

# Shenzhen Jiabaida Electronic Technology Co.

shenzhen jiabaida electronics technology.co.,ltd

## product product Specification

### Specification Book

Product specification

Customer Name (CUSTOMER).	Anil	
SAMPLE NAME.	21 strings of 300A software boards	
MODEL NAME.	jbd-ap21s002-l21s-300a-300a-b-u-r-c	
Date Submitted (DATE).	2022-12-09	
VERSION.	A.1	
Client's signature and seal (SIGNATURES).		
Compilation (compiler)	Reviewer	Approval (Approver)

Zhang Wanlian	Liu Houwei (1931-1989), Chinese actor	Zhang Qiaoxiao (1917-2005), one of the Gang of Four
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## Correction record

version number Version number	paginati on Page number	propose r Reviser	revision date Revision date	revision Revised content	note remarks
A.0	full version	Zhang Wanlian	2022.09.14	new formulation	
A.1	portion	He Tao (1642- 1707), Chinese landscape painter and poet	2022.12.08	Partial amendment	

## 1. Product introduction

JBD-AP21S002 is a software protection board specially designed for 21 series lithium battery packs. The product adopts the front-end acquisition chip + MCU architecture, and some parameters can be flexibly adjusted by the host computer according to customer requirements.

JBD-AP21S002 is a software protection board scheme specially designed for 21 strings of lithium battery packs. The product adopts architecture of front -end acquisition chip + MCU, and some parameters can be flexibly adjusted through the host computer according to customer needs. The product adopts architecture of front-end acquisition chip + MCU, and some parameters can be flexibly adjusted through the host computer according to customer needs.

## 2. Functional configuration (Configuration)

Function	Configuration	Function	Configuration
Number of strings supported	21S	485 communication (isolated) 485 communication (isolated)	standard equipment (Standard option)
continuous current (Continuous current)	300A	UART Interface (Isolated) UART interface (isolated)	/
Number of NTCs (Number of NTCs)	1 internal, 4 external, 2 external by default (1 built-in, 4 external. Default two-way external)	CAN communication (CAN communication)	standard equipment (Standard option)
equalization function (Balance Function)	passive equilibrium (Passive balance)	232 Communications (232 Communication)	/
UART interface (non-isolated) (UART (non-isolated))	standard equipment (Standard option)	Heating Membrane Function (Heating function)	/
switching function (Switch function)	optional (Optional)	Bluetooth module (Module of Bluetooth)	optional (Optional)
Charge current limit function (Charging current limit)	/	Battery packs in series (Battery packs in series)	unsupported (Not supported)
Battery pack parallel connection (Battery packs in parallel)	unsupported (Not supported)	Secondary protection function (Secondary protection)	/
biographies (History storage)	optional (Optional)	LCD Display (LCD display)	optional (Optional)
Pre-discharge function (Pre-discharge function)	/	LED Indicator Interface (LED indicator interface)	/
buzzers (Buzzer)	standard equipment (Standard option)	GPS Interface (interface)	/

Note: 1. The UART interface (non-isolated) does not support communication with chargers or loads.

Note: The UART interface (non-isolated) does not support communication with chargers or loads.

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2、Support the use of battery packs in series, but the total number of strings is less than or equal to 32 strings after series connection.

The battery pack can be used in series, **but the total number of strings after series** is required to be less than or **equal** to 32.

3, 7~21 cells series protection, and automatic identification of the number of battery strings.

7 ~ 21 battery cells are protected in series, and the number of battery strings is automatically identified.

### 3. Parameter Setting

#### 3.1. Basic parameter

Cell specifications	21 strings of <b>Lithium</b> Iron (21 strings of Lithium Iron Battery)
Interface type	Charge and discharge are both at the same port
Charging voltage	3.6V*Number of strings
Cell voltage range range)	2.2~3.75V
Continuous charging current (Continuous charging current)	≤300A
Continuous discharging current (Continuous discharging current)	≤300A
Consumption of power for operation (Consumption of running)	≤300mA
Consumption of sleep	≤1000uA
Sleep conditions	No current\communication\protection state delay 65000S (settable) Delay 65000s under no current \ communication \ protection state (settable)
Circuit resistance	≤10mR
Operating temperature	-20°C~75°C
<b>Protection board structure size</b> (Structure size of PCB)	
Size	200±2mm * 114.5±0.5mm * 51±1mm (Length*Width*Height)

Note: The test should be conducted at a temperature of 25±2°C and a relative humidity of 65±20%.

Note: Test should be at temperature 25±2°C, and relative humidity 65±20% of surroundings.

Supplementary Note: Continuous standstill for 65000S (settable) will automatically disconnect the relay and reduce the standby power consumption of the BMS. Higher charge/discharge Intelligent . Safe for lithium only

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currents are recognized by the pre-charge/discharge circuit and then the relay is closed.

Supplementary note: continuous standing for 65000s (settable) will automatically disconnect the relay and reduce the standby power consumption of BMS. A large charge discharge current will be identified through the pre charge discharge circuit, and then close the relay.

