



**Dongguan weimei Guanze Electronic Technology Co., LTD**  
**SPECIFICATION FOR APPROVAL**

Product Name	VIP-3-15STI1-H03		
Customer Material code			

CUSTOMER		DATE	2021. 10. 28
DESCRIPTION	3~15 strings of Software protection boards		

			Dongguan weimei Guanze Electronic Technology Co., LTD			
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1.

**Disclaimer**

This document describes the functions and parameters of the BMS designed and manufactured by Dongguan Weimei Guanze Electronic Technology Co., LTD. Users are requested to read this document carefully and comply with the relevant industry specifications before operating the product. The company is not responsible for any damage caused by improper operation or beyond the operating conditions specified in this specification.

Due to product updates and upgrades, the contents of this document may be modified without notice to customers. If you want to know the latest product information or technical parameters, please contact our business department.

## 2. Functions overview

Voltage, current and temperature management of monomer in high integration platform. Designed for lithium battery pack, support 3~15 batteries, up to 4 sets of temperature sensing detection.

Supports Bluetooth module communication to view BMS monitoring data and battery string status.

Modifies the protection parameters and enables the switch on or off of a specific protection or algorithm.

Improved protection function:

- (COV) .
- (CUV) .
- (SOCC) .
- (SOCD) .
- (ASCD) .
- (OTD) .
- (UTC) .
- (UTD) .

abnormal detection prevents defects in the product manufacturing process

Cell voltage detection line shedding detection.

Temperature sensing line shedding detection

Charging switch circuit abnormal detection

Discharge loop detection abnormal detection

Power MOSFET overheat protection.

The industry leading intelligent balance management, SOC analysis.

High precision voltage, current and temperature measurement.

Three power modes provide free choice of performance and power consumption at any time:

Communication mode: < 20mA, timely monitoring voltage, current, temperature, quick response to various events and instructions.

Standard model: < 400uA, bluetooth is turned off, MCU communication power enters low power consumption mode, BMS has overvoltage, undervoltage, overcurrent secondary protection and short circuit protection.

Dormant mode: < 25uA, must be charged to wake up.

**First use A cycle charge and discharge is required to activate the equalization function**

and  
calibrate the SOC.

Weak current switch function: opens the weak current switch to enable the chip to enter low-powermode. opens and closes the weak current switch to remove the protection state when the battery pack is overcharged and overreleased.

High rate capacity design ensures product stability under high current charge and discharge.

### 3.

#### Product profile

VIP-3-15STI1-H03 is a centralized lithium battery management module developed according to market demand. It has the characteristics of multi-function, low power consumption, high reliability, high cost performance and so on. It is suitable for 3~15-string lithium iron phosphate battery pack.

(Product Model Description) :



**VIP-3-15STI1-H03** is a Bluetooth protector with TI and HUada (BQ92003, BQ93003, BQ94003, HC32F030F8TA) integrated chips, with Bluetooth, 485functions. With battery heating and weak current switch and other functions

#### 4.

#### Working condition and storagecondition

	item	standard	note
working condition	working temperature range	-20°C ~ 75°C	normally work
	relative humidity	5% ~ 95%	work long time, no condensing
	atmospheric pressure	86 ~ 106 KPa	
storagecondition	temperature	-40°C ~ 85°C	
	relative humidity	< 75%	
	atmospheric pressure	86kPa ~ 106kPa	

#### 5. 极限参数

#### Absolute rating

(project)	表示符	单位	下限	上限
(Power voltage)	$V_{BP}-V_{BN}$	V	---	64
(Cell input voltage)	$V_{CELL(N)}-V_{CELL(N-1)}$	V	2.3	4.3
(Max Charge Current)	$I_{(BN-->PN)}$	A	---	150
(Maximum continuous discharge current)	$I_{(PN-->BN)}$	A	---	150
(Working temperature)		°C	-10	75

## 6.

### Function introduction

VIP-3-15STI1-H03 has complete functions, as shown in the following table:

