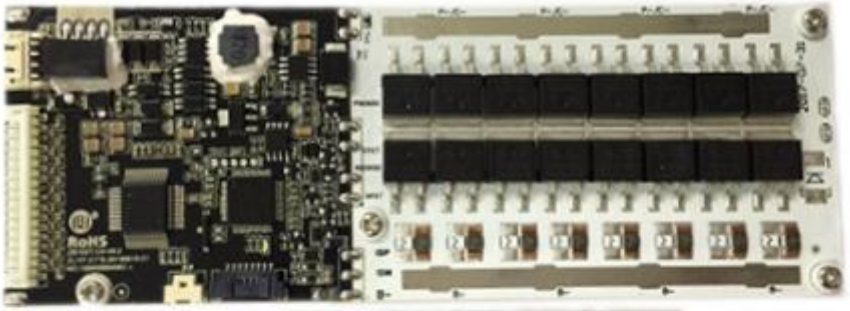
Product Manual

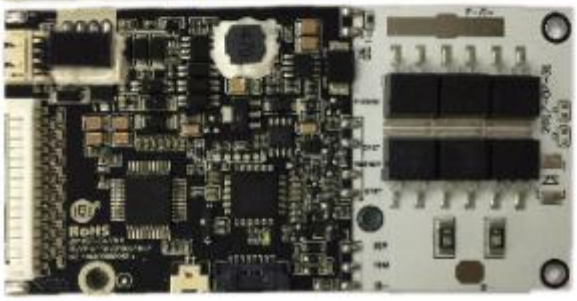
(CANBUS & UART)

170*60*25mm
Current≤60A



140*60*10mm
Current≤40A

120*60*10mm
Current≤20A



Company Name	Shenzhen Smart Li-ion Energy Technology Co.,Ltd.	TEL	+86-0755-82175278
Address	Second Floor, Building 11, Huanlian Industrial park, Huaning Road, Dalang street, Longhua, Shenzhen, China (P.O 518109)		

1. Summary

This series BMS is mainly designed for intelligent management of small series high rate discharge batteries. This management system can realize intelligent management of 484V high rate power lithium battery. In thissc heme, a low-power and high-precision processor is used to match the high-precision front-end sampling chip for dynamic intelligent management of battery pack. This series BMS use our own independent SOC & SOH algorithm, which can achieve high-precision SOC estimation for large capacity battery packs. This system supports CAN communication and UART communication, and supports CAN and URAT online upgrading. At the same time, the system supports intelligent dynamic equalization to ensure that the lithium batteries work in a stable state and prolong the life of lithium batteries.

2. Application scope

48V (15S) LifePo4, Special in large capacity battery pack.

3. Product features

1) Support CAN communication, read battery information;

2) Support UART communication, read battery information, online firmware upgrade function;

3) Support 4 external temperature collection, have 4pcs temperature line;

4) Coulomb electricity calculation, accurate display of electricity, and equipped with power learning function;

5) Intelligent dynamic balancing;

6) Support record data storage;

7) Support on/off switch function(Default don’ t have it);

8) Support external expansion of PC tool, bluetooth or LCD.

4. Produce Specification

The following parameters are the default parameters, the specific parameters of the shipment report shall prevail.

SMART BMS	TECHNICAL SPECIFICATION FOR APPROVAL	Rev	V1
		Date	2018.11.06
		Page	1/2

No	Item	Condition	Specification
1	Input Voltage	Input Voltage B+ to B-	Cells x 3.65V
2	SOC	Cell Detection voltage accuracy	±30mV
		Battery Detection voltage accuracy	±300mV
		Detection current accuracy	3%
		SOC accuracy	10%
3	Over charge protection (single cell)	Over charge detection voltage	3650±30mV
		Over charge release voltage	3500±30mV
		Over charge detection delay time	1000±300mS
5	Over discharge protection (single cell)	Over discharge detection voltage	2500±30mV
		Over discharge release voltage	3000±30mV
		Over discharge detection delay time	1000±300mS
7	First Over discharge current	First Over current	45A±3%A
		First delay time	3S±300mS
8	Second Over discharge current	Second Over current	65A±3%A
		Second delay time	1S±300mS
9	Over charge current protection	Over current	20A±3%A
		Delay time	1S±300mS
10	Communication return delay time	No enter hibernation communication return delay time	≤100mS
		Return delay time after entering sleep communication (more than two commands are issued, the first is communication activated, and the second is data response)	≤100mS
11	Short protection	Short detection delay time	200~600uS
		Release Conditions	Cut load and charge

No	Item	Condition	Specification
12	Temperature protection	High temperature discharge protection	65℃（±3℃）
		High temperature discharge recover protection	60℃（±3℃）
		Low temperature discharge protection	-20℃（±3℃）
		Low temperature discharge recover protection	-15℃（±3℃）
		High temperature charge protection	55℃（±3℃）
		High temperature charge recover protection	50℃（±3℃）
		Low temperature charge protection	-5℃（±3℃）
		Low temperature charge recover protection	0℃（±3℃）
		High temperature Mosfet protection	85℃（±3℃）
		High temperature Mosfet recover protection	75℃（±3℃）
13	Communication	CAN	Support
14	Communication	UART	Support
14	On/off switch	Control discharge mosfet open or close	Support (Default is not)
15	Battery temperature monitoring	4 external temperature lines	Support
16	Balancing	Passive consumption equilibrium	Support
17	Extension function (Choose one of them)	1）PC software 2）Bluetooth 3）LCD	Support
18	Short circuit protection	Support battery pack within 30AH	Support
19	Normal current consumption	Normal model	≤30mA
		Sleep model	≤300uA
		Hibernate model	≤20uA
20	0V charger	Allowed 0V change	No
21	Suggest working conditions	Suggest Max continuous discharge current	30A
		Suggest Max continuous charge current	15A
		Suggest cell capacity	Software match
22	Appearance	1) No components are damaged. 2) All the solder joints are good. 3) PCM has no warping. 4) Compliance with the appearance standard of BMS company	
23	Reliability test	ESD test : Connect 6KV Air 10KV	

Note: The basic protection parameters can be modified by PC software!
Please revise it under the guidance of professional engineers!

