
SHENZHEN JIABAIDA ELECTRONICS TECHNOLOGY.CO.,LTD**Product specification**

CUSTOMER:	
SAMPLE NAME:	3-4 series 60-200A software board
MODEL NAME:	JBD-DP04S007 V1.6 LiFeP04 series
DATE:	2023-08-10
VERSION:	A02
SIGNATURES:	

compiler	Reviewer	Approver
刘厚伟	王礼刚	张桥桥

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1.Product introduction

●JBD-DP04S007 is a software protection board

scheme specially designed for 3~4 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.

2.Configuration

Function	Configuration	Function	Configuration
Number of strings supported)	3~4S	485 communication	(Not supported
Continuous current	60~200A	UART interface (isolated)	Not supported
(Number of NTC)	1 external	CAN communication	n o t supported
Balance Function	Passive balance	232 Communication	Not supported
UART (non-isolated)	Standard option	Heating function	(Optional)
Switch function	Optional	Module of Bluetooth	(Standard option)
Charging current limit	Not supported	Battery packs in series	Optional
Battery packs in parallel	Not supported	Secondary protection	Not supported
History storage	Not supported	LCD display	Not supported
Pre-discharge function	Not supported	Interface of LED indicator	Not supported
Buzzer	Not supported	Interface of GPS	Not supported

3.Parameter Setting

3.1.Basic parameter

Cell specifications		3~4 strings of LiFePO4 battery cell
Interface type		Charge and discharge are both at the same port
Charging voltage		3.6V*Number of strings
Cell voltage range		2.20~3.75V
Continuous charging current		60~200A
Continuous discharging current		60~200A
Consumption of running		≤10mA
Consumption of sleep		≤800uA
Sleep conditions		Delay 1min±30s under no current \ communication \ protection state
Circuit resistance		
Operating temperature		-20℃~75℃
Structure size of PCB		
size	60~120A	160±2mm * 105±1mm * 10±1mm (Length*Width*Height)
	150~200A	160±2mm * 105±1mm * 17±1mm (Length*Width*Height)

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

3.2.Main parameter

		Project	Specification			(Unit)			
			MIN	TYP	MAX				
Over-voltage and Under-voltage protection		Over-voltage	3.700	3.750	3.800	V			
		Over-voltage delay	1000	2000	3000	mS			
		Over-voltage release	3.550	3.600	3.650	V			
		Under-voltage	2.100	2.200	2.300	V			
		Under-voltage delay	1000	2000	3000	mS			
		Under-voltage release	2.500	2.600	2.700	V			
		Under-voltage release conditions	Self-recovery by increasing voltage or charging						
		Over-current Charge protection value	Refer to configuration table of over-current protection value below						
		Over-current Charge delay	7	10	13	S			
		Over-current Charge release conditions	Automatic recover after a delay of 32S						
		1th Over-current Discharge value	Refer to configuration table of over-current protection value below						
		1th Over-current Discharge delay	7	10	13	S			
		2th Over-current Discharge value	Refer to configuration table of over-current protection value below						
		2th Over-current Discharge delay	100	300	500	mS			
		Over-current Discharge release	Automatic recover after a delay of 32S						
Short Circuit Protection		Short circuit protection current value	Refer to configuration table of over-current protection value below)						
		Short circuit protection delay time	-	560	900	uS			
		(Short circuit protection recovery)	Recover by releasing load after approximately 5s						
		(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 2000A , short-circuit protection is not guaranteed, and short-circuit protection testing is not recommended.)							
Short Circuit Discharge				62	65	68	°C		
				52	55	58	°C		
		CHG	Without heating	Temperature protection value		-13	-10	-7	°C
				Temperature protection release value		-8	-5	-2	°C
		CHG	With heating	Temperature protection value		-3	0	3	°C
				Temperature protection release value		2	5	8	°C
		DSG		Temperature protection value		72	75	78	°C