### 3.2. Main parameter

	Project	Specification			Unit
		minimum value MIN	typical value TYP	maximum values MAX	
Overvoltage and undervoltage protection (Overvoltage and undervoltage protection)	Overvoltage	3.70	3.75	3.80	V
	Overvoltage delay	1000	2000	3000	mS
	Overvoltage release	3.40	3.45	3.50	V
	Overdischarge protection voltage (Undervoltage)	2.10	2.20	2.30	V
	Undervoltage delay	1000	2000	3000	mS
	Undervoltage release	2.60	2.70	2.80	V
	Undervoltage release conditions)	Voltage self-recovery or charge recovery within 60S (60S voltage) self-recovery or charge recovery)			
Overcurrent Charge Protection	Overcurrent Charge Protection Value (Overcurrent Charge) protection value)	305	325	345	A
	Overcurrent Charge Delay delay)	5	10	15	S
	Charge over current release condition (Charge over current) release conditions)	Automatic recover after 32S delay (Automatic recover after a delay of 32S)			
Overcurrent Discharge	Primary discharge overcurrent protection value (1st Overcurrent Discharge)	305	325	345	A
	Primary discharge overcurrent protection delay (1st Overcurrent Discharge delay)	5	10	15	S
	Secondary discharge overcurrent protection current value (2nd Overcurrent Discharge)	1100	1400	1700	A
	Secondary discharge overcurrent 2 Protection delay (2nd Overcurrent Discharge delay)	110	310	510	mS
	Discharge overcurrent protection recovery conditions (Overcurrent Discharge release)	Automatic recovery after 32S delay (Automatic recovery after a delay of 32S)			
	Short circuit protection current (Short circuit protection) current)	2300	2800	3300	A



Short Circuit Discharge	Short circuit protection delay time (Short circuit protection delay time)	200	400	800	uS
	Short circuit protection recovery (Short circuit protection recovery)	Recover after 5S delay after disconnecting the load. (Recover after 5S) delay after disconnecting the load.)			
	Short-circuit instructions: short-circuit current less than the minimum value or higher than the maximum value may cause the short-circuit protection failure, short-circuit current more than 3500A, does not guarantee that there is a short-circuit guarantee protection, nor is a short circuit protection test recommended. (Short-circuit description: The short-circuit current is less than the minimum value or higher than the maximum value, which may cause the short- circuit protection to fail, and the short-circuit current exceeds 3500A, short-circuit protection is not guaranteed, and short-circuit protection testing is not recommended.)				

Charging High Temperature Protection Overtemperature Charge	Temperature protection value)	62	65	68	°C
	Temperature protection release value (Temperature protection) release value)	52	55	58	°C
Charging Low Temperature Protection (no heating) Undertemperature Charge (no heating) function)	Temperature protection value)	-15	-10	-5	°C
	Temperature protection release value	-10	-5	0	°C
Charging Low Temperature Protection (Undertemperature Charge (with heating function)	Temperature protection value)	-	-	-	°C
	Temperature protection release value	-	-	-	°C
Discharge heat protection Overtemperature Discharge	Temperature protection value)	72	75	78	°C
	Temperature protection release release value)	62	65	68	°C
Discharge cryoprotection Undertemperature Discharge	Temperature protection value)	-25	-20	-15	°C
	Temperature protection release release value)	-15	-10	-5	°C
FET High temperature protection (built-in) high temperature protection of FET (Built-in)	Temperature protection value)	85	90	95	°C
	Temperature protection release value (Temperature protection) release value)	65	70	75	°C
Balance Function	Equalized turn-on voltage (Equalization turn-on voltage)	3.25	3.30	3.35	V
	Opening differential pressure (Difference opening voltage value)		15		mV
	Equalization current (Balance current)	80	180	280	mA
	equalization model (Balance model)	Static Equalization/Charge Equalization (Static equalization)			
	Equilibrium type (Balance type)	Pulse Mode (Pulsed model)			

Note: Tests should be conducted at a temperature of 25±2°C and a relative humidity of 65±20%.

Note: Test should be at temperature  $25 \pm 2^{\circ}\text{C}$ , and relative humidity  $65 \pm 20\%$  of surroundings.

### 3.3. parameter settings

JBDTools -V4.2-202200829

通讯口设置 开始 升级

☐ SAVEDATA 保存数据

AFE\_SH303 AFE\_T1\_BQ76XX AFE\_SH309  
AFE\_DC10XX AFE\_O2\_3717 AFE\_O2\_3714 AFE\_NUVOTON

☐ 简体中文 ☐ 中文繁體 ☐ English

PASSWORD

电池信息 参数设置 校准 其他功能 历史记录 测试工具

读取参数

☐ factory 出厂参数

写入参数

导出参数

导入参数

基本保护参数配置

单体过压	3750 mV	释放电压	3450 mV	延时	2 S
单体欠压	2200 mV	释放电压	2700 mV	延时	2 S
整组过压	78750 mV	释放电压	72450 mV	延时	2 S
整组欠压	46200 mV	释放电压	56700 mV	延时	2 S
充电高温	65 C	释放温度	55 C	延时	5 S
充电低温	-10 C	释放温度	-5 C	延时	5 S
放电高温	75 C	释放温度	65 C	延时	5 S
放电低温	-20 C	释放温度	-10 C	延时	5 S
充电过流	325000 mA	释放时间	32 S	延时	10 S
放电过流	325000 mA	释放时间	32 S	延时	10 S

功能配置

☐ SW\_EN ☒ LOAD\_EN ☒ BAL\_EN ☐ CHG\_BAL  
☐ LED\_EN ☐ LED\_NUM ☐ RTC ☐ EDV\_EN  
☐ CHGLimit ☐ GPS\_EN ☒ Buzzer\_EN ☐ CARMODE

