

**Shenzhen Jiabaida Electronic Technology Co., Ltd.**

SHENZHEN JIABAIDA ELECTRONICS TECHNOLOGY.CO.,LTD

**Product specification**

## Product specification

Customer name:

Customer

product name:

Sample Name

4 Lithium iron skewer 120A Software board with Bluetooth and RS485

Product number:

Model Name

JBD-SP04S020A-L4S-150A-150A-BUR A01

Date of submission:

Date

2021-05-29

Version:

Version

V1.0

Customer signature and stamp:

SIGNATURES

Prepared by: Liu Houwei

Review:

approve:

## change log

version number	Page/Chapter	Revised by	Revision date	modify the content	Remark
A0	full text	Liu Houwei	2021.05.27	New fiction	

## 1. Product Introduction

JBD-SP04S028A It is specifically for small energy storage batteries, street lights, 12V Lead-acid for lithium battery and other products 4 The software protection board solution designed by stringing battery packs can be applied to lithium batteries with different chemical properties, such as lithium ion, lithium polymer, lithium iron phosphate, etc.

The whole system adopts TI( The front-end acquisition chip of Texas Instruments+ MCU , Some parameters can be flexibly adjusted through the host computer according to customer needs.

## 2. Features

2.1 3-4 String batteries are protected in series.

2.2 The battery is intelligently balanced, and the balanced opening voltage and pressure difference can be flexibly adjusted by the host computer. Optional charge balance or static balance.

2.3 Integrate hardware protection functions such as overvoltage, undervoltage, overcurrent, and short circuit.

2.4 A variety of working modes, when the protection board is in a static state, it can hide and enter sleep to achieve the purpose of reducing power consumption.

2.5 Comes with two communication ports, which can read voltage, current, SOC , Temperature, protection status and other data.

2.6 UART (TTL Level) can be connected to Bluetooth, computer and non-battery-powered equipment, isolated RS485 It can communicate with controllers, chargers and other devices.

2.7 There are two temperature detection probes by default, one is to detect the internal temperature of the protection board, and the other is to be placed in the place where the temperature needs to be detected according to customer needs.

## 3. technical parameter

### 3.1. Basic parameters

Cell specifications: 4 strings of lithium iron phosphate battery pack	
The interface type is the same for charging and discharging	
Recommended charging voltage 14.4V	
Operating voltage range 10V~14.6V	
Continuous charging current $\leq 150A$	
Continuous discharge current $\leq 150A$	
Operating power consumption $\leq 20mA$	
Sleep power consumption $\leq 200\mu A$	
When the charge and discharge MOS in the protection board are both turned on, the internal resistance from B- solder joint to output solder joint is $\leq 10mR$	
Operating temperature -30°C~75°C	
Protection board size 185±0.5mm * 102±0.5mm * 18±1mm( length Width Height)	

Note: The test needs to be at temperature 25±2 °C, relative humidity 65±20% environment of

## 3.2. The main parameters

Function	project	Specification			unit
		Minimum	Typical value	Max	
Monomer overvoltage protection	Overvoltage protection voltage	3.60	3.65	3.70	V
	Overcharge protection delay time	1000	2000	3000	mS
	Overcharge protection recovery voltage	3.45	3.50	3.55	V
Single over-discharge protection	Over discharge protection voltage	2.40	2.50	2.60	V
	Over-discharge protection delay time	1000	2000	3000	mS
	Over-discharge protection recovery voltage	2.90	3.00	3.10	V
	Overdischarge protection recovery conditions	60S Internal voltage self-recovery or charge recovery			
Charging overcurrent protection	Charging overcurrent protection value	152	160	168	A
	Charge overcurrent delay	7	10	13	S
	Charge overcurrent release condition	Delay 32S Automatically restore after			
Discharge overcurrent protection	Primary discharge overcurrent protection current	152	160	168	A
	First-level discharge overcurrent 1 Protection delay	7	10	13	S
	Secondary discharge overcurrent protection current value	520	620	720	A
	Secondary discharge overcurrent 2 Protection delay	150	320	500	mS
	Discharge overcurrent protection recovery conditions	Delay 32S Automatically restore after			
Short circuit protection	Short circuit protection circuit	1600	1900	4500	A
	Short circuit protection delay time	-	400	800	uS
	Short circuit protection recovery	Delay after disconnecting the load 5S recover.			
	Short circuit description	Short circuit description: short circuit current is less than minimum or high Above the maximum value may cause the short-circuit protection to fail, short-circuit Current exceeds 2000A , Short-circuit protection is not guaranteed, and It is not recommended to do short-circuit protection test.			
Discharge high temperature protection ( External)	Temperature protection value	65	70	75	°C
	Temperature protection release value	55	60	65	°C
Discharge low temperature protection ( External)	Temperature protection value	-15	-10	-5	°C
	Temperature protection release value	-5	0	5	°C
Charging high temperature protection	Temperature protection value	60	65	70	°C