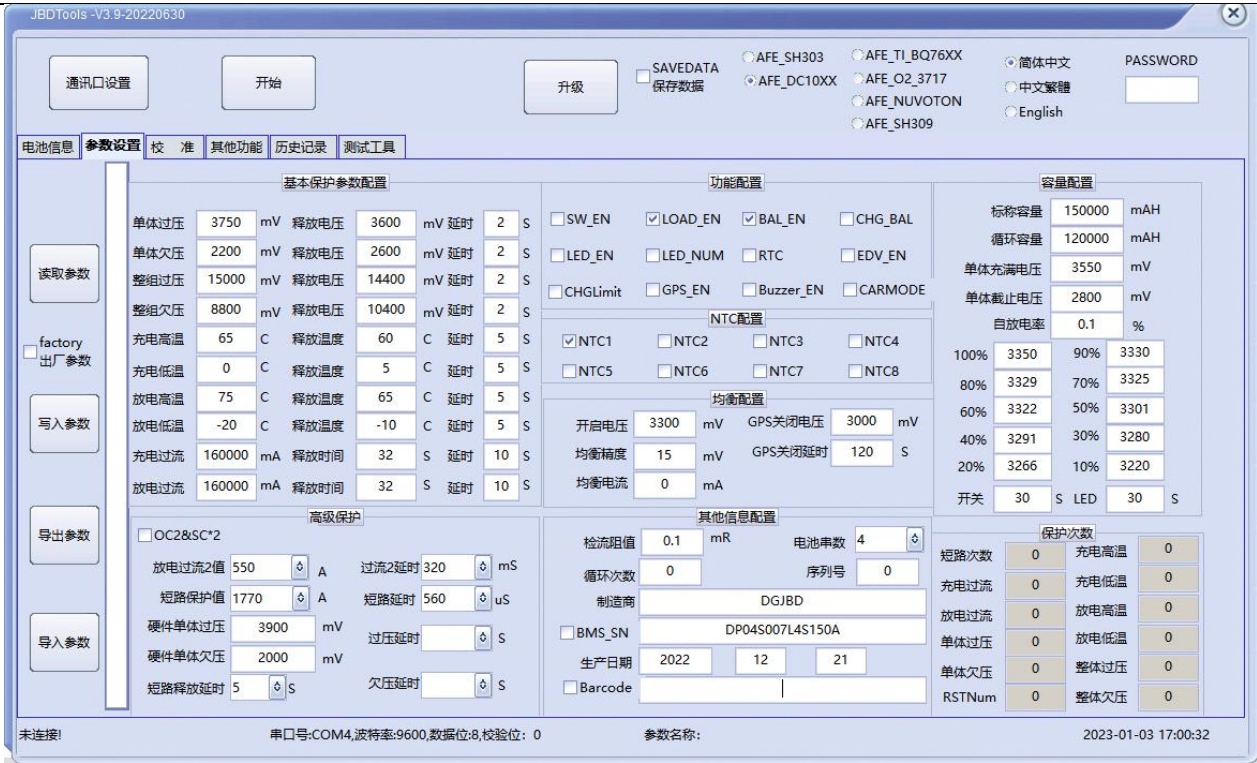
		Temperature protection release value	62	65	68	°C
		Temperature protection value	-23	-20	-17	°C
		Temperature protection release value	-13	-10	-7	°C
	FET	Temperature protection value	100	105	110	°C
	Temperature protection release value	60	75	90	°C	
(Balance Function)	Balance function turn-on voltage		3.27	3.30	3.33	V
	(Difference opening voltage value)			15		mV
	(Balance current)		150	200	250	mA
	(Balance model)		(Idle equalization)			
	(Balance type)		(Pulsed model)			

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

Over-current protection value configuration table

(Continuous current)		Charge Over-current value	一级放电过流保护值 (1 st discharge Over-current value)	(The second discharge Over-current value)	短路保护值 (Short circuit protection value)
Charge	Discharge				
60A	60A	70±5A	70±5A	210±50A	750±150A
80A	80A	90±5A	90±5A	280±60A	1000±200A
100A	100A	110±5A	110±5A	330±80A	1350±300A
120A	120A	130±5A	130±5A	440±120A	1550±400A
150A	150A	160±5A	160±5A	550±120A	1800±400A
200A	200A	210±5A	210±5A	760±120A	2400±400A

3.3 parameter settings



The diagram of the host computer

***Attention:**

The version of software in upper computer is **JBDTOOLS - V4.2 or above**, and please choose the 'AFE_DC10XX' at top right corner.