NTC配置

☒ NTC1 ☒ NTC2 ☒ NTC3 ☐ NTC4  
☐ NTC5 ☐ NTC6 ☐ NTC7 ☐ NTC8

均衡配置

开启电压 3300 mV GPS关闭电压 3000 mV  
均衡精度 15 mV GPS关闭延时 120 S  
均衡电流 0 mA

容量配置

标称容量	300000	mAh
循环容量	240000	mAh
单体充满电压	3550	mV
单体截止电压	2800	mV
自放电率	0.2	%

100%	3350	90%	3330
80%	3329	70%	3325
60%	3322	50%	3301
40%	3291	30%	3280
20%	3266	10%	3220
开关	65000 S	LED	30 S

高级保护

☐ OC2&SC\*2

放电过流2值	500 A	过流2延时	310 ms
短路保护值	1000 A	短路延时	343 uS
硬件单体过压	3900 mV	过压延时	6.0 S
硬件单体欠压	2000 mV	欠压延时	6.0 S
短路释放延时	5 S		

其他信息配置

检流阻值 0.1 mR 电池串数 21  
循环次数 0 序列号 0  
制造商 DGJBD  
☐ BMS\_SN JBD-AP21S002-L21S-300A-B-U-R-C  
生产日期 2022 9 1  
☐ Barcode

保护次数

短路次数	0	充电高温	0
充电过流	0	充电低温	0
放电过流	0	放电高温	0
单体过压	0	放电低温	0
单体欠压	0	整体过压	0
RSTNum	0	整体欠压	0

未连接! 串口号:COM4,波特率:9600,数据位:8,校验位: 0 参数名称: 2022-12-09 18:36:34

The diagram of upper computer

## 4. Function Description

### 4.1. Overcharge protection and recovery

#### 4.1.1. Cell overcharge protection and recovery

When the voltage of any battery cell is higher than the set value of single overcharge voltage and the duration reaches the single overcharge delay time, the system enters the overcharge protection state and shuts down the charging MOS, and cannot charge the battery.

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After monomer overcharge protection, when all monomer voltages drop below the monomer overcharge recovery value, the overcharge protection state is released. It can also be discharged to release.

When the voltage of any cell is higher than the set value of the cell overcharge voltage, and the duration reaches the cell overcharge delay, the system enters the overcharge protection state, the charging MOS is turned off, and the battery cannot be charged.

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 released by discharge.

#### 4.1.2. Entire overcharge protection and recovery

When the overall voltage is higher than the overall over-voltage setting value and the duration reaches the overall over-charging delay, the system enters into the over-charging protection state and closes the charging MOS, and cannot charge the battery.

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When the overall voltage drops below the total voltage overvoltage protection restoration value, the overcharge protection state is released, and can also be discharged and released.

When the entire voltage is higher than the entire overvoltage set value, and the duration reaches the entire overcharge delay, the system enters the overcharge protection state, turns off the charging MOS, and cannot charge the battery.

When the entire voltage drops below the recovery value of the entire voltage overvoltage protection, the overcharge protection state is released, and it can also be released by discharge.

### 4.2. Over-discharge protection and recovery

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

When the lowest section voltage is lower than the single over-discharge voltage setting value and the duration reaches the single over-discharge delay time, the system enters into the over-discharge protection state, closes the discharge MOS and cannot discharge the battery.

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After the occurrence of single unit over-discharge protection, charging the battery pack can release the over-discharge protection state.

When the minimum cell voltage is lower than the set value of the over-discharge voltage of the cell, and the duration reaches the over-discharge delay of the cell, the system enters the over-discharge protection state, turns off the discharge MOS, and cannot discharge the battery.

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

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

When the overall voltage is lower than the overall over-discharge voltage setting and the duration reaches the overall over-discharge delay, the system enters into the over-discharge protection state and shuts down the discharge MOS, and cannot discharge the battery.

After overall overdischarge protection has occurred, charging the battery pack can release the overdischarge protection state.

When the entire voltage is lower than the entire over-discharge voltage set value, and the duration reaches the

entire over-discharge delay, the system enters the over-discharge protection state, turns off the discharge MOS, and cannot discharge the battery.

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

### 4.3. Charging 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 into the charging overcurrent protection state and cannot charge the battery. After over-current charging protection occurs, the delay time is automatically restored, if you do not want to restore automatically, you can set the corresponding release time longer; discharge can also be released from over-current charging state.

When the charging current exceeds the charging protection current and the duration reaches the overcurrent detection delay time, the system enters the charging overcurrent protection state and cannot charge the battery. After the charging overcurrent protection occurs, it will automatically recover after a delay. After the charging overcurrent protection occurs, it will automatically recover after a delay. If you want to automatically recover or not, you can set the corresponding release time to be longer; the charging overcurrent state can also be released by discharging.

### 4.4. Discharge overcurrent protection and recovery

When the discharge current exceeds the overcurrent protection current and the duration reaches the delay time of overcurrent detection, the system enters into the overcurrent protection state and shuts down the discharge MOS. the delay time automatically recovers after the overcurrent discharge occurs, if you want to avoid the automatic recovery, you can set the corresponding release time longer. Charging can also release the discharge overcurrent state. There are two levels of overcurrent protection for discharge, with different response speeds for different current values to protect the battery more reliably.