功能 (Function)	描述 (Depict)
(Battery temperature detection)	Designed for lithium battery pack, the protection plate supports four groups of temperature sensing detection
(Overcharge Protection)	When the protection board detects that the voltage of any cell exceeds the "overcharge protection value" and the duration exceeds the overcharge protection delay, the overcharge protection function of the protection board will be triggered (turning off the charging MOS).
(The overcharge protection is removed)	When any of the following conditions are met, the overcharge protection state will be automatically removed: (1) When the voltage of all the cells is lower than the overcharge release voltage value and no other protection state is triggered, the protection board will automatically remove the overcharge protection and turn on the charging MOS. (2) When the charger is removed and connected to the load, the protection plate will automatically remove the overcharge protection and turn on the charging MOS.
(Put protection)	When the protection board detects that the voltage of any cell is lower than the "over-discharge protection value" and the duration exceeds the over-discharge protection delay, the over-discharge protection function of the protection board will be triggered (turn off the discharge MOS).
(The overdischarge protection is removed)	When any of the following conditions are met, the overdischarge protection will be automatically released: (1) When the voltage of all the cells is higher than the over-discharge release voltage value and no other protection state is triggered, the protection plate will automatically release the over-discharge protection and turn on the discharge MOS. (2) When the charger is connected after the load is removed, the protection plate will automatically release the overdischarge protection and turn on the discharge MOS.
(Discharge over current and load short circuit protection and)	1) Discharge over current and load short circuit protection  Protection plate provides discharge overcurrent -1, discharge overcurrent -2 and load short circuit protection: . (a) When the discharge current exceeds the discharge overcurrent -1 threshold and keeps this state longer than the detection delay time of discharge overcurrent -1, discharge overcurrent -1 protection will be triggered (turn off the discharge MOS). (b) When the discharge current exceeds the discharge overampere-2 threshold and the discharge overampere-2 detection delay time is maintained, the discharge overampere-2 protection (turn off the discharge MOS) will be triggered. (c) When the discharge current exceeds the short circuit protection threshold and the load short circuit delay time remains in this state, the short circuit protection (turn off the discharge MOS) will be triggered.

release)	<p>2) Discharge overcurrent and load short circuit protection are removed</p> <p>When the load is removed, the discharge overcurrent or load short circuit protection will return to normal.</p> <p><b>Note:</b> When a battery pack is connected to a system with a large capacitive load, short-circuit protection may be triggered by mistake.</p>
(Charging overcurrent protection and release)	<p>1) When the charging current exceeds the charging overcurrent threshold and the charging overcurrent detection delay time is kept in this state, the charging overcurrent protection (turn off the charging MOS) will be triggered.</p> <p>2) Remove the charger and connect the load to remove the charge overcurrent protection</p>
(Discharge overtemperature protection and recovery)	<p>When the protection panel detects that the temperature of any NTC exceeds discharge overtemperature protection point, the protection panel closes the discharge loop of the battery string. If discharge overtemperature protection occurs, the protection board can discharge only when the temperature of all NTC is lower than discharge Overtemperature Release Point.</p>
(Charge overtemperature protection and recovery)	<p>When the protection panel detects that the temperature of any NTC exceeds the charging overtemperature protection point, the protection panel closes the charging loop of the battery string. Once the overtemperature protection occurs, the protection board must detect that the temperature of all NTC is lower than the Charging overtemperature release point before charging again.</p>
(Low temperature protection and recovery of charging)	<p>When the BMS detects that any temperature is lower than the low temperature protection point, the BMS closes the charging loop of the battery string. Once low-temperature charging protection occurs, BMS should detect that all temperature sensing temperatures are higher than the "low-temperature charging release point" before re-allowing charging function.</p>
(Discharge low temperature protection and recovery)	<p>When the BMS detects that the temperature of any sensor is lower than the low discharge threshold, the BMS closes the discharge loop of the battery string. Once low-temperature discharge protection occurs, the BMS can discharge only when it detects that the temperature of all temperature sensors is higher than discharge low-temperature release point.</p>
(Supports Bluetooth module communication)	<p>You can view BMS monitoring data and battery string status</p>
(Communications functions)	<p>According to customer requirements, RS485, Bluetooth communication interface CAN be selected; Has 1 RS485 communication interface, can be connected to the 485 communication interface with the computer for communication; It has 1 bluetooth communication interface, and can set parameters and read battery information through mobile phone APP.</p>
(SOC calculations)	<p>Provides high-precision SOC calculation function to calculate the remaining battery charge in real time</p>
(Charge and discharge management)	<p>Complete charging and discharging alarm and protection to ensure battery safety.</p>