4.Function Description

4.1.Overcharge protection and recovery

4.1.1.Cell overcharge protection and recovery

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 will turn 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 entire voltage is higher than the entire Over-voltage 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 Over-voltage 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 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 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. Over-current protection and recovery in charging

When the charging current exceeds the charging protection current and the duration reaches the Over-current detection delay time, the system enters the charging Over-current protection state and cannot charge the battery. After the charging Over-current 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 Over-current state can also be released by discharging.

4.4. Over-current protection and recovery in discharging

When the discharge current exceeds the discharge Over-current protection current and the duration reaches the Over-current detection delay time, the system enters the discharge Over-current protection state and turns off the discharge MOS. Delayed automatic recovery after discharge Over-current occurs, and the corresponding release time can be set longer if automatic recovery is required. Charging can also release the discharge Over-current protect condition. Discharge has two-level Over-current protection function, which has different response speeds for different current values, and protects the battery more reliably.

4.5. Temperature Protection and Recovery

4.5.1. High temperature protection and recovery in charging and discharging

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 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.

4.5.2. Low temperature protection and recovery in charging and discharging

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 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.

4.6. Balance function

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 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 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 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. 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 once.

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 Over-voltage protection, then discharge to under-voltage protection, and then charge it again.

4.8. Sleep function

When the BMS is in static state (no communication, no current, no balance and Over-voltage protection), after a delay of 1minutes, it will enter the sleep state.

After entering this state, the BMS will only reduce the frequency of detecting and its own power consumption. Communication, dial switch, charging and discharging can automatically exit the sleep mode

4.9.Communication

4.9.1.Serial Communication



(UART communication box)

Note: The above tools need to be purchased separately.

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. Open the upper 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 click on the parameter page to read the parameters before changing the parameters.

COM Settings:

- Baud rate:9600;
- Parity Bit:NONE;
- Data Bit:8 bits;
- Stop Bit:1 bit

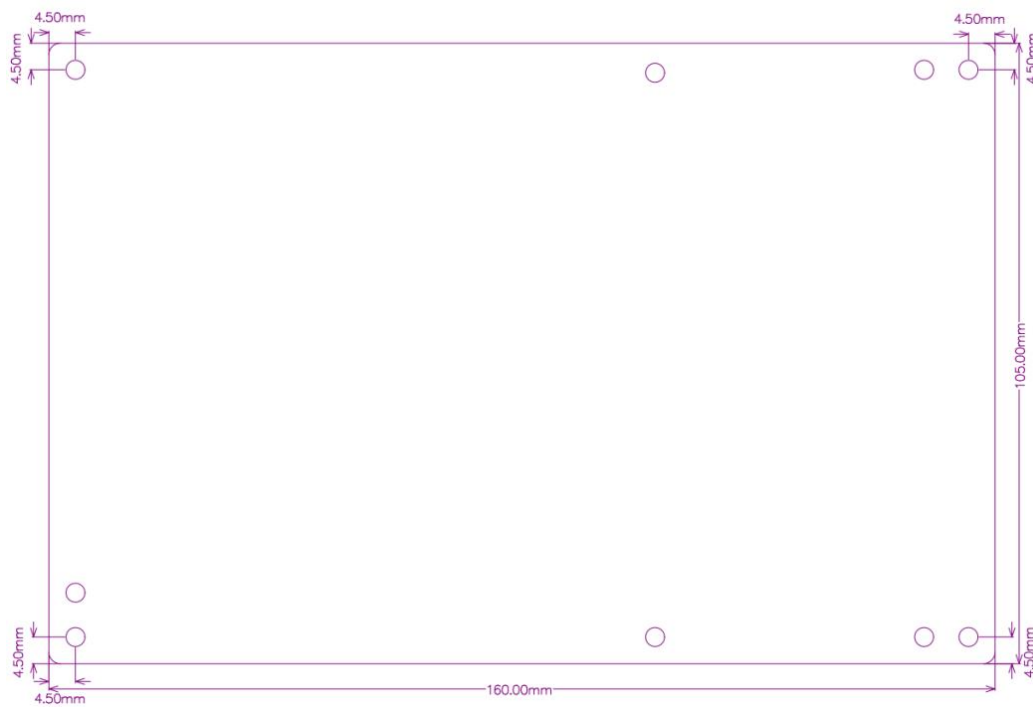
5.Main material

(Number)	(Name of Material)	(Manufacturer)	(Quantity)
1	IC\SSOP24\DVC1006	Devechip(集澈)	1PCS
2	IC\TQFN32\TL8R8250F512ET32	Telink(泰凌微)	1PCS
3	MOS管\HYG011N04LS1TA\TOLL	华羿微	
	MOS管\DP038NE8BGN\TO-263	德普微	
	MOS管\PES016N08R\TOLL-8	芯电元	
	MOS管\LSGT085R014HC\TOLL-8	龙腾	
4	NTC\10K\3950\250mm\带端子\HY2.0		1PCS
5	PCB-JBD-DP04S007		1PCS
Accessories			
1	采集线\5PIN\HY2.0\带卡扣\24AWG\550mm\黑白红	电压采集线	1PCS
2	采集线\2PIN\HY2.0\带卡扣\24AWG\550mm\黑红	开关线	1PCS

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. The controlled specifications, the final interpretation right belongs to JBD.

6. Schematic and Dimensions

6.1. Dimensions and installation point drawing

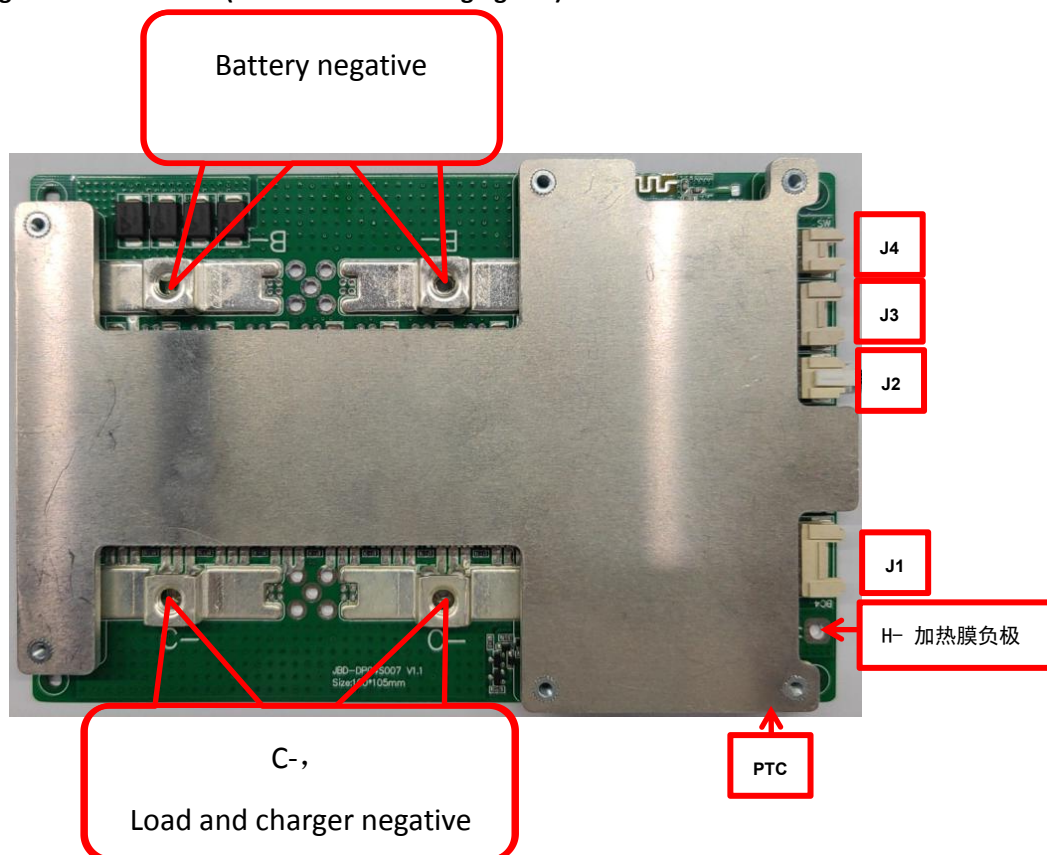


Structure size

7. Definition of signal port

7.1. Illustration annotation

Schematic marking the interface label (Refer to the following figures)