When the discharge current exceeds the discharge overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the discharge overcurrent protection state and turns off the discharge MOS. When the discharge current exceeds the discharge overcurrent protection current and the duration reaches the overcurrent detection delay time, the system enters the discharge overcurrent protection state and turns off the discharge MOS. The current and the duration reaches the overcurrent detection delay time, the system enters the discharge overcurrent protection state and turns off the discharge MOS. Discharge has two-level overcurrent protection function, which has different response speeds for different current values, and protects the battery more reliably. Discharge has two-level overcurrent protection function, which has different response speeds for different values, and protectss the battery more reliably.

### 4.5. Temperature Protection and Recovery (TPR)

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

When the NTC detects that the temperature on the surface of the battery cell is higher than the set high-temperature protection temperature during charging and discharging, the management system enters into a high-temperature protection state, and the charging or discharging MOSFETs are turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature on the surface of the cell drops to the high-temperature recovery setpoint, the management

system recovers from the high-temperature state and re-conducts the charge/discharge MOS.

When the NTC detects that the temperature of the battery cell surface is higher than the setting of high temperature protection value during charging and When the NTC detects that the temperature of the battery cell surface is higher than the setting of high temperature protection value during charging and discharging, the management system enters the high temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack The charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the surface of the cell drops to the high temperature recovery set value, the management system recovers from the high temperature state and turns on the charge and discharge MOS again. state and turns on the charge and discharge MOS again.

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

When the NTC detects that the temperature on the surface of the battery cell is lower than the set low-temperature protection temperature during charging and discharging, the management system enters into the low-temperature protection state, and the charging or discharging MOSFETs are closed, and the battery pack cannot be charged or discharged in this state.



When the temperature on the surface of the cell rises to the low temperature recovery setting, the management system recovers from the low temperature state and re-conducts the charge/discharge MOS.

When the NTC detects that the temperature of the cell surface is lower than the setting of low temperature protection value during charging and When the NTC detects that the temperature of the cell surface is lower than the setting of low temperature protection value during charging and discharging, the management system enters the low temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack The charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the cell surface rises to the low temperature recovery set value, the management system recovers from the low temperature state and turns on the charge and discharge MOS again. and turns on the charge and discharge MOS again.

#### 4.6. Balance function

The management system adopts resistance bypass to equalize the battery cells, during the charging process, when the voltage of the highest single cell of the battery pack reaches the set equalization starting voltage value, and the voltage difference between the lowest voltage and the highest voltage of the single cell of the battery pack is greater than the set value, then the equalization function of the battery cell which reaches the condition will be turned on, and the equalization function of the two neighboring channels cannot be turned on at the same time.

Equalization stops when the cell pressure difference is less than the set value or the cell voltage is less than the equalization on voltage.

The management system uses the resistance bypass method to balance the cells. During the charging process, the voltage of the highest single cell 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 reaches the maximum voltage. During the charging process, the voltage of the highest single cell 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 is greater than the set value. single cell of the battery pack is greater than the set value. When the value is set, the equalization function of the cells that meet the conditions is When the value is set, the equalization function of the cells that meet the conditions is enabled, and the two adjacent equalizers cannot be enabled at the same time.

The equalization stops when the cell voltage difference is less than the set value or the cell voltage is less than the equalization turn-on voltage.

#### 4.7. Capacity calculation

The SOC calculation of the battery pack can be accurately performed by integrating the current and time. The full capacity and cycle capacity of the battery pack can be set through the upper computer, and the capacity can be updated automatically after a complete charge/discharge cycle. With the function of calculating the number of charge/discharge cycles, when the accumulated discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles will be increased once.

The SOC calculation of the battery pack can be accurately performed by integrating current and time. The full capacity and cycle capacity of the battery pack can be set through the host computer, and the capacity can be automatically updated after a complete charge and discharge cycle. The full capacity and cycle capacity of the battery pack can be set through 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. 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 When the cumulative discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles increases once.

Note: For newly installed batteries, please set the nominal capacity and cycle capacity according to the battery capacity and perform capacity learning once, otherwise capacity inadmissibility problem may occur. Capacity learning operation:

Just fully charge it to overvoltage protection, then discharge it to undervoltage protection and charge it again.

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

#### 4.8. Sleep function

When the protection board is in static state (no communication, no current, no equalization and no overvoltage protection). After a delay of 1 minute, 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. Communication, switching, charging and discharging can automatically exit the hibernation mode.

When the protection board is in static state (no communication, no current, no balance and overvoltage protection) . After a delay of 1 minute, it will enter the sleep state. After entering this state, the protection board will only reduce the frequency of detecting After entering this state, the protection board will only reduce the frequency of detecting voltage and current and its own power consumption.

switch, charging and discharging can automatically exit the sleep mode.

#### 4.9. Communication function (Communication)

The protection board can be connected to a PC via a communication box in the format 9600,8,N,1 The upper computer receives the data from the protection board.