(Balance model)	During the charging process, the balancing function is activated when BMS detects that the voltage of any cell is higher than the "balancing starting voltage". When the voltage of a cell is higher than the allowable equilibrium voltage of the cell with the lowest voltage, the cell enters the equilibrium state
(Three power modes)	Free choice of performance and power consumption at any time
(Sleep mode)	$I = 25\mu A$ , must be charged to wake up. Charge is allowed, discharge is forbidden
(Communication mode)	$I = 20mA$ , timely monitoring voltage, current, temperature, quick response to various events and instructions. Allow charging, discharging, protection and communication
(The standard model)	$I = 400\mu A$ , bluetooth is turned off, MCU communication power enters low power consumption mode, BMS has overvoltage, undervoltage, overcurrent secondary protection and short circuit protection. Allow charging, discharging and protection
(First Use Instructions)	First use requires a cycle charge and discharge of the battery pack to activate the equalization function and calibrate the SOC.
(diagnosis)	Provides the system self-diagnosis function. After power-on, a comprehensive self-check is performed to ensure that the BMS functions and performance are normal.
(Abnormal detection: cell detection line drop detection and protection)	When BMS detects that any of the cell detection wires are off, the LED flashes immediately. In addition, the state of all the detection lines of the battery cells should be continuously detected within the time specified in "Cell offline protection delay". If the detection lines are not recovered within the specified time, the charge and discharge circuits of the battery string should be closed. The off-line protection can be released and the charging and discharging functions can be resumed only after all the cell detection lines are found to be normal
(Temperature detection line drop detection and protection)	When BMS detects that any of the temperature sensing lines are off. The system continuously checks the status of all temperature sensor cables within the time specified in Temperature sensor Offline Protection Delay. If the temperature sensor cables are not recovered within the specified time, the battery string charge and discharge circuits are closed. The off-line protection can be released and the charging and discharging functions can be resumed only after all the temperature sensing lines are detected to be normal.
(Cycle number and SOC analysis)	BMS will monitor and analyze the cycle times and SOC results in real time. Compare the current maximum SOC capacity with "battery pack design capacity" and analyze voltage, current, cell impedance and other parameters to get the current health status of battery pack.
(Supplementary notes:)	When the BMS detects that the cell voltage is below the shutdown voltage, it immediately enters hibernation mode. Once the BMS is assembled with the cell, it is likely to go straight into hibernation mode, at which point it must be recharged.

(Battery heating function)

#### 6.1

The protection plate is equipped with the battery heating function. The temperature threshold for enabling or disabling the heating function can be set by using the host computer or mobile phone APP. When the battery is heated to the setting value of heating function off, the protection plate will stop heating! Turn on the charging MOS to charge the battery. When the battery temperature drops to the setting value of heating function, the protection plate will turn off charging. MOS will stop charging and start heating function again!

#### 6.2

The heating function is activated only when the battery temperature is below the set temperature threshold and the charger is connected!

#### 6.3

When using the heating function, ensure that the charger has the same voltage as the number of protection plate strings. Do not use a charger whose voltage is too high or too low than the actual voltage of the protection plate. Otherwise, the heating function of the protection plate will not work.

#### 6.4

The output power of the charger must also meet the working power of the heater, otherwise the battery heating function cannot start working. (The maximum heating power of protection plate is 100W)

#### 6.5

Protection plate and battery temperature detection probe NTC3, NTC4, heating sheet temperature detection probe NTC1, NTC2.