(Label)	(Tag number)	(Connector)	(Schematic diagram)	PIN	(Pin function definition)	(Note)
1	(HY2.0-5P) J1	电压检测插座 (Voltage detection socket)		1	Connect to Negative Side of Cell 1	BC0
				2	Connect to Positive Side of Cell 1 接第 2 节电芯正极	BC1
				3	Connect to Positive Side of Cell 2	BC2
				4		BC3
				5	Connect to Positive Side of Cell 3	BC4
2	(HY2.0-2P) J2	NTC		1	Connect to Positive Side of Cell 4	
				2	Connect to the temperature detection	
3	J3 (HY2.0-4P)	UART\Blue-tooth		1	UART - GND	
				2	UART - RXD	
				3	UART - TXD	
				4	UART - VDD 5V	
4	(HY2.0-2P) J4	弱电开关 (Switch)		1	K +	预留
				2	K -	
5	PTC	温控开关	焊盘		常闭, 60°C温控	预留

3S 接线方式

标号 (Label)	位号 (Tag number)	接插件功能 (Connector)	接插件示意图 (Schematic diagram)	PIN	PIN 功能定义 (Pin function definition)	备注 (Note)
1	J1 (HY2.0-5P) (带卡扣)	电压检测插座 (Voltage detection socket)		1	接最低节电芯负极 Connect to Negative Side of Cell 1	BC0
				2	接第 1 节电芯正极 Connect to Positive Side of Cell 1	BC1
				3	接第 2 节电芯正极 Connect to Positive Side of Cell 2	BC2
				4	接第 3 节电芯正极 Connect to Positive Side of Cell 3	BC3
				5		

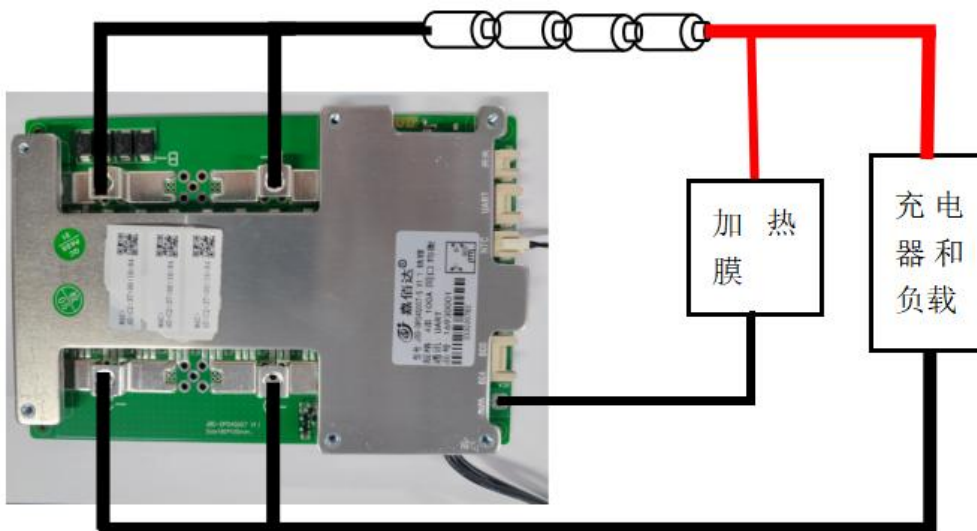
备注:

1、J4-UART 的地线为 B-，为非隔离 UART 端口，不支持与充电器或负载通讯。

Remarks:

1、The ground wire of J4-UART is B-，which is a non-isolated UART port and does not support communication with chargers or loads.