5.Function description

5.1 Sleep function:

When the battery is normal and still for 30S, the BMS enters the system to hibernate and reduces the self-consumption. At this time, the charging and discharging MOS is in the open state, and the charging or discharging can be activated to the normal working state. The power consumption after dormancy is less than 300uA.
Dormant activation conditions: Current (charging, discharging) and communication activation.
Note: 1) In the case of balanced start, do not start sleep.
2) When on/off switch is disconnected, and the power consumption after dormancy is less than 300uA.

5.2 Overdischarge (Deep dormancy):

When the battery pack is in the overdischarge state and the minimum voltage is less than the overdischarge protection value, BMS will reduce the power consumption to the minimum, BMS will enter the shutdown state, and the power consumption after deep dormancy is less than 10uA, only the charger can be activated (it must be guaranteed that the charger has a voltage).

5.3 Charging instruction:

When the battery pack needs to be charged, the voltage of the charger is recommended to be lower than the single overcharge protection value by 30mV.The voltage of the charger is lower than the overcharge protection value, and the BMS protection will not trigger the overcharge protection. In this way, the energy charged by the battery pack is sufficient. If the voltage of the charger is high and the charging current is still large, the BMS will trigger overcharge protection because the charging voltage reaches the overcharge protection value, which makes the charging energy insufficient.

5.4 On/off switch function:

On/off switch is a switch that only control discharge mosfet open or close.

There have an orange wire named 'EN' wire need connected to positive poles of batteries (B+), then BMS will have output.

When the orange wire named 'EN' wire is disconnect to B+, then output will turned off.

By default, there have no on/off switch function. Customer need ask before produce then will have it.

5.5 External switch reset function:

If the battery pack fails to communicate, discharge or charge, etc.

Press the reset button of the external switch to restart the BMS system.

There have two wires, connect the tail of two wires means open, disconnect means close.

For this function, the reset switch button must be connected to the battery case.

5.6 UART serial port extension:

The URAT serial port supports external expansion of the bluetooth, PC and LCD.

1) Bluetooth (Real-time display of monitoring battery information via mobile app);
2) LCD display (Real-time display of monitoring battery information);
3) PC software (Real-time display of monitoring battery information);
4) 2G module (Data exchange and positioning function, the data exchange of cloud background server is realized. The background server is tracking and monitoring the actual use of the battery pack in real time, upload and feed back battery information to the back-end server through 2G function. Smart to determine the health of the battery pack, as well as the abnormal state and prompt warning. At the same time, track and locate the geographic location of the battery pack in real time.)

Can not be used at the same time, can only choose one of them.

5.7 Communication:

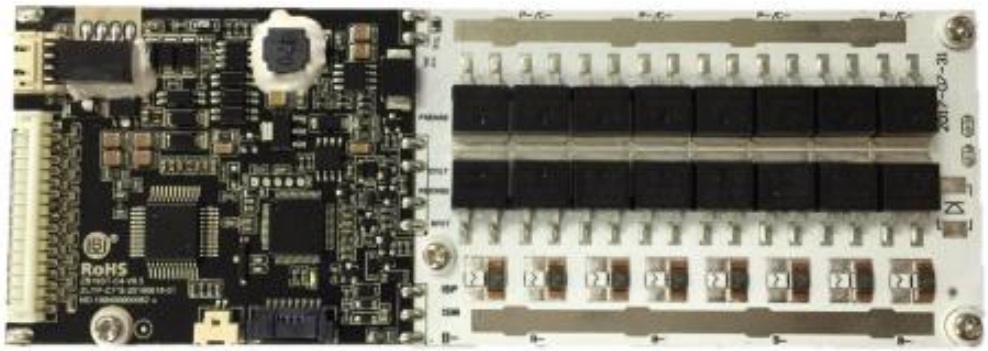
1) The system use CAN isolation communication, communication rate 500Kbps.
2) The system use UART isolation communication, communication rate 9600 baud rate.
The firmware can be upgraded online through UART communication.

Note: 1) CANBUS BMS only can connect with OUR PC SOFTWARE by UART plug.
2) If customer want to connect the software by CANBUS plug, it is necessary to purchase a CANBUS communication PC connector and software in other company.