## 6.6

### LED indicator

(Protection and abnormal status indication)

(The event type)	LED0
(Charging and discharging off failure)	闪烁 (Flashing)
(Cell detection line is disconnected)	闪烁 (Flashing)
(SOCC)	闪烁 (Flashing)
(SOCD)	闪烁 (Flashing)
(ASCD)	闪烁 (Flashing)
(COV)	闪烁 (Flashing)
(CUV)	闪烁 (Flashing)
(UTC)	闪烁 (Flashing)
(UTD)	闪烁 (Flashing)

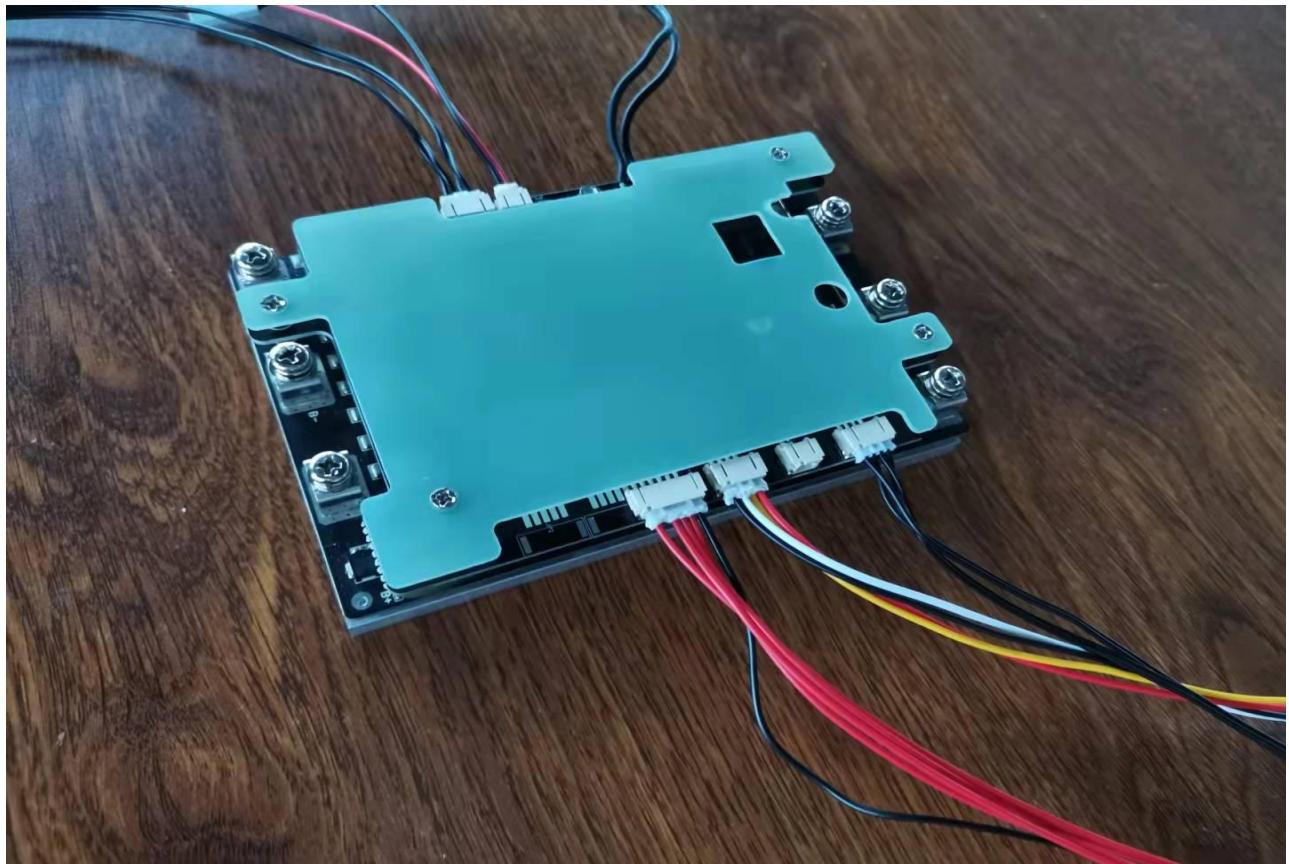
### Warning and protection parameters

(number)	(Setting up the project)	(instructions)
1	(The monomer overvoltage alarm is generated)	When the maximum cell voltage exceeds the threshold, a BMS alarm is generated. The default lithium iron 3.7V, ternary 4.2V
2	(The monomer undervoltage alarm is generated)	When the lowest single voltage is lower than the preset value, a BMS alarm is generated. Default lithium iron 3.0V, ternary 3.2V
3	(COV)	When the maximum monomer voltage is greater than the set value, close the charging tube and stop charging. Default lithium iron 3.75V, Three YUAN 4.25 V
4	(CUV)	When the minimum monomer voltage is less than the set value, close the discharge tube and stop discharging. Default iron lithium 2.8V, Ternary 3.0 V
5	(FC)	When the total voltage is greater than the set value, close the charging tube and stop charging
6	(FD)	When the total voltage is less than the set value, close the discharge tube and stop discharging
7	(SOCC)	When the charging current is greater than the set value, and the duration is greater than the set value of charging overcurrent delay time, offClose the charging tube and stop charging
8	(SOCC DELAY)	When the charging current is greater than the set value, and the duration is greater than the set value of charging overcurrent delay time, offClose the charging tube and stop charging