7.2.加热膜接线图（带加热功能的机型）



8.环境适用性(Environmental suitability)

8.1.工作环境(The environment of working)

- BMS 保护板允许在下列条件下正常工作:
- 环境温度: $-20^{\circ}\text{C} \sim 75^{\circ}\text{C}$;
- 相对湿度: $5\% \sim 90\%$;
- 大气压力: $86\text{kPa} \sim 106\text{kPa}$;

-
- BMS The protective plate allows normal operation under the following conditions:
 - Ambient temperature: $-20^{\circ}\text{C} \sim 75^{\circ}\text{C}$;
 - Relative humidity: $5\% \sim 90\%$;
 - Atmospheric pressure: $86\text{kPa} \sim 106\text{kPa}$;

8.2.存储环境(The environment of storage)

●BMS 保护板应存储在环境温度为 $-5^{\circ}\text{C} \sim +40^{\circ}\text{C}$ 、相对湿度不大于 70%、清洁通风良好的库房内,空气中不得含有腐蚀性气体及影响电气绝缘的介质,不得受任何机械冲击或重压。不受阳光直射,与热源(暖气设备等)之间的距离不得少于 2m。在以上存储条件下,BMS 保护板可存放一年。

●BMS 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 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 can be stored for one year.

9. 包装运输(Packing and shipping)

9.1. 标志(Logo)

BMS 保护板应有下列清晰耐久标志：

- 产品名称、型号
- 电芯型号
- 出厂日期及编号

9.2. 包装(Package)

- 包装应符合防潮、防振动的要求，包装箱应牢固可靠，箱内应衬有防潮材料，产品在箱内不应窜动。
- 外部纸箱包装箱，单板防静电袋加气泡袋包装；

● 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.

- External carton box, veneer anti-static bag plus bubble bag packaging;

9.3. 运输(transportation)

- 在运输中，产品不得受剧烈机械冲撞、暴晒、雨淋、化学腐蚀性物品及有害气体侵蚀；在装卸过程中，产品轻搬轻放，严禁摔掷、重压。

- 包装箱码放高度小于 5 层。

● During transportation, the product shall not be subject to severe mechanical impact, exposure to the sun, rain, chemical corrosive substances and harmful gases; 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. 注意事项(Precautions)

1. 本电池管理系统常规是不能串联使用的，需要定制版本才支持串联使用。
2. 多个使用本管理系统的电池包并联时，应确保并联之前各电池包的最大压差低于 3V。
3. 多个使用本管理系统的电池包并联使用时，适配器总的充电冲击电流可能施加到单个电池包上，应确保适配器总的充电冲击电流不超过单个管理系统充电冲击电流的最大值。
4. 本管理系统的短路保护功能适用于多种应用情景，但并不能保证可以在任意条件下短路。当电池包和短路回路的内阻值总和低于 40mΩ、电池组容量超出额定值 20%、短路电流超过 2000A、短路回路的电感非常大或者短路的导线总长度非常长时，请自行测试确定是否可以正常使用本管理系统。
5. 焊接电池引线时，一定不可有错接或反接。如果确实已接错，这块电路板可能已损坏，需要重新测试合格后才可使用。
6. 装配时管理系统不要直接接触到电芯表面，以免损坏电路板。装配要牢固可靠。
7. 使用中注意引线头、烙铁、焊锡等不要碰到电路板上的元器件，否则有可能损坏本电路板。焊接本电路板请不要使用膏状助焊剂，否则有可能导致本电路板工作不正常。
8. 使用过程要注意防静电、防潮、防水等。
9. 使用过程中请遵循设计参数及使用条件，不得超过本规格书中的值，否则有可能损坏管理系统。
10. 将电池组和管理系统组合好以后，初次上电如发现无电压输出或充不进电，请检查接线是否正确。
11. 本规格书中的参数、功能和外形仅供参考，请以保护板实物为准。

1.This battery management system cannot be used in series generally, 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 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 total internal resistance of the battery pack and the short-circuit loop is lower than 40mΩ, the capacity of the battery pack exceeds the rated value by 20%, the short-circuit current exceeds 2000A, 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 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. Assembly should be firm and 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. 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 system may be damaged.

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 charging fails when the battery is powered on for the first time.

11.The Parameter,function and outlook of BMS in this specification are for reference only,please refer to actual product.