6. Product connection instruction

6.1 Product picture

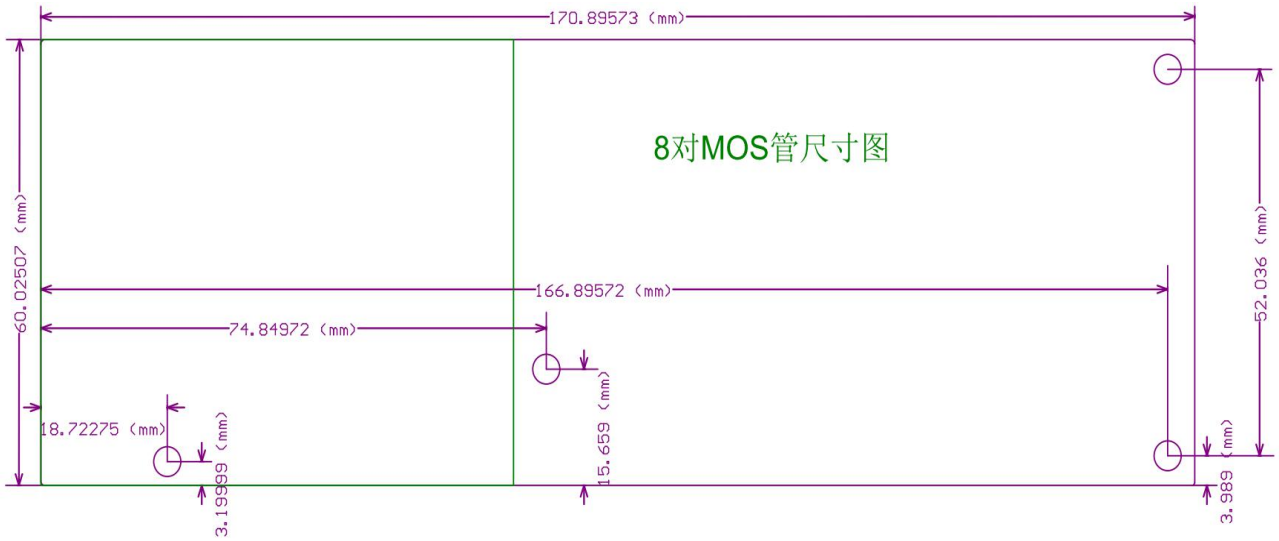
6.1.1 Product picture for 170*60*25mm.

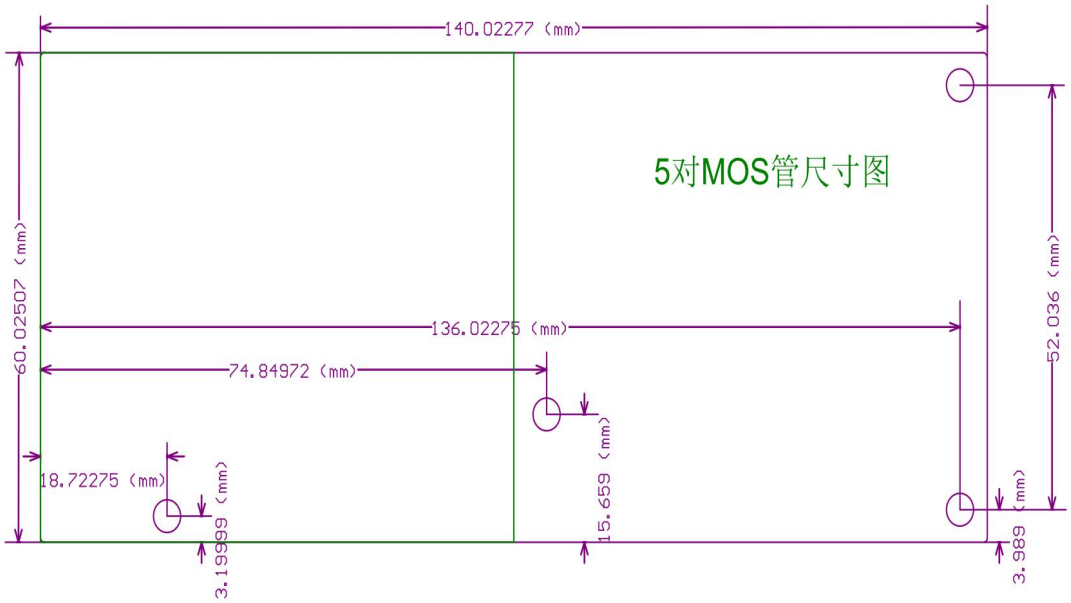


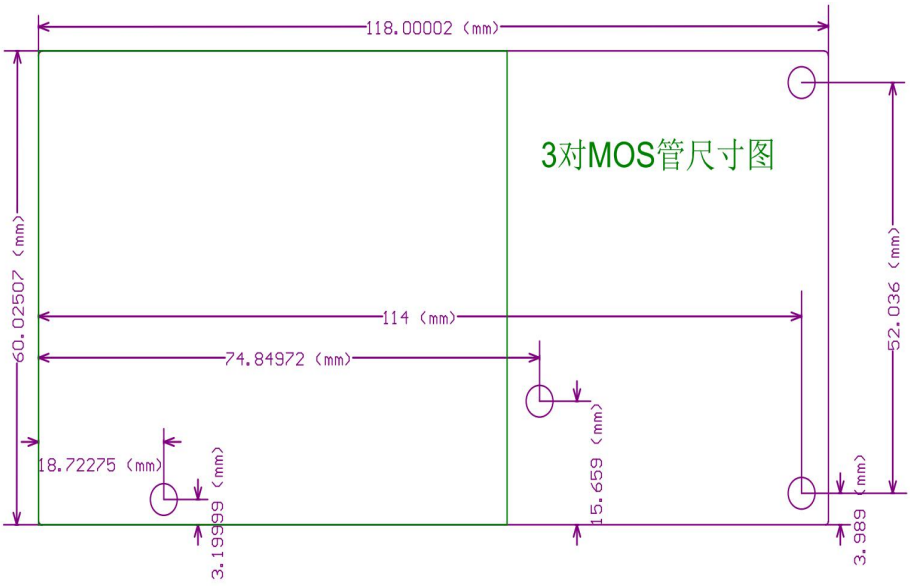
6.1.2 Product picture for 140*60*10mm.