( External)	Temperature protection release value	50	55	60	°C
Charging low temperature protection	Temperature protection value	-6	- 1	4	°C
( External)	Temperature protection release value	0	5	10	°C
FET Discharge high temperature protection	Temperature protection value	85	90	95	°C
Protection (built-in curing)	Temperature protection release value	65	70	75	°C
Balance function	Turn on voltage	3.35	3.40	3.45	V
	Open pressure difference		15		mV
	Balance current	40		70	mA
	Balanced method	Charge balance			
	Balance type	Time-sharing equalization/pulse equalization			

Note: The test needs to be at temperature 25±2 °C, relative humidity 65±20% environment of

## 4. Function Description

### 4.1. Overcharge protection and recovery

#### 4.1.1. Monomer overcharge protection and recovery

When the voltage of any cell is higher than the cell overcharge voltage setting value, and the duration reaches the cell overcharge delay, the system enters the overcharge protection state, and the charging is turned off MOS , Cannot charge the battery.

After the cell overcharge protection, when the voltage of all cells drops below the cell overcharge recovery value, the overcharge protection state is released. It can also be discharged.

#### 4.1.2. Overall overcharge protection and recovery

When the overall voltage is higher than the overall overvoltage set value, and the duration reaches the overall overcharge delay, the system enters the overcharge protection state, and the charging is turned off MOS , Cannot charge the battery. When the overall voltage drops below the overall voltage overvoltage protection recovery value, the overcharge protection state is released, and the discharge can also be released.

### 4.2. Overdischarge protection and recovery

#### 4.2.1. Single over-discharge protection and recovery

4.2.1.1. When the lowest cell voltage is lower than the monomer overdischarge voltage setting value, and the duration reaches the monomer overdischarge delay, the system enters the overdischarge protection state, and the discharge is turned off MOS , Cannot discharge the battery.

After the monomer over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

#### 4.2.2. Overall over-discharge protection and recovery

When the overall voltage is lower than the overall over-discharge voltage setting value, and the duration reaches the overall over-discharge delay, the system enters the over-discharge protection state and closes the discharge MOS, Cannot discharge the battery.

After the overall over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

#### 4.3. Charge overcurrent protection and recovery

When the charging current exceeds the charging overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the charging overcurrent protection state and the battery cannot be charged. After charging overcurrent protection occurs 32 The system will automatically recover within seconds. If you don't need to recover automatically, you can set the corresponding release time longer; the overcurrent state of charge can also be released by discharging.

#### 4.4. Discharge overcurrent protection and recovery

When the discharge current exceeds the discharge overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the charge overcurrent protection state, and the discharge is turned off MOS. After discharge overcurrent occurs 32 The system will automatically recover within seconds, and the corresponding release time can be set longer if necessary. Charging can also release the discharge overcurrent state. The discharge has two-level over-current protection functions, which have different response speeds to different current values, and protect the battery more reliably.

#### 4.5. Temperature protection and recovery

The management system has two temperature detection ports, which cooperate with NTC Can do temperature protection.