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



UART Communication Box  
(UART communication box)



RS485 Communication Box  
(RS485 communication box)



Bluetooth Module  
(Bluetooth module)

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

Connection: After installing our special driver for communication box on your computer, plug the USB end of the communication box into the USB port of your computer, and connect the other end to the corresponding interface of the protection board which has been connected with the battery. Open the host computer, point to the communication port setting, select the corresponding CMO port of the communication box, other options do not need to move, after confirming, click start, you can read the data in the protection. **If you need to change the parameters of the protection board, be sure to click Read Parameters on the Parameters page first, and then come back to change the parameters.**

The connection method: after installing the special driver for our communication box on the computer, insert the USB end of the communication box into the USB port of the computer, and connect the other end to the corresponding interface of the protection board that has been connected to the battery. USB port of the computer, and connect the other end to the corresponding interface of the protection board that has been connected to the battery. Open the host computer, click the communication port settings, select the CMO port corresponding to the communication box, and do not change other options. 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 on the parameter page to read the parameters, and then click Start to read the parameters.** If you need to change the parameters of the protection board, you must first click on the **parameter page to read the parameters, and then change the parameters**.

#### 5. Main material

serial number (Number)	Name of Material	manufacturer (of a product) (Manufacturer)	quantities (Quantity)
1	KA49522A	nuvoton	1PCS
2	HC32L072KATA	UW	1PCS
ACCESSORIES			
1	Capture Cable\14PIN\HY2.0\with Snap \24AWG\800MM\Black White Red	---	1PCS

2	Capture Cable\9PIN\HY2.0\With Snap \24AWG\800MM\Black White Yellow Red	---	1PCS
3	Plug-in Fuse\Non-Resettable\70*20\400A	---	1PCS
4	Accessories\capture cable\2PIN\HY2.0\with snap \24AWG\550MM\blue and white \485 Specialized \ROHS	---	2PCS
5		---	

Note: The above materials may be replaced by materials with the same specifications or better specifications, if there is a need for certification does not allow the replacement of materials, you need to notify our business to re-send!

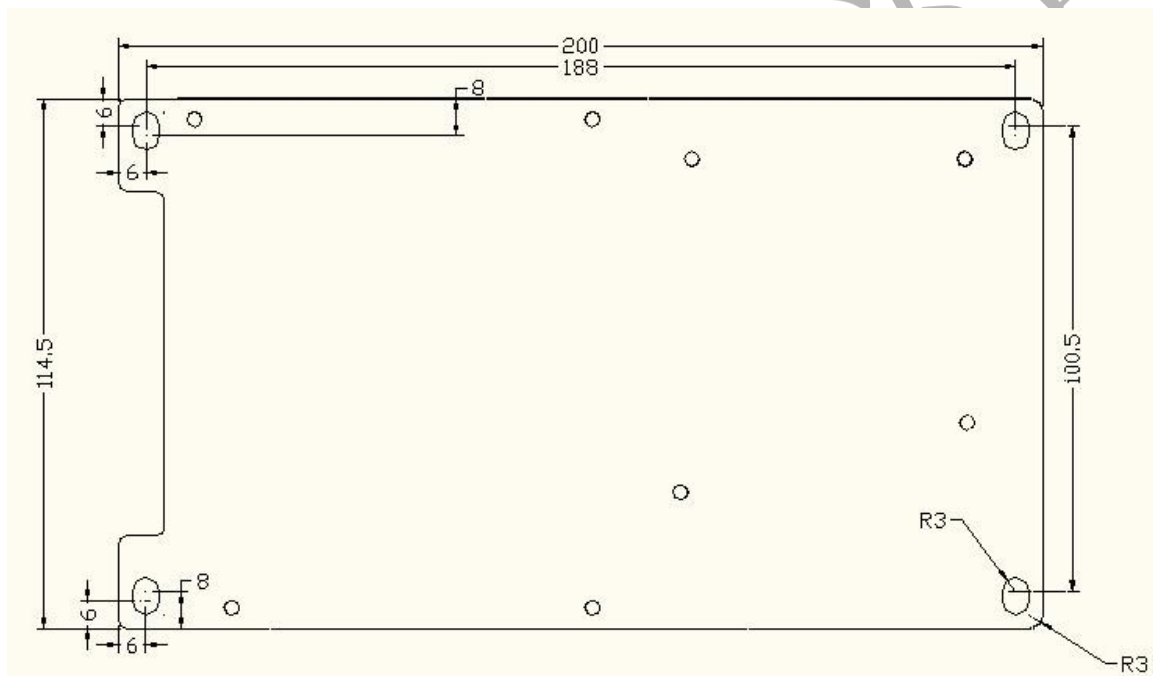
Sample, controlled specifications, the final interpretation of the right to Kaibabda.

Note: The above materials may be replaced by materials with the same specifications or better specifications. If there are certification requirements, the replacement of materials is not allowed, and we need to notify our business to send samples again. If there are certification requirements, the replacement of materials is not allowed, and we need to notify our business to send samples again. The controlled specifications, the final interpretation right belongs to Jiabaida.