6.1.3 Product picture for 120*60*10mm.

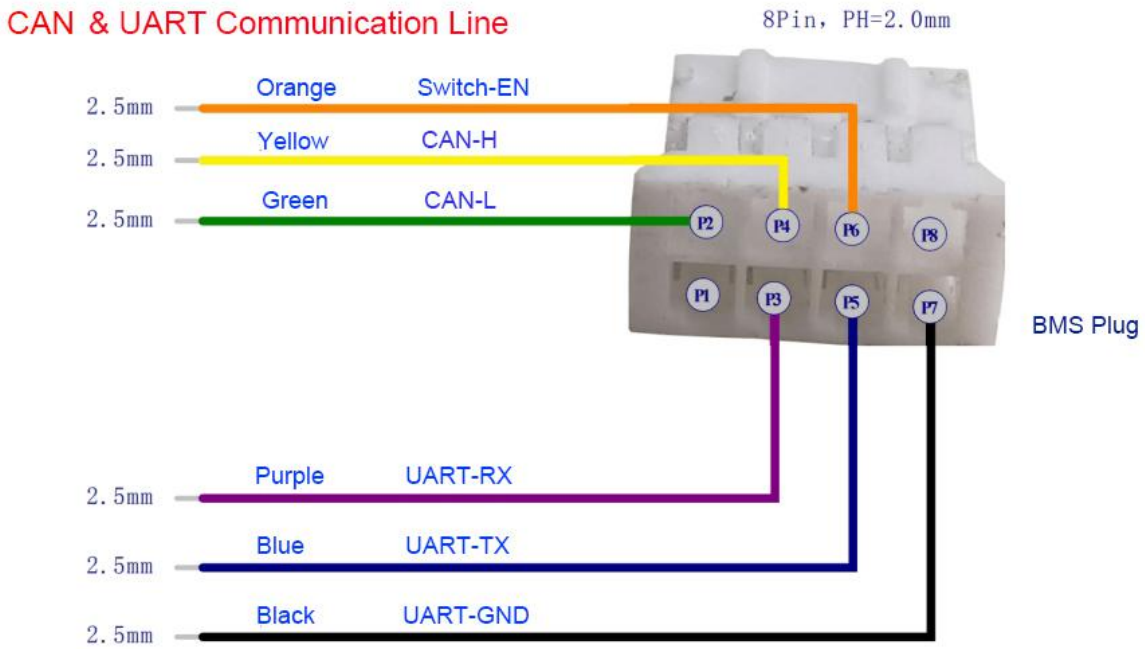
6.2 Dimensional drawing



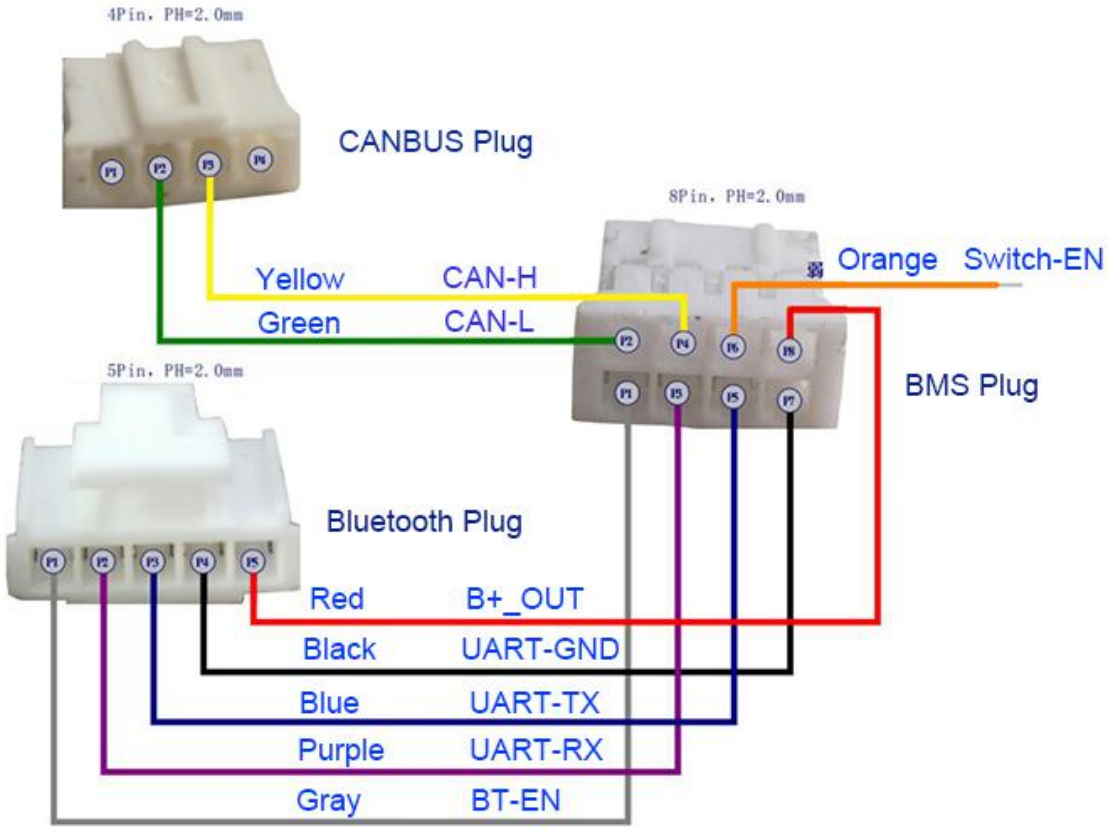