##### 4.5.1. Charge and discharge high temperature protection and recovery

When charging and discharging NTC When the surface temperature of the detected battery is higher than the set high temperature protection temperature, the management system enters the high temperature protection state, charging or discharging MOSFET Closed, the battery pack cannot be charged or discharged in this state.

When the temperature of the battery cell surface drops to the high temperature recovery setting value, the management system recovers from the high temperature state and reconnects to charge and discharge MOS.

##### 4.5.2. Charge and discharge low temperature protection and recovery

When charging and discharging NTC When the temperature of the battery cell surface is lower than the set low temperature protection temperature, the management system enters the low temperature protection state, charging or discharging MOSFET Closed, the battery pack cannot be charged or discharged in this state.

When the temperature of the battery cell surface rises to the low temperature recovery setting value, the management system recovers from the low temperature state and reconnects to charge and discharge MOS.

4.5.3. In static state (without charging and discharging), if the temperature rises or drops to the protection board, the protection board will not make any protection action until the system detects a current, then the corresponding protection action will be made.

#### 4.6. Balance function

The management system adopts the resistance side-by-way method to balance the cells. During the charging process, the maximum cell voltage of the battery pack reaches the set equilibrium starting voltage value, and the voltage difference between the minimum voltage and the maximum voltage of the battery pack cell is greater than the set value. When the value is set, the cell equalization function that meets the condition is turned on, and the two adjacent equalizers cannot be turned on at the same time. When the equalization starts, the charging current is reduced for the high-voltage battery, and the reduced current is the equalization current set by the management system.

When the cell voltage difference is less than the set value, the equalization stops. The charge balance mode and static balance mode can be set.

#### 4.7. Capacity calculation

The battery pack can be accurately measured by integrating the current and time. SOC calculate. The full capacity and cycle capacity of the battery pack can be set by the host computer, and the capacity can be automatically updated after a complete charge and discharge cycle. It has the function of calculating the number of charge and discharge cycles. When the cumulative discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles increases by one.

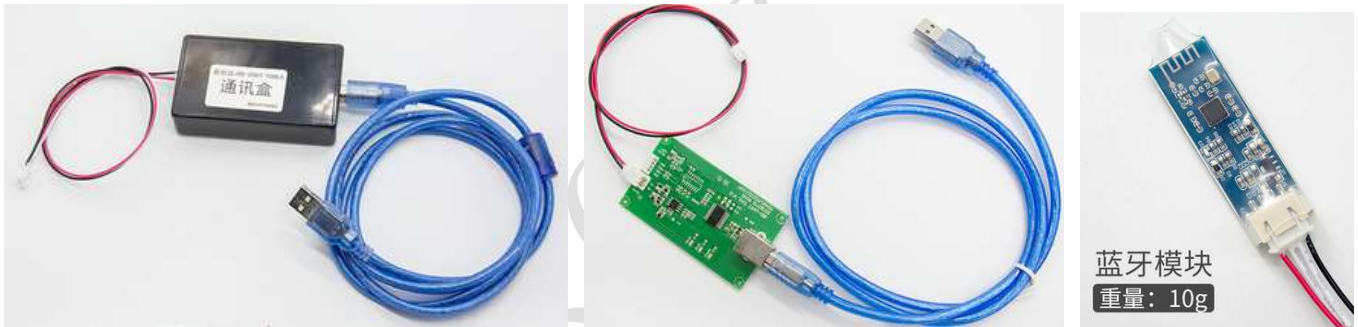
**Note: For newly installed batteries, please set the nominal capacity and cycle capacity according to the battery capacity, and perform a capacity study, otherwise capacity inaccuracy may occur. Capacity learning operation: first fully charge to overvoltage protection, then discharge to undervoltage protection, and then charge again.**

#### 4.8. Sleep function

When the protection board is in static state (no communication, no current, no balance and overvoltage protection.) Delay 1 Minutes later, it enters the dormant state. After entering this state, the protection board only reduces the frequency of detecting voltage and current and its own power consumption, without any impact on customer use. Communication, toggle switch, charging and discharging can automatically exit sleep mode