## 6. Schematic and Dimensions

### 6.1. Dimensions and installation point drawing (尺寸及安装点标注图)

#### 6.1.1. Structural dimensions

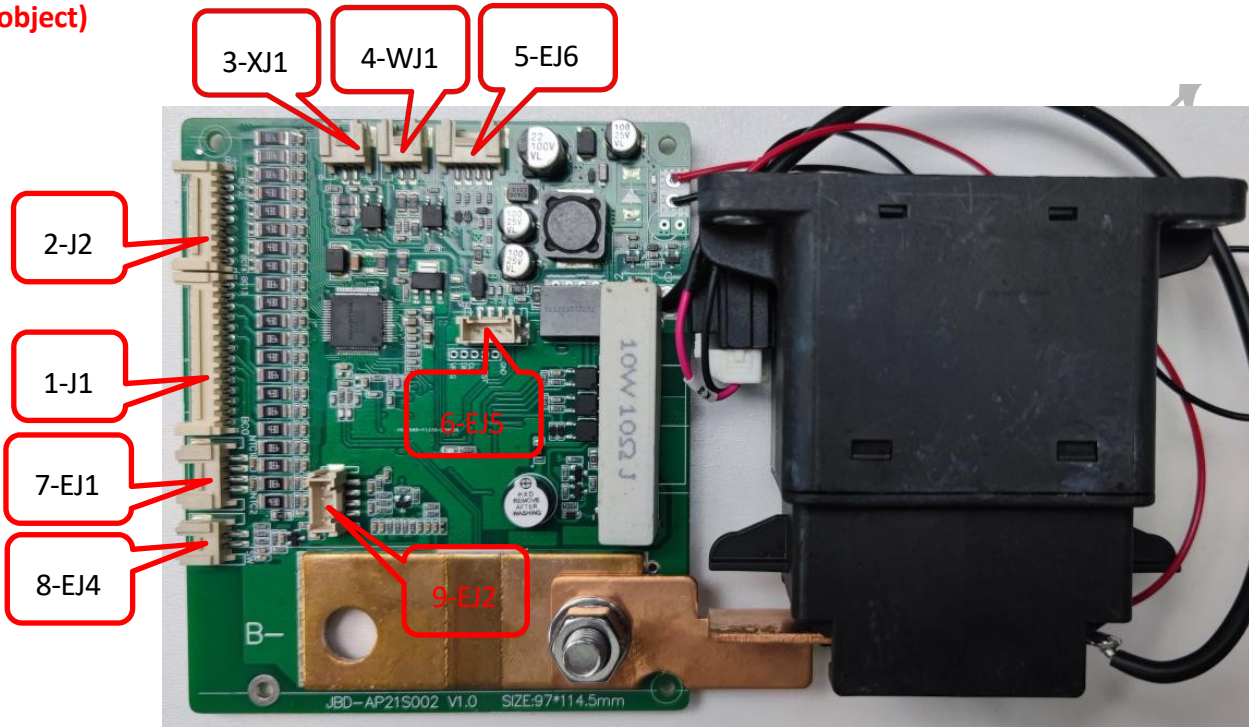



structure size

## 7. Signal port definition


### 7.1. Schematic labeling interface labeling (the picture is a wiring schematic, the shape of the physical shall prevail)

Schematic marking the interface label (the picture is a wiring diagram, the shape is subject to the actual object)







grade (Label)	bit number (Tag number)	Connector Function (Connector)	Schematic diagram of connectors (Schematic diagram)	PIN	PIN Function Definition (Pin function)	note (Note )
1	J1 (HY2.0-14P) (with carabiner)	Voltage detection socket		1	Connect to the negative terminal of the lowest battery Connect to Negative Side of Cell 1.	BC0
				2	Connect to the positive terminal of the first battery section Connect to Positive Side of Cell 1	BC1
				3	Connect to the positive terminal of the 2nd battery section Connect to Positive Side of Cell 2	BC2
				4	Connect to the positive terminal of the 3rd battery section Connect to Positive Side of Cell 3	BC3
				5	Connect to the positive terminal of section 4 battery Connect to Positive Side of Cell 4	BC4
				6	Connect to the positive terminal of section 5 battery Connect to Positive Side of Cell 5	BC5
				7	Connect to the positive terminal of the battery in section 6. Connect to Positive Side of Cell 6	BC6
				8	Connect to the positive terminal of the battery in section 7. Connect to Positive Side of Cell 7	BC7
				9	Connect to the positive terminal of section 8 battery Connect to Positive Side of Cell 8	BC8
				10	Connect to the positive terminal of section 9 battery Connect to Positive Side of Cell 9	BC9
				11	Connect to the positive terminal of the 10th battery section Connect to Positive Side of Cell 10	BC10
				12	Connect to the positive terminal of the 11th battery section Connect to Positive Side of Cell 11	BC11






				<b>13</b>	Connect to the positive terminal of the 12th battery section Connect to Positive Side of Cell 12	BC12
				<b>14</b>	Connect to the positive terminal of the 13th battery section Connect to Positive Side of Cell 13	BC13
<b>2</b>	J2 (HY2.0-14P) (with carabiner)	Voltage detection socket		<b>1</b>	Connect to the positive terminal of the 14th battery section Connect to Positive Side of Cell 14	BC14
				<b>2</b>	Connect to the positive terminal of battery section 15 Connect to Positive Side of Cell 15	BC15