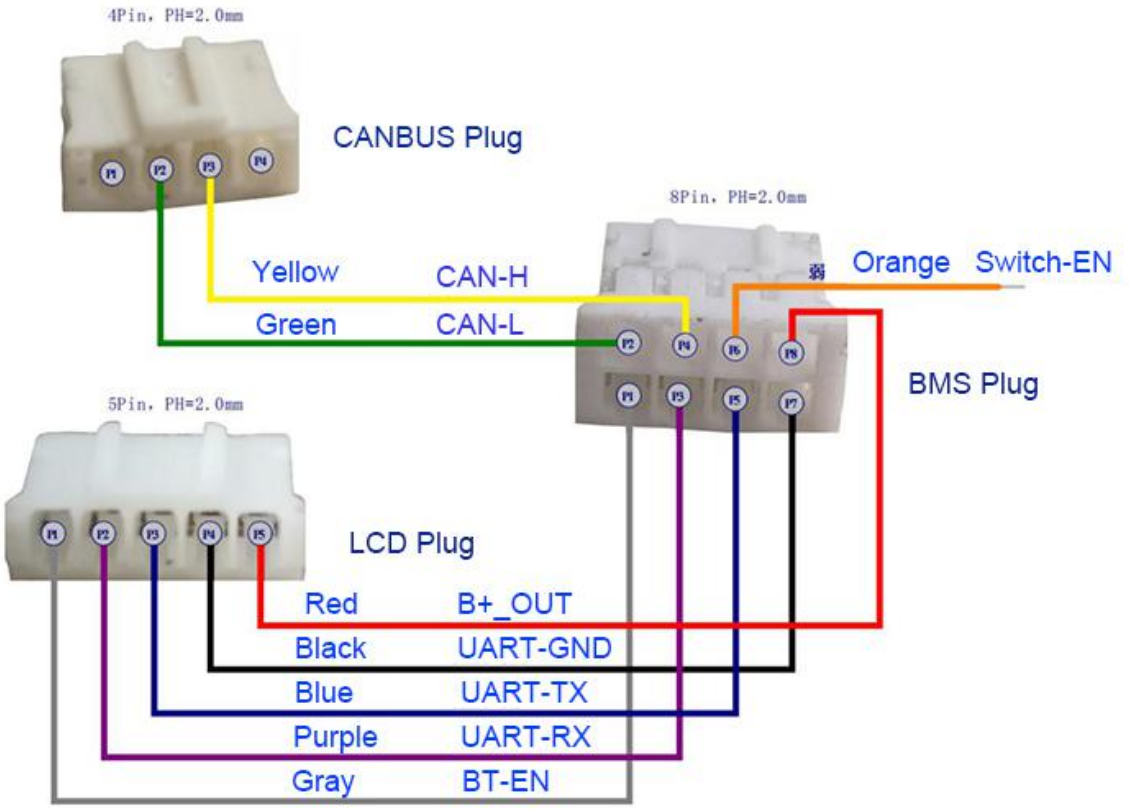
6.3 Description of each connecting terminal:



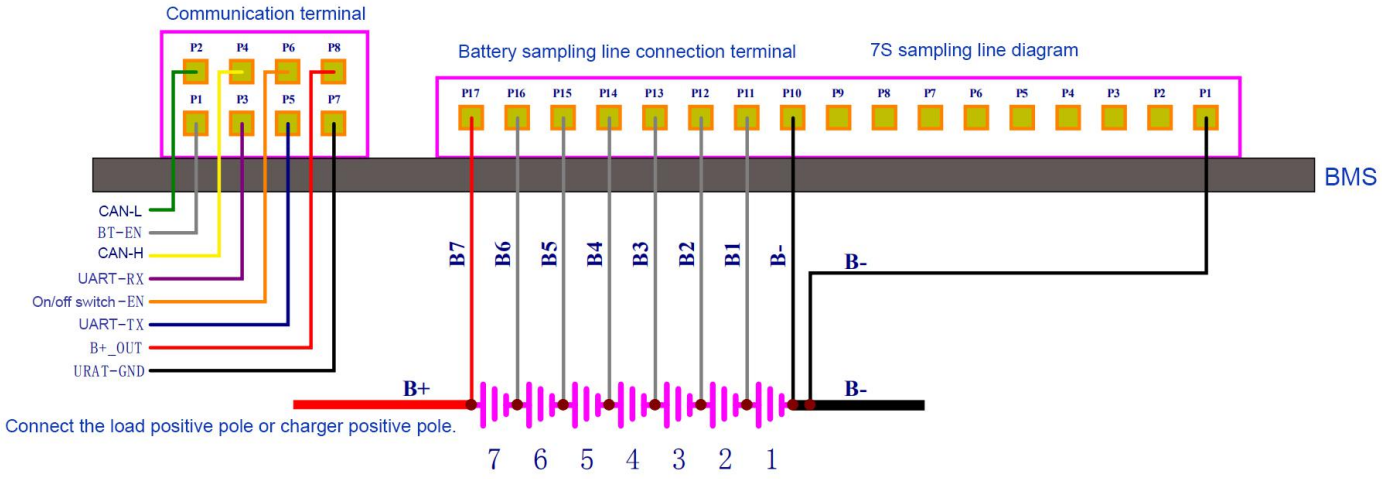
Bluetooth line:



LCD line:



Sampling line:

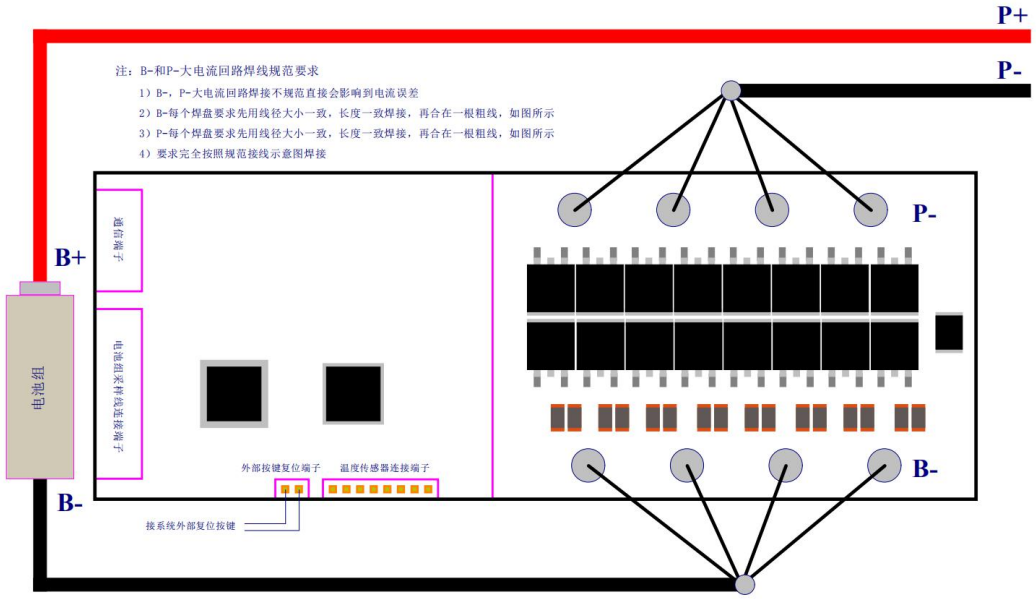


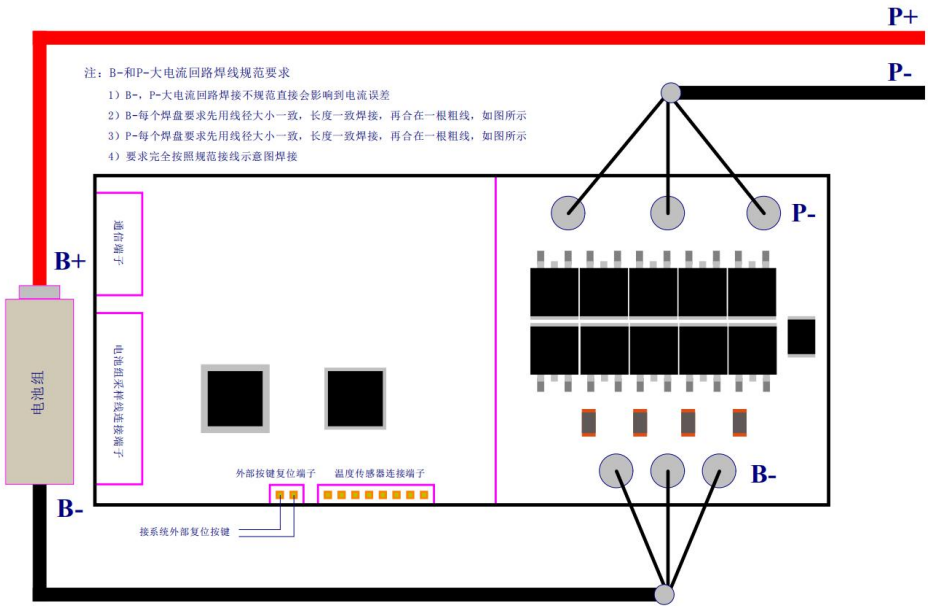
Warning:Requirements for B- and P- high-current welding lines

1) If B-, P- wire welding is not following the photo, it will directly lead to inaccurate data. When data is error, please check whether the wiring is correct first.

2)Each B- and P- solder pad shall be welded with the same wire diameter and length, and then assembled into a strong wire, as shown in the figure.

3)It is required to weld according to the standard wiring diagram.


P+
P-
注：B-和P-大电流回路焊线规范要求
1）B-，P-大电流回路焊接不规范直接会影响到电流误差
2）B-每个焊盘要求先用线径大小一致，长度一致焊接，再合在一根粗线，如图所示
3）P-每个焊盘要求先用线径大小一致，长度一致焊接，再合在一根粗线，如图所示
4）要求完全按照规范接线示意图焊接
通信端子
电池组采样线连接端子
电芯组
B+
B-
外部按键复位端子
温度传感器连接端子
接系统外部复位按键
P-
B-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通信端子
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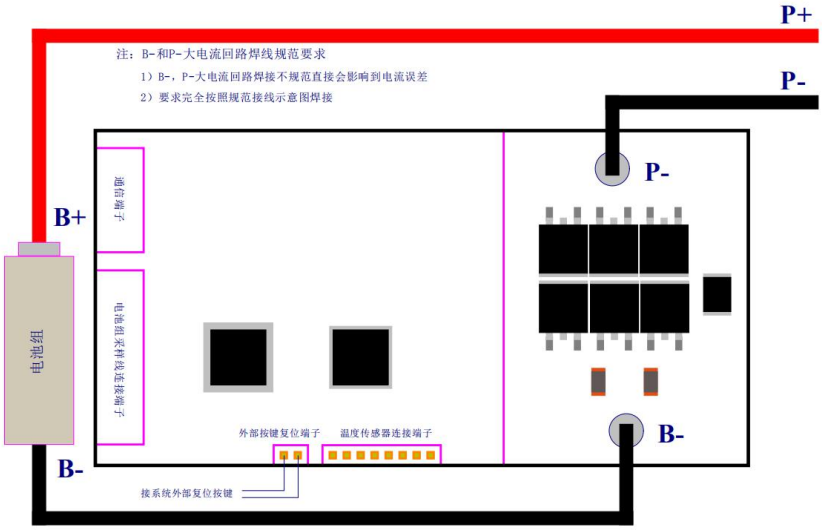
B+
B-
外部按键复位端子
温度传感器连接端子
接系统外部复位按键
P-
B-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通信端子
电池组采样线连接端子
电芯组
B+
B-
外部按键复位端子
温度传感器连接端子
接系统外部复位按键
P-
B-