9	(SOCD)	When the discharge current is greater than the set value, and the duration is greater than the set value of discharge over current delay time, close the discharge tube, stop discharge
10	(SOCD DELAY)	When the discharge current is greater than the set value, and the duration is greater than the set value of discharge over current delay time, offClose the discharge tube and stop discharging
11	(ASCD)	When the short-circuit current is greater than the set value, and the duration is greater than the set value of the short-circuit protection delay time, offClose discharge tube to stop short circuit
12	(ASCD DELAY)	If the current is greater than the short-circuit protection value and the set delay time, the short-circuit protection is performed
13	(OTC)	When the battery temperature exceeds the threshold, the system shuts down the charging tube and stops charging. The default value of 55 °C
14	(OTCC)	The battery temperature drops below the set value, and the system

		closes the charging tube again. The default value of 60 °C
15	(OTD)	When the battery temperature exceeds the threshold, the system shuts down the discharge tube and stops discharging. The default value is 75 °C
16	(OTDC)	When the battery temperature drops below the preset value, the system closes the discharge tube again. The default value is 70 °C
17	(OTM)	When the MOS tube temperature exceeds the set value, the system closes the discharge tube and charging tube. The default high temperature protection point is 75 °C
18	(OTMC)	When the MOS tube temperature exceeds the set value, the system closes the discharge tube and charging tube. The default high temperature protection point is 75 °C