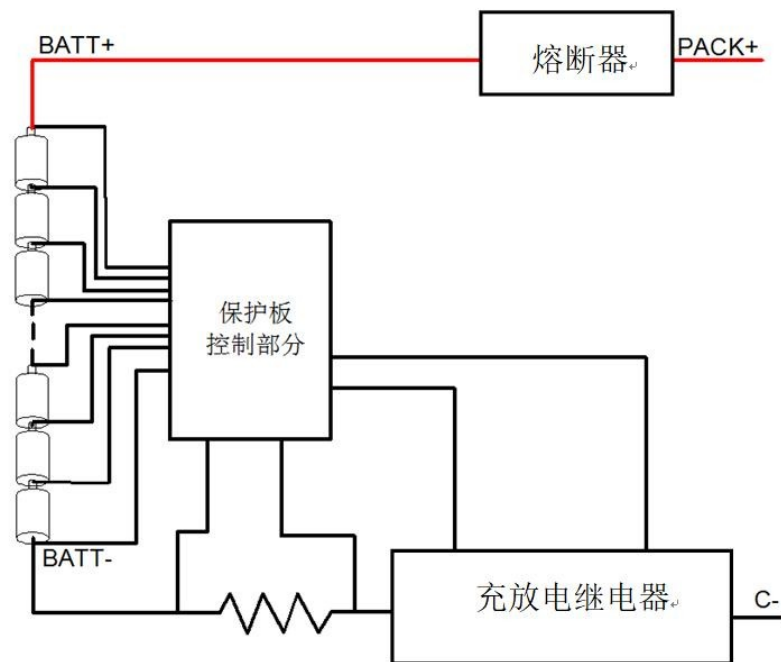
				3	Connect to the positive terminal of the 16th battery Connect to Positive Side of Cell 16	BC16
				4	Connect to the positive terminal of the 17th battery Connect to Positive Side of Cell 17	BC17
				5	Connect to the positive terminal of the 18th cell Connect to Positive Side of Cell 18	BC18
				6	Connect to the positive terminal of the 19th battery section Connect to Positive Side of Cell 19	BC19
				7	Connect to the positive terminal of the 20th battery section Connect to Positive Side of Cell 20	BC20
				8	Connect to the positive terminal of the 21st cell Connect to Positive Side of Cell 21	BC21
				9	Connect to the positive terminal of the 21st cell Connect to Positive Side of Cell 16	B+
3	XJ1 (HY2.0-2P) (with carabiner)	RS485 Interface (RS485) interface)		1	RS485-B	
				2	RS485-A	
4	WJ1 (HY2.0-2P) (with carabiner)	CAN Interface (CAN) interface)		1	CANL	
				2	CANH	
5	EJ6 (HY2.0-4P) (with carabiner)	LED Indicator/Heating Block/Current Limiting Module Control Interface (LED indicator)		1	LED-C Control interface of current limiting module LED-C Control interface of current limiting module	reserve
				2	JR-EN Heating Module Control Interface JR-ER Heating module control interface	
				3	GND	

		/ heating module / current limiting module control interface)		4	SW+ LED Indicator Interface SW+ LED indicator interface	
6	EJ5 (HY2.0-4P) (with carabiner)	UART\ Bluetooth interface UART \ Bluetooth interface		1	GND UART interface ground (UART-GND)	
				2	RXD Protection board data connection (RXD-BMS)	
				3	TXD Protection Board Data Send (TXD-BMS)	
				4	VDD Bluetooth power supply (Bluetooth power supply)	

7	EJ1 (HY2.0-4P) (with carabiner)	External temperature probe interface (External temperature probe interface)		1	NTC1 Temperature Probe	
				2	NTC1 temperature probe	
				3	NTC2 Temperature Probe	
				4	NTC2 temperature probe	
8	EJ4 (HY2.0-2P) (with carabiner)	Self-Locking Discharge Switch Interface Self locking discharge switch interface		1	SW- Switch Negative Interface SW- Switch negative interface	
				2	SW+ Switch Positive Interface SW+ Switch positive interface	
7	EJ2 (HY2.0-4P) (with carabiner)	External temperature probe Interface (External temperature probe interface)		1	NTC3 Temperature Probe	reserve
				2	NTC3 temperature probe	
				3	NTC4 Temperature Probe	
				4	NTC4 temperature probe	

## 7.2. Delivered Fuse Wiring Diagram

Fuse wiring diagram delivered



## 8. Environmental suitability

### 8.1. The environment of working

- The BMS protection board is permitted to operate normally under the following conditions.
  - Ambient temperature:  $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$ .
  - Relative humidity: 5% ~ 90%.
  - Atmospheric pressure: 86 kPa~106 kPa.
- 
- BMS The protective plate allows normal operation under the following conditions.
  - Ambient temperature:  $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$ .
  - Relative humidity: 5% ~ 90%.
  - Atmospheric pressure: 86kPa~106kPa.

### 8.2. The environment of storage

BMS protection boards should be stored in a clean and well-ventilated warehouse with ambient temperature of  $-5^{\circ}\text{C} \sim +40^{\circ}\text{C}$ , relative humidity of not more than 70%, no corrosive gases or media affecting electrical insulation in the air, and not subject to any mechanical shock or heavy pressure, no direct sunlight, and the distance from heat sources (heating equipment, etc.) should not be less than 2 m. Under the above storage conditions, BMS protection boards can be stored for one year. It should not be exposed to direct sunlight, and the distance between it and the heat source (heating equipment, etc.) should not be less than 2 m. Under the above storage conditions, the BMS protection board can be stored for one year.

BMS The protection board should be stored in a clean and well-ventilated warehouse with an ambient temperature of  $-5^{\circ}\text{C} \sim +40^{\circ}\text{C}$ , a relative humidity of not more than 70%, and the air must not contain corrosive gases and media that affect electrical insulation, and must not be affected by any mechanical shock or shock. more than 70%, and the air must not contain corrosive gases and media that affect electrical insulation, and must not be affected by any mechanical shock or heavy pressure. Not subject to direct sunlight, and the distance from the heat source (heating equipment, etc.) should not be less than 2m. Under the above storage conditions, the BMS protection board should not be subject to any mechanical shock or heavy pressure. Under the above storage conditions, the BMS protection board can be stored for one year.

