Lithium-ion Polymer 1100mAh Battery Datasheet

Distributed by TinyCircuits:

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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

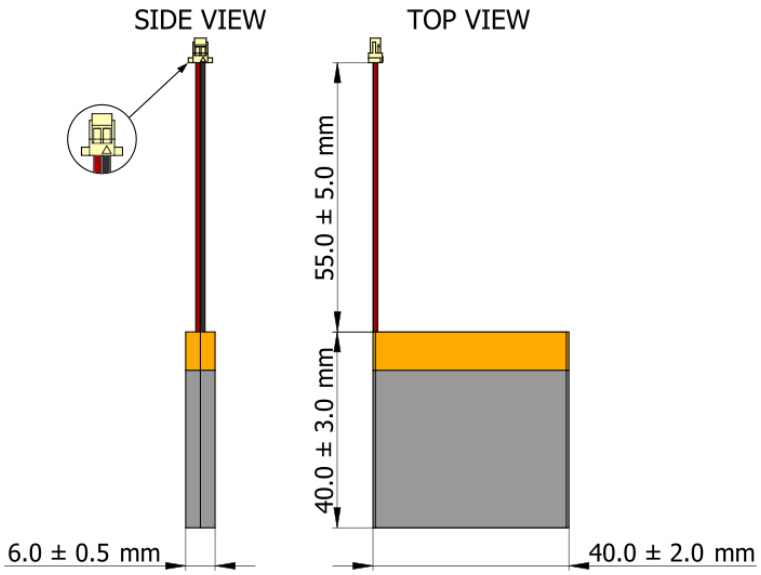

Figure 1: 1100mAh Battery Drawing & Dimensions

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 Minimum Capacity	1100 1100	mAh mAh	0.2C Discharge
2.2	Nominal voltage	3.70	V	
2.3	AC Impedance Resistance	$\leq$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 Discharge Temperature	10 - +45 $-$10 - +45	°C °C	
2.13	Storage Temperature ($\leq$ 1 month) Storage Temperature ($\leq$ 3 months) Storage Temperature ($\leq$ 6 months)	$-$10 - +45 $-$10 - +40 $-$0 - +25	°C °C °C	
2.14	Storage Humidity	$\leq$ 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±2℃	$\leq$100mΩ
(3) Minimum Capacity	After standard charging, put it aside for 30 minutes, discharge 0.5C to 2.75V, and test the cell capacity (The capacity is defined as **C5**)	**C5**$\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℃)	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 $\geq$ 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±2℃. 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±2℃/min to a temperature of 130±2°C where the battery is to remain for 30 minutes.	No explosion, no fire
Temperature Characteristics	1. Under the condition of 25±5℃, 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℃.	-10℃: $\geq$50% 0-25℃: 100% 45℃: $\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℃	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	$\leq$2.5A
	Detection condition	Exterior short circuit
	Detection delay time	150μs - 500μs
	Protection release conditions	Break the short circuit

7. PCM Schematic Diagram & Table

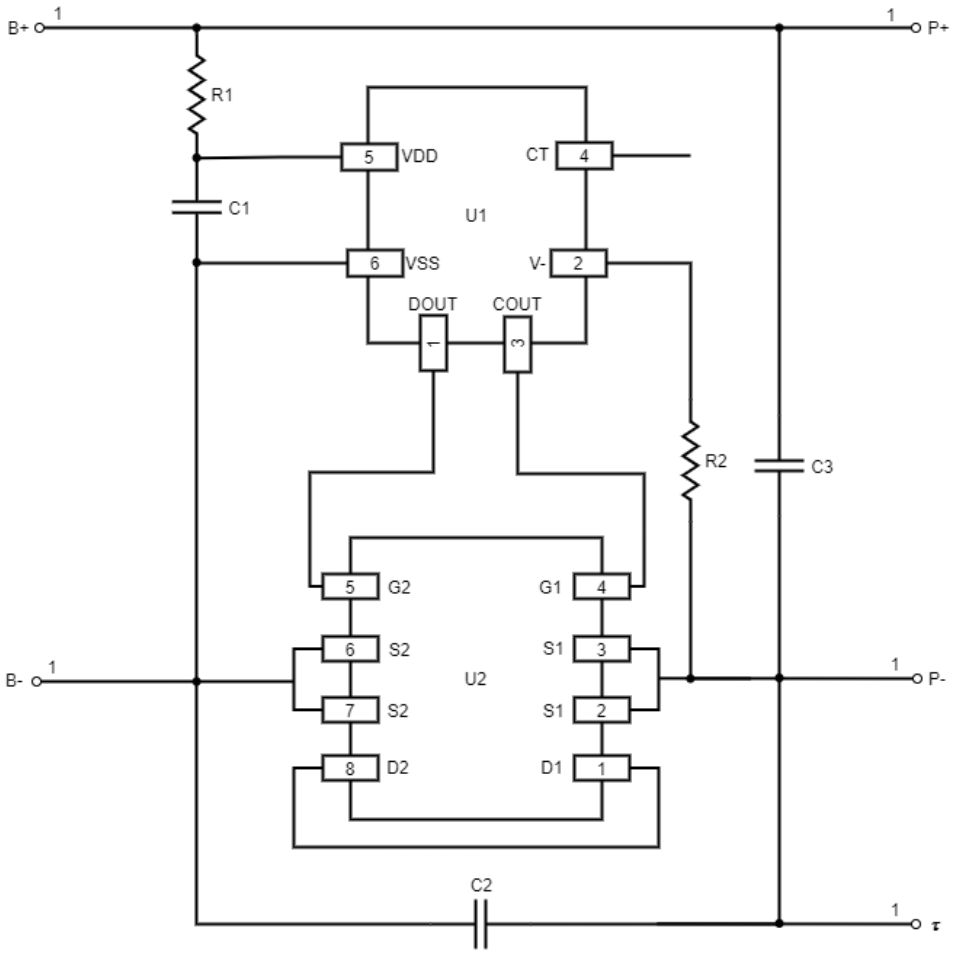

Figure 2: 1100mAh Battery Schematic

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.*

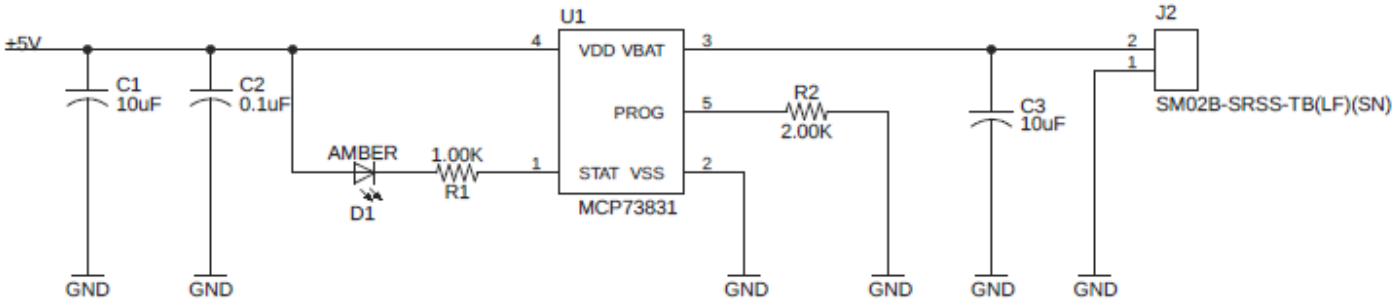

Figure 3: Sample Battery Charger Schematic

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.