7. Announcement for BMS connection to battery pack

Warning: If BMS is connect to the battery pack, or disconnect with the battery pack, the following wiring method must be observed; otherwise, it may damage the components, leading to the failure of protection function and serious consequences such as failing to protect the battery.

1）Steps to connect BMS：

A)The sampling line is sequentially welded from low to high to the battery pack.
（This step remember don’ t put the sampling line port into BMS!）

B)Weld the B-, P-, and B+ wires to the battery pack.Make sure the wire is well welded to the corresponding electrode and the B- main current negative wire has welded to the main and negative side of the battery pack;

C)Make sure all the tail of sampling line is connect with the battery, then put the sampling line port to BMS.

After the above steps, the battery pack is connected to the protective plate.
Then connect the external charger, or load.

2）Steps to remove BMS（ Reverse the order above）：

A)Disconnect external charger, or load.

B)The positive electrode of the battery is disconnected with P+.

C)Unplug the sampling line.

8. Other attention：

1.After the product is connected with the battery pack, if there is no voltage output for the first time, please use the special charger to charge and activate.

2.Please note that the lead head, soldering iron, etc. in the assembly should not touch the components on the circuit board, otherwise the circuit board may be damaged.

3.Please pay attention to the use of anti-static, moisture-proof and waterproof.

4.This product can only be used in a separate battery pack, can not in parallel or in series.

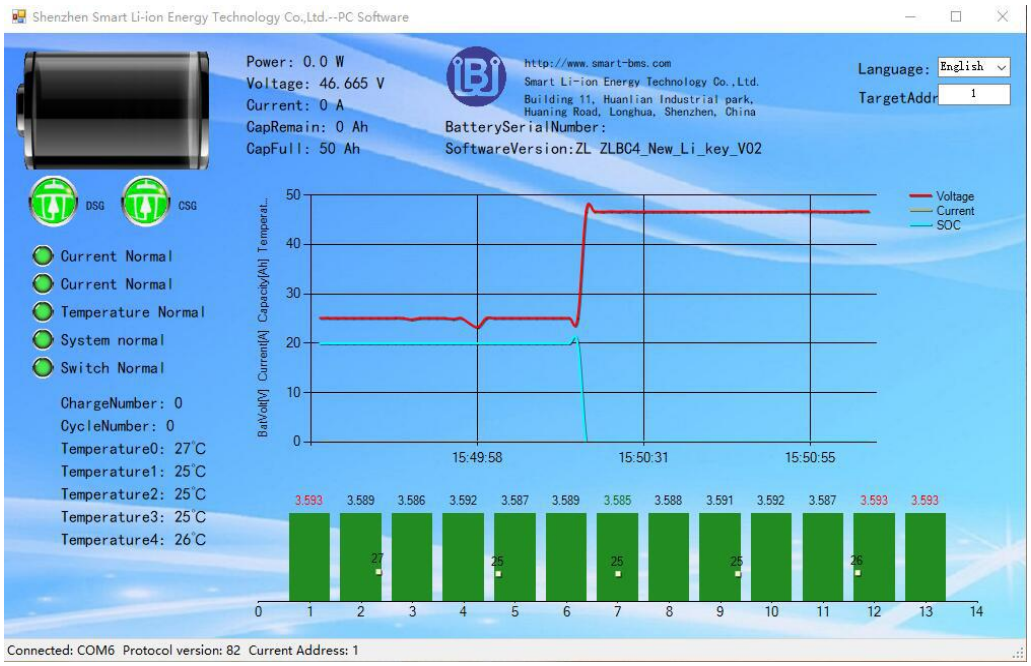
5.After the product is assembled with the battery, the aging cabinet cannot be used to measure the battery voltage, otherwise the battery pack maybe will damaged.

6.If the battery pack is stored for a long time, it is recommended not to exceed 3 months.Charge the battery pack at least once regularly.

7.Please follow the design parameters and usage conditions during use, and do not exceed the values in this specification. Otherwise, BMS maybe will damaged.

9.PC software:

9.1 Information display (Picture for reference only)



Information including voltage,current,temperature,electricity,real-time data,etc.

1)On the left side of the page is the status display:Green is normal,red is abnormal.

a)Voltage state includes: normal voltage, overcharge protection, over discharge protection, differential pressure protection, etc.

b)Battery status: normal current, charging over current, discharging over current, short circuit protection, etc.

c)Temperature status: normal temperature, high charge temperature, high discharge temperature, low charge temperature, etc.

d)Communication status: normal communication, attempted connection, etc.

2)At the bottom of the page is the battery single voltage display.

a)Describe the battery voltage directly in curve form,and display maximum voltage, minimum voltage, maximum pressure difference.

b)When the battery enters the balance, the voltage point of the battery shows the balance state in blue.

3)Upper left corner of the page(Battery icon)

a) The battery icon shows the percentage of remaining battery pack capacity.

Display charging and discharging status simultaneously.

b) Show the corresponding percentage of capacity in green and black.