## 9. Packing and shipping

### 9.1. Logo

The BMS protection board shall have the following clear and durable markings.

- Product Name, Model

Intelligent . Safe for lithium

only

Smart - only for lithium battery safety

- Cell type
- Factory date and number

## 9.2. Package

- Packaging should meet the requirements of moisture-proof, anti-vibration, the box should be firm and reliable, the box should be lined with moisture-proof materials, the product should not be tampered with in the box.
  - Exterior carton box, veneer anti-static bag with bubble wrap.
-

- The packaging should meet the requirements of moisture-proof and anti-vibration, the packing box should be firm and reliable, the inside of the box should be lined with moisture-proof material, and the product should not move in the box. the inside of the box should be lined with moisture-proof material, and the product should not move in the box.
- External carton box, veneer anti-static bag plus bubble bag packaging.

### 9.3. Transportation

- In transportation, the product shall not be subjected to violent mechanical impact, sun exposure, rain, chemical corrosive substances and harmful gas erosion; 5.3.2 In the loading and unloading process, the product is gently carried and placed, and it is strictly prohibited to drop, heavy pressure.
  - Boxes are stacked less than 5 high.
- 
- During transportation, the product shall not be subject to severe mechanical impact, exposure to the sun, rain, chemical corrosive substances and During transportation, the product shall not be subject to severe mechanical impact, exposure to the sun, rain, chemical corrosive substances 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 throw or press it.
  - The height of the packing boxes shall be less than 5 layers.

### 10. Precautions

1. This battery management system can not be used in series, and requires a customized version to support series connection.
2. When multiple packs using this management system are connected in parallel, it shall be ensured that the maximum differential pressure of the packs prior to paralleling is less than 3V.
3. When multiple packs using this management system are used in parallel, the total charging inrush current of the adapter may be applied to a single pack, and it should be ensured that the total charging inrush current of the adapter does not exceed the maximum value of the charging inrush current of a single management system.
4. The short-circuit protection function of this management system is applicable to various application scenarios, but it does not guarantee that it can be short-circuited under any conditions. When the total internal resistance of the battery pack and the short-circuit circuit is less than  $40\text{m}\Omega$ , the capacity of the battery pack exceeds 20% of the rated value, the short-circuit current exceeds 1800A, the inductance of the short-circuit

circuit is very large, or the total length of the short-circuited wires is very long, please test by yourself to make sure that this management system can be used.

5. When soldering the battery leads, be sure not to have them misconnected or reversed. If you do misconnect them, the board may be damaged and will need to be retested before use.

6. When assembling, the management system should not directly touch the surface of the battery cell to avoid damaging the circuit board. The assembly should be firm and reliable.

7. Be careful not to touch the components on the board with the lead wire, soldering iron or solder, otherwise the board may be damaged. Do not use paste flux for soldering the board, otherwise the board may not work properly.

8. The use process should pay attention to anti-static, moisture, waterproof and so on.

9. During use, please follow the design parameters and conditions of use, and do not exceed the values in this specification, otherwise the management system may be damaged.



10. After combining the battery pack and the management system, if you find that there is no voltage output or charging for the first time, please check whether the wiring is correct.

11. The parameters, functions and shapes in this specification are for reference only, and are subject to the physical appearance of the protection board.

1) This battery management system cannot be used in series in general, and requires a customized version to support series use.

2) When multiple battery packs using this management system are connected in parallel, make sure that the maximum voltage difference of each battery pack is lower than 3V before parallel connection.

3) When multiple battery packs using this management system are used in parallel, the total charging inrush current of the adapter may be applied to a single battery pack. It should be ensured that the total charging inrush current of the adapter does not exceed the maximum charging inrush current of a single battery pack 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. 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. capacity of the battery pack exceeds the rated value by 20%, the short-circuit current exceeds 1800A, the inductance of the short-circuit loop is very large, or the total length of the short-circuit wire is very long, please test yourself to determine whether This management system can be used.

5) When soldering the battery leads, there must be no wrong or reverse connection. If it is indeed connected incorrectly, the circuit board may be damaged and If it is indeed connected incorrectly, the circuit board may be damaged and needs to be re-tested before it can be used.

6) When assembling, the management system should not directly touch the surface of the cell to avoid damage to the circuit board. reliable.

7) During use, be careful not to touch the components on the circuit board such as lead tips, soldering iron, solder, etc., otherwise the circuit board may be damaged. During use, be careful not to touch the components on the circuit board such as lead tips, soldering iron, solder, etc, otherwise the circuit board may be damaged. Please do not use paste flux when soldering this circuit board, otherwise it may cause this circuit board to work abnormally.

8) During use, pay attention to anti-static, moisture-proof, waterproof, etc.

9) During use, please follow the design parameters and conditions of use, and must not exceed the values in this specification, otherwise the management During use, please follow the design parameters and conditions of use, and must not exceed the values in this specification, otherwise the management

10) After the battery pack and the management system are combined, please check whether the wiring is correct if you find that there is no voltage output or After the battery pack and the management system are combined, please check whether the wiring is correct if you find that there is no voltage output or charging fails when the battery is powered on for the first time.

11) The parameters, functions and appearances in this specification are for reference only, and the actual protection board shall prevail.

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