#### 4.9. Communication function

The protection board can be connected to the computer through the communication box, communication format 9600,8 , N , 1 The upper computer receives the protection board data:



UART Communication box

RS485 Communication box

Bluetooth module

**Note: The above three tools need to be purchased separately.**

The connection method is: after installing the dedicated driver for our communication box on the computer, connect the communication box USB Plugged into the computer USB The other end of the port is connected to the corresponding port of the protection board that has been connected to the battery. Turn on the host computer, click the communication port setting, select the corresponding communication box CMO

□, other options do not need to be moved, after confirming, click start to read the data in the protection. **If you need to change the parameters of the protection board, you must first click to read the parameters on the parameter page, and then change the parameters.**

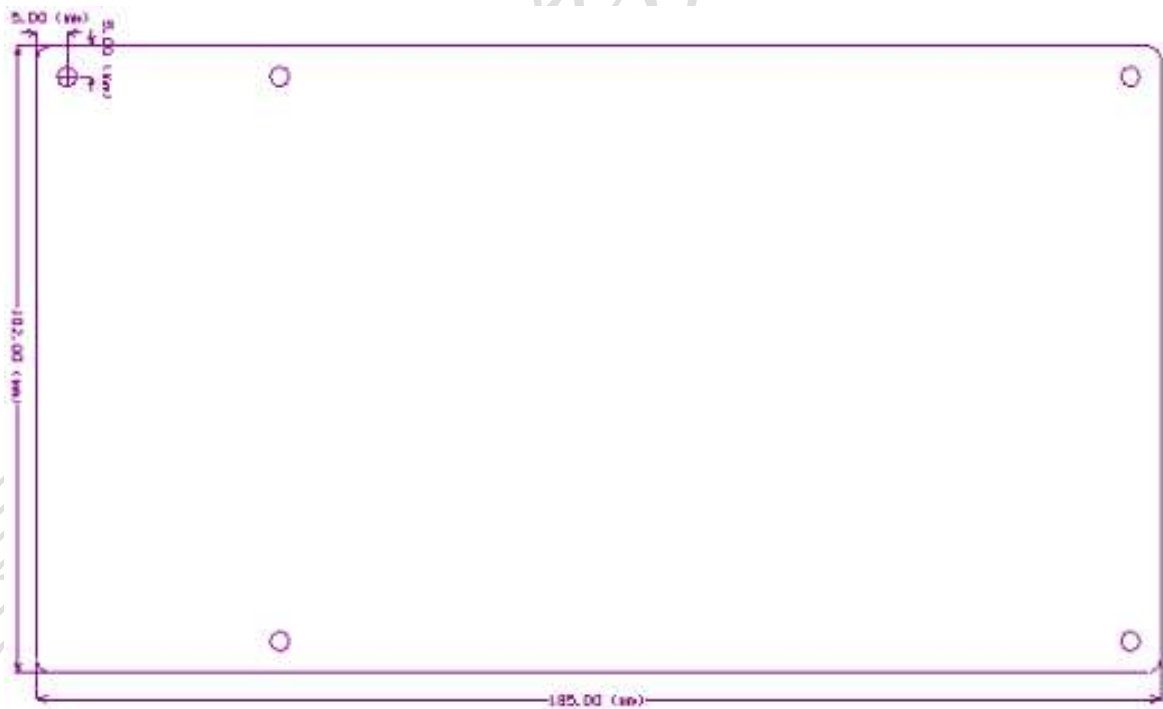
## 5. Main material

Serial number	Material name	Manufacturer	Dosage
1	NANO100SD3BN	nuvoton	1PCS
2	BQ7692003PW	TI	1PCS
3	CRSS052N08N	China Resources	64PCS
4	PCB-JBD-SP04S028A A01	JBD	1PCS

Note: The above materials may be replaced by materials with the same specifications or better specifications. If the material is not allowed to be replaced if there is a certification requirement, you need to notify our business to re-send the samples, the controlled specifications, and the final interpretation right belongs to Jiabaida .