## 8.

### Structural dimension and weight

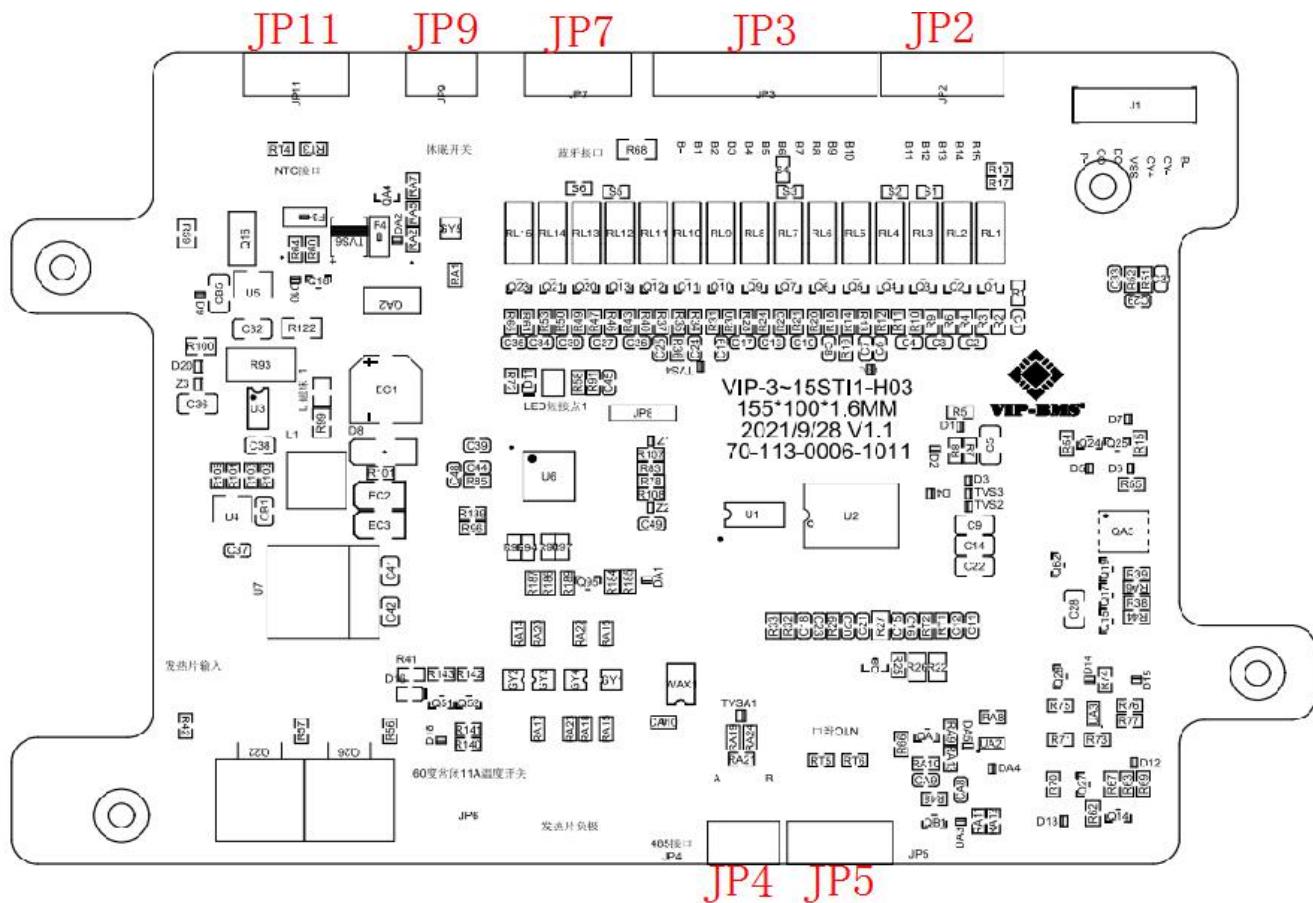


8.1	(finished size)	长 (long) 155 ±1.6 mm	
		高 (tall) 30 ±1.6mm	
		宽 (wide) 100 ±1.6mm	
	(finished weight)		539.6g

## 9.

## Interface definition

The external ports of the VIP-3-15STI1-H03 protection board are defined as follows:



JP3 (6PIN) 2.0 spacing core voltage sampling line interface

PIN脚	(Signal definition)	(function)	(wire socket)
1	B-	(V0)	(B0)
2	B1	(V1)	(B1)
3	B2	(V2)	(B2)
4	B3	(V3)	(B3)
5	B4	(V4)	(empty)
6	B5	(V5)	(B4)
7	B6	(V6)	(empty)
8	B7	(V7)	(empty)
9	B8	(V8)	(empty)
10	B9	(V9)	(empty)
11	B10	(V10)	(empty)
12	B11	(V11)	(empty)
13	B12	(V12)	(empty)
14	B13	(V13)	(empty)
15	B14	(V14)	(empty)
16	B15	(V15)	(empty)

