger, product ASL2112*.

*The ASL2112 is a standalone Lithium battery charger that can be used with a Micro USB B cable. Use the JST SH connector on the ASL2112 board to easily plug-in a battery (compatible batteries sold at <https://tinycircuits.com/>). Alternatively, a battery can be connected without the JST SH connector by using the two through holes, J3 and J4, to connect to a battery pack. To charge a battery with ASL2112, plug the USB B side of the charger into a power source using a compatible cable, and plug a lithium polymer or lithium ion rechargeable (3.7V / 4.2V) battery into the other side. A status LED on the board will indicate when a battery is charging, and the LED will turn off when the battery is fully charged.

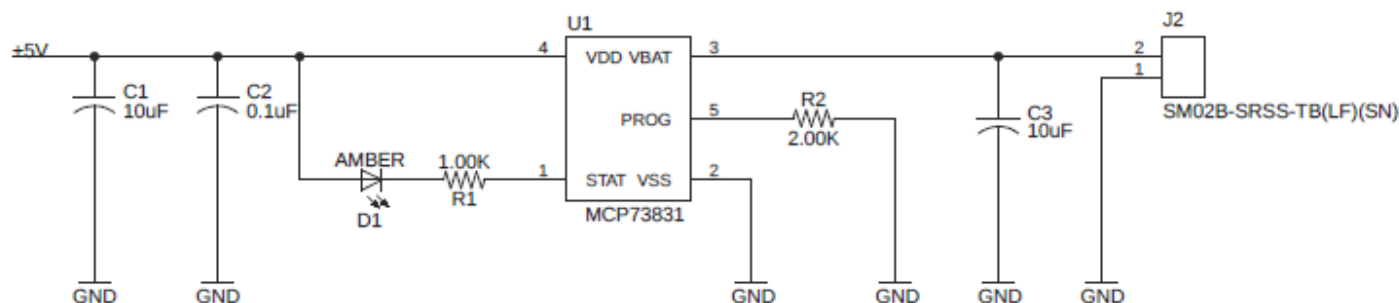


Figure 3: Sample Battery Charger Schematic

Table 4: PCM BOM List

| Component | Label | Specification | Notes |
|-----------|-------|---------------------------|---|
| IC | U1 | MCP73831 | |
| R | R1 | 1KΩ | |
| R | R2 | 2KΩ 2 | |
| C | C1,C3 | 10μF | |
| C | C2 | 0.1μF | |
| LED Diode | D1 | AMBER | Charging Status LED |
| Connector | J2 | JST SM02B-SRSS-TB(LF)(SN) | Compatible Battery Connector: JST SHR-02V-S-B |

Handling Instruction and Warnings

Read and observe the following precautions carefully to ensure the correct use of lithium-ion batteries. Our company is not responsible for any problems arising from violation of the following precautions.

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

Battery Environment

- Do not immerse the pack in water, seawater, or other liquids.
- Do not use, or leave the battery near heat sources such as a fire or heater.
- Do not use or store the battery where it is exposed to an extremely hot environment, such as in a car under direct sunlight or on a hot day. Otherwise, the battery will overheat and may catch fire (ignite). This can also reduce battery performance and/or shorten service life.
- Do not place the battery in a microwave oven or pressurized container.
- Do not use the battery in a location where static electricity or magnetic fields are great, otherwise, the safety devices in the pack may be damaged, which may cause unsafe risks.
- Keep the batteries out of the reach of young children. If a child somehow swallows a battery, seek medical attention immediately. In cases where children use the battery, instruct them on the contents of this document and supervise them to ensure that the battery is being used correctly.
- Use the battery only under the environmental conditions mentioned in this document. Failure to do so can result in reduced performance or a shorten service life. Using the battery outside this temperature range can cause the battery to overheat, explode or catch fire.

Aluminum Foil Flexible Packaging

- The aluminum foil flexible packaging encasing the battery cells is vulnerable to sharp objects that could puncture or damage the integrity of the aluminum.
- Do not transport or store the battery together with metal objects such as keys, necklaces etc.
- Do not strike at pack with any sharp objects. The soft aluminum packing foil may be easily damaged by sharp edge parts such as Ni-tabs, pins and needles.
- Do not strike the battery with any sharp-edged parts.
- Trim nails or wear gloves before handling batteries.
- Clean worktable where battery is used to avoid any sharp objects.
- Polymer batteries have lower mechanical durability than metal shell prismatic batteries. Drops, collisions, bending, etc. may reduce the performance of polymer batteries.

Battery Electrolyte

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

- Pay attention to the use of insulation structures between the battery core (the exposed aluminum layer on the side and the top edge of the package sealing film) and the PCB, as well as between the battery core and electrical appliances. Pay special attention to the insulation between the aluminum layer and positive and negative terminals of the battery. Contact of the poles and aluminum layer or electrical equipment may cause battery leakage or swelling.
- 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.

Prohibit Short Circuit

- A short circuit will generate high current and may cause the battery to generate heat, leak electrolyte, smoke, and/or explode.
- Do not short-circuit the pack by connecting the positive and negative terminals directly, or by using conductive materials such as metal wire.
- Short circuiting is very dangerous. The battery tabs may be short-circuited by putting them on a conductive surface. An external short circuit such as this may lead to heat generation and damage to the battery.

Electrical Application

- Do not use the battery in combination with batteries of different capacity, type, or brand.
- Do not attempt to disassemble or modify the battery in any way.
- Do not use any chargers other than those recommended for Lithium-ion Polymer batteries. Consider using TinyCircuits' Battery Charger product ASL2112.
- Do not reverse the positive (+) and negative (-) terminals.
- Do not connect the pack to an electrical outlet, such as wall outlets or car cigarette-lighter sockets.
- Do not directly solder the pack or battery terminals.
- If the pack emits an odor, generates heat, becomes discolored or deformed, or any abnormal phenomenon occurs during charging, recharging or storage, immediately remove the battery from the charger or device, and stop use.
- If the case pack terminals are dirty, 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 that discharged battery may cause fire or smoke; tape the terminals with insulating paper to insulate them.
- For directions on battery installation and removal, read the instruction manual that accompanies the equipment in which the battery will be used.
- The load circuit may generate voltage and current, which will be reversed to the battery pack (including PCM). The voltage and current cannot exceed the reverse withstand voltage (RWV) and current (RWI) value of the protection board itself. High voltage or current can damage the protection board in the battery pack.

Storage

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.

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

Vendor Notes

The customer is requested to contact TinyCircuits in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

TinyCircuits will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.

TinyCircuits will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the battery, if it is deemed necessary.

Any matters that this specification does not cover should be conferred between the customer and TinyCircuits.

Period of Warranty

The period of warranty is 90 days from the date of shipment. If you find that the product does not perform to specifications at any time within ninety (90) calendar days of purchase, TinyCircuits will gladly replace the defective product. If the problem is caused by the user's misuse, it will not be replaced.

Amendment of this Specification

The company, TinyCircuits, has the right to revise this product specification. After revising the product specification, our company will notify the customer.