## 6. Schematic and size

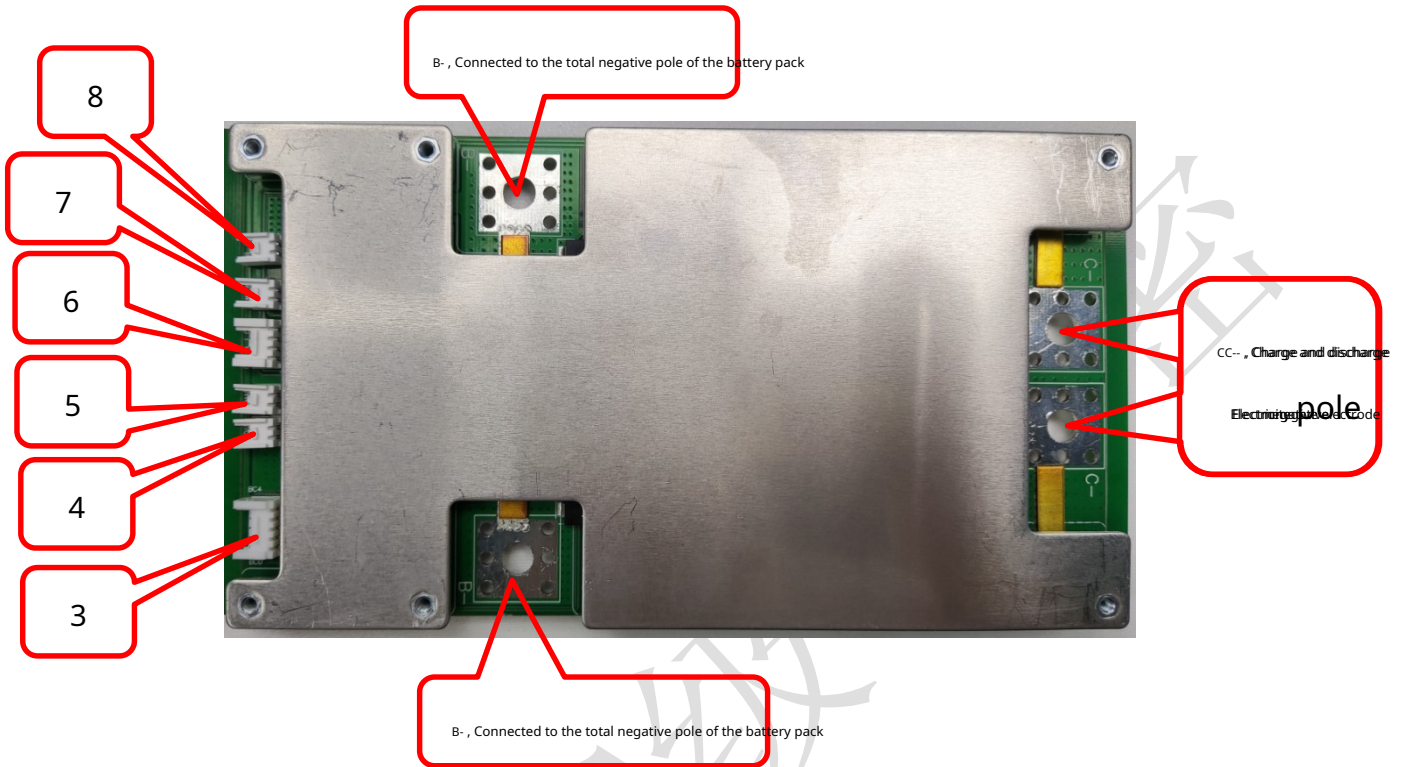
### 6.1. Mark the size and installation point marking diagram



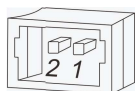
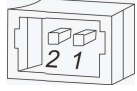