B-,P- power output line interface

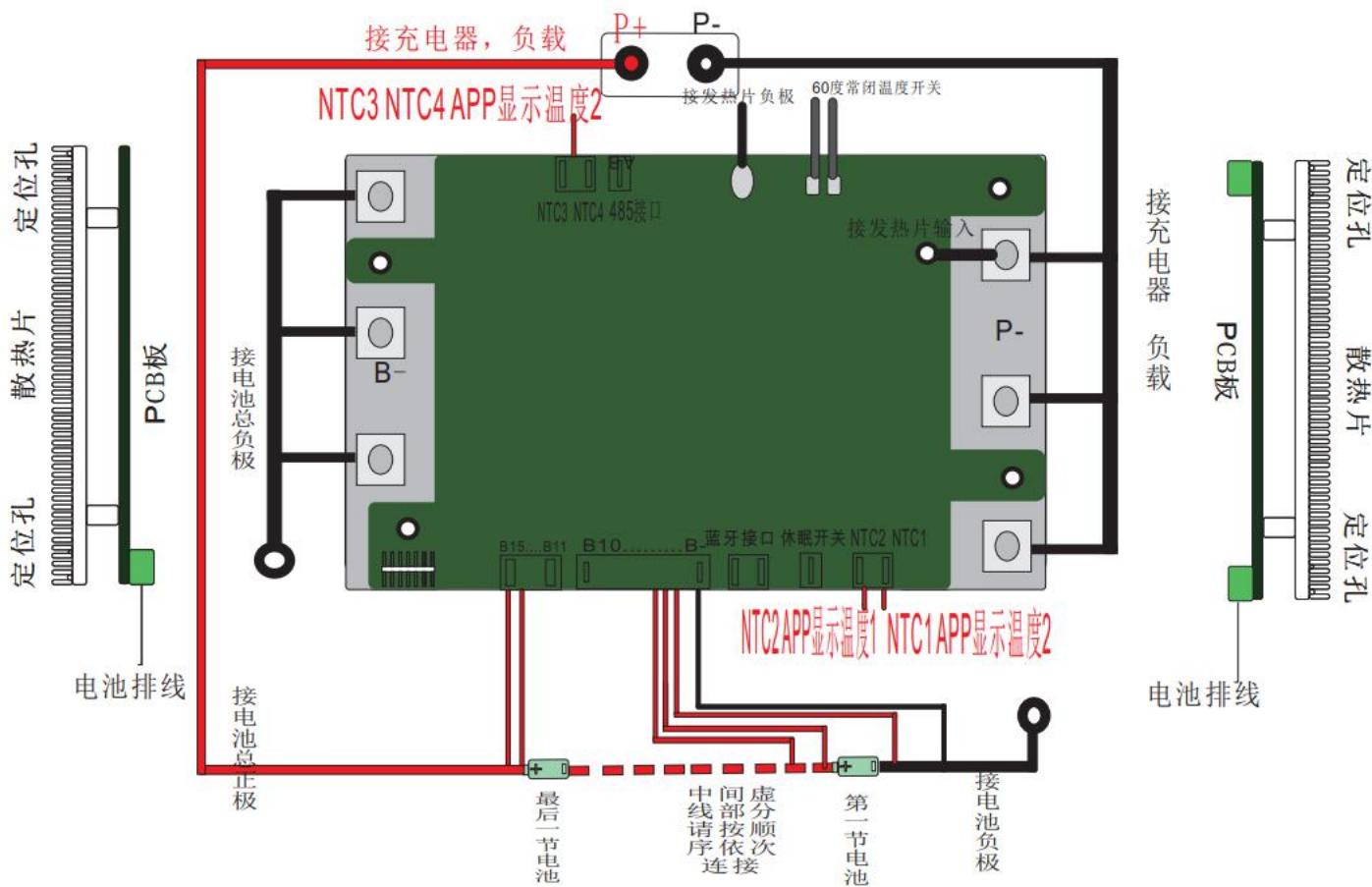
PIN脚	(Signal definition)	(function)	(note)
1	B-	(Total negative electrode of battery)	
2	P-	(Discharge output negative, charge input negative)	