4)Upper left corner of the page(Two Mosfet icons)

a) Respectively indicate the status of charging and discharging open or close, green means on, black means off and red means damage.

b) Click the corresponding MOS icon to turn off the charging or discharge switch to realize remote shutdown.

9.2 Parameter display and modification (Picture for reference only)

In the more information interface, it can read data such as protection parameter, and also has parameter modification function.

Note: We do not recommend that customer modify the parameters themselves.

Please understand the battery parameter and actual demand parameter in detail before modifying the parameters, to avoid hidden dangers.

If the customer change the parameters after purchase, we will not be responsible for any problem. Customer have to sign a disclaimer and change by password.

9.3 Cycle record.

The communication data is automatically saved in the PC software running directory in real time, named with time and saved with the CVS suffix.

10. Balancing function description

Equalization resistance 75R 1/4w (10~30mA) pulse equalization.

Equalization type: Passive consumption equalization.

Equalization mode: Mode 0 means no equalization, mode 1 means start equalization when charging, mode 2 means charge or static equalization.

The following is the regulation of charging balance.

A)Open conditions: Satisfy all the following conditions.

a)Charging state or static state.

b)The voltage of the cell is greater than the set value (3.8v).

c)The voltage difference of the cell is greater than the set value of 50mV and less than 0.5v.

B)Close condition: One of the conditions is happened.

a)Discharge state, overcharge and disconnection protection for any of them.

b)The voltage difference of the cell is less than 20mV or greater than 0.5v.

c)The highest cell voltage is less than or equal to 3.8v.

d)The equilibrium temperature is greater than 80 degrees or less than -5 degrees.

Note: The balancing effect is to reduce the capacity error caused by the use of a single battery. If there is a difference in the capacity of the battery itself, the balancing can not make the capacity between the batteries become consistent.

11.SOC algorithm of Smart Li-ion Energy Company

Smart Li-ion Energy Technology Company adopts the self-developed core algorithm and the coulomb meter method as the basis. Add the static voltage curve,current dynamic curve, and voltage and capacity change curve, the multi-line SOC is estimated. It can make up the weakness of the coulomb meter and improve the SOC precision in the use of battery pack.

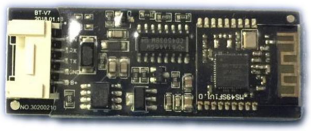
According to the high precision sampling, the BMS system of Smart Li-ion Energy Technology Company can calculate the real time state of the battery through high speed processor,to minimize the error in battery pack usage.

12.Fittings of BMS

12.1 PC connector (Size: 80*45*25mm) $19

This module is TTL to USB function, which can be used to communicate with PC.

12.2 Bluetooth (Size: 56*21*7mm) $13



Bluetooth APP.

Android users scan QR Code to download APP.
Apple users search 'smart-bms' from APP store.

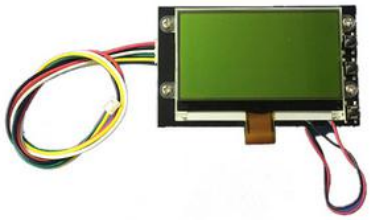
Home

Information

Parameter

This module is bluetooth, which is used to communicate with Android devices or IOS devices, including mobile and tablet devices.

12.3 LCD $16 - $19



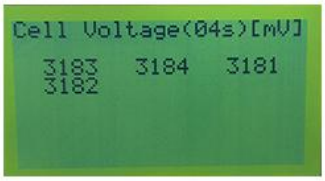
LCD with no box.

Default is have no box.

Size:96*59*10mm

LCD with box.

If you need box, please contact with Kitty.



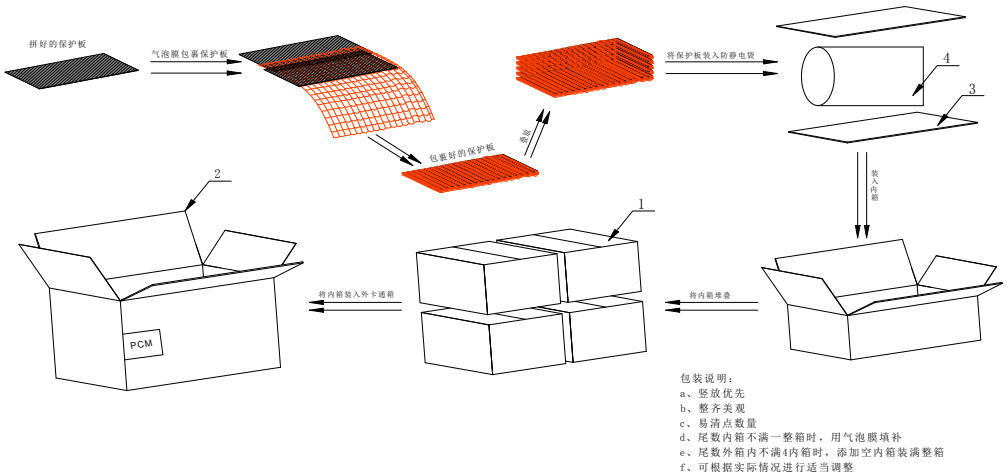
Size:99*62*15mm

Note: Customer can make choice according to their needs.

13.Packing & Delivery

13.1 Packing

Product packed by ESD Air bubble film , put into ESD packer ,insert 2 piece of clapboard, and then put into a small box and one big box contain 4 small boxes.



13.2 Shipping

Delivery to your storehouse by express.
Please avoid moisture, humidity, extrusion, hitting so as to prevent PCM damaged during shipping.