## 7. Signal port definition

7.1. The schematic diagram is marked with the interface number (refer to the figure below)



Label	Tag	connector function	Schematic diagram of the connector	Pin definition	PIN Function definition	illustrate
3	J1	Voltage detection socket		1	Connect to the negative pole of the lowest battery-saving core	
				2	Next 1 Battery-saving core positive	
				3	Next 2 Battery-saving core positive	
				4	Next 3 Battery-saving core positive	
				5	Next 4 Battery-saving core positive	
4	RT2	External temperature probe interface		1	Temperature probe interface	
				2	Temperature probe interface	
5	RT3	External temperature probe interface		1	Temperature probe interface	
				2	Temperature probe interface	
6	J4	UART\ Bluetooth connection mouth		1	GND UART Interface ground	
				2	RXD Protection board data reception	
				3	TXD Protection board data transmission	

				4	VDD Bluetooth powered	
7	J3	Switch interface		1	Switch positive interface	
				2	Switch negative interface	
8	J5	RS485 interface		1	RS485-B	
				2	RS485-A	

## 8. Environmental suitability

### 8.1. Working conditions:

BMS The protection board allows normal work under the following conditions:

Ambient temperature:- 30 °C ~+ 75 °C;

Relative humidity: 5% ~ 90%;

Atmospheric pressure: 86kPa~106 kPa;

### 8.2. Storage environment

BMS The protection board should be stored at an ambient temperature of -5 °C~+40 °C , The relative humidity is not greater than 70% , In a clean and well-ventilated warehouse, the air must not contain corrosive gases and media that affect electrical insulation, and must not be subject to any mechanical shock or heavy pressure. Keep away from direct sunlight, and the distance from the heat source (heating equipment, etc.) must not be less than 2m . Under the above storage conditions, BMS The protection board can be stored for one year.

## 9. Packing and shipping

### 9.1. Logo:

BMS The protective board should have the following clear and durable marks:

- 1) Product name and model
- 2) Cell model
- 3) Factory date and serial number

### 9.2. Package

1) The packaging should meet the requirements of moisture-proof and vibration-proof, the packaging box should be firm and reliable, the box should be lined with moisture-proof material, and the product should not move in the box.

2) External carton packing box, veneer anti-static bag and bubble bag packaging;

### 9.3. transportation

- 1) During transportation, the product must not be subject to violent mechanical impact, exposure to the sun, rain, chemically corrosive materials and harmful gases; 5.3.2 During the loading and unloading process, the product should be handled with care, and it is strictly forbidden to drop or press it.
- 2) The stacking height of the packing box is less than 5 layers.

## 10. Precautions

- 1) This management system cannot be used in series.
- 2) When multiple battery packs using this management system are connected in parallel, ensure that the maximum voltage difference of each battery pack is lower than 3V before paralleling.
- 3) When multiple battery packs using this management system are used in parallel, the total charge impulse current of the adapter may be applied to a single battery pack. It should be ensured that the total charge impulse current of the adapter does not exceed the maximum value of the charge impulse current of a single management system.
- 4) The short-circuit protection function of this management system is suitable for a variety of application scenarios, but it does not guarantee that it can be short-circuited under any conditions. When the sum of the internal resistance of the battery pack and the short-circuit loop is less than  $40\text{m}\Omega$ , the battery pack capacity exceeds 20% of the rated value, the short-circuit current exceeds 1800A, the inductance of the short-circuit loop is very large, or the total length of the short-circuited wire is very long, please test by yourself to determine whether You can use this management system.
- 5) When welding the battery lead, there must be no wrong or reverse connection. If the wrong connection is indeed made, this circuit board may be damaged, and it can be used only after passing the test again.
- 6) When assembling, the management system should not directly touch the surface of the cell to avoid damage to the circuit board. The assembly must be firm and reliable.
- 7) Be careful not to touch the components on the circuit board with the lead wire, soldering iron, solder, etc. during use, otherwise the circuit board may be damaged.
- 8) Pay attention to anti-static, moisture-proof, waterproof, etc. during use.
- 9) Please follow the design parameters and conditions of use during use, and must not exceed the values in this specification, otherwise the management system may be damaged.
- 10) After the battery pack and the management system are combined, if you find that there is no voltage output or charging can not be found at the first power-on, please check whether the wiring is correct.