**Communication Interface**

PIN脚	(Signal definition)	(function)	(note)
JP4	(485 communications)	(485 communication interface)	
JP7	(bluetooth communication)	(Bluetooth communication interface)	
JP9	(Dormancy switch)	(Operating control switch)	
JP5、 JP11	NTC	(Two monitoring protection plate temperature, Two monitoring heating temperature)	

10.

## Protection board wiring diagram



## 1. the battery pack connecting steps:

**Warning:** The wiring when connecting batteries and PCM must strictly abide by the following order, or it may cause damage to electronic components of PCM.

Connect the battery packs cathode BAT- to B- pad in the PCB.

;

Connect the battery packs anode to B+ pad in the PCB

**Warning:** Wire **disassembly order must be reversed to the above.**

## 2. the charging connecting method:

Charging and discharging at the same port;

## 3. the discharging connecting method:

The cathode of the load connects to P- pad in PCB; The anode of the load connects to BAT+

## 11.

### Accessories

(number)	(The name of the accessories)	(Specifications describe)	(Amount)	(note)
1	(Collect row line)	6PIN 2.0MM	1	
2	(Bluetooth line)	4P 2.0MM	1	线序: 黑, 白, 黄, 红
3	(Bluetooth)	蓝牙通 讯器	1	
4	(Low voltage switch)	2P 2.0MM 线长 300MM	1	
5	NTC	4P 2.0MM 10KNTC 线长400MM	2	
6	(485 communication line)	2P 2.0MM 线长 300MM	1	A红 B黑
7	(set screws)	M5	6	

## 12.

### Main components

Type	Componenet Name
IC	HC32F030F8TA
Charging MOS	PW52N08N/WMM053NV8HGS*18 (MOS 耐压值 80V)
Discharge MOS	PW52N08N/WMM053NV8HGS*18 (MOS 耐压值 80V)
Sampling Resistors	2512-0.003R/2W*18

#### Please note to the customer:

Division I each type of protection board in the bulk shipping process, different batches of orders Division I may replace different brands of different models of charging and discharging Mos, but only if the above performance indicators to meet the changes made (Communicate with customers in advance)

### 13. Packing

#### and shipping

(Packing) :

(Use shockproof cotton and carton packing)

(Storage) :

(Store in a dry and ventilated room with an ambient temperature of -10 ° C to 50 ° C and humidity less than 75%. Avoid direct contact with corrosive objects and keep away from fire and heat sources. )

(Transport) :

(Violent vibration should be prevented during transportation.)

## 14.

### OneWarningCaution

Please read carefully and follow the following rules before using the battery. Improper use may result in dangerous injuries such as battery damage, smoke or fire.

#### 14.1 It is strictly prohibited items

- the BMS must not be placed in the combustion, water (or other liquid), vacuum and high pressure environment.
- May not be specified in the specifications of environment storage or use of this product.
- Shall not disassemble, bump, piercing or any other way destroyed original product structure.

#### 14.2 Mattersneedattention

- Check protection plate appearance damage, cracks before use.
- 
- Ensure the BMS and battery parameters matching.
- In transportation environment, packaging shall not be less than original packing grade. And can not appear such as violent shaking, falling, extrusion, high temperature, rain, inversion and other phenomena.

#### 14.3 Expirationdate

If the customer does not appear damaged or any other man-made (intentional or unintentional) marks during the use, storage and transportation in accordance with the requirements of this specification, the warranty shall be one year from the date of delivery. If the < product purchase and sales contract > has the proposed related terms, then the < product purchase and sales contract > terms for effective implementation!

15.

## Product Revision Record form:

16.

## post-sales service

You are in use and installation process. If you have any questions about our products, please contact us.

After-sales service telephone: 18823451632 13961165739

## FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.