



无人机专用智能电池管理系统

Smart Battery Management System for Drones

PRODUCT SPECIFICATION

产品名称 <i>Product Name</i>	12S 81A UAV BMS
产品型号 <i>Product Model</i>	EF-006
输出方式 <i>Output Mode</i>	MOS
产品工艺 <i>Product Technology</i>	PCBA 刷三防漆 / PCBA conformal coating
版本编号 <i>Version No.</i>	AYEF006-M001
尺寸 <i>Dimensions</i>	123.8 mm × 94.8 mm × 11 mm (±1 mm)
规格 <i>Configuration</i>	12S, common port, 27A charge, 81A discharge, CAN, BLE

客户确认 <i>Customer Confirmation</i>		
编制/日期 <i>Prepared by / Date</i>	审核/日期 <i>Reviewed by / Date</i>	批准/日期 <i>Approved by / Date</i>
客户签字/盖章 <i>Customer Signature / Company Seal</i>		

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Revision History

[illegible]



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1 产品概述

1 Product Overview

1.1 产品简介

1.1 Product Introduction

本产品为面向无人机锂电池组设计的 12S 81A 智能电池管理系统 (BMS)，采用 MOS 管输出与充放电共口结构，适用于单体电压范围为 3.0 V ~ 4.25 V 的锂电池组。板卡采用 PCBA 刷三防漆工艺，集成电芯电压采样、充放电控制、被动均衡、温度监测、CAN 通信及蓝牙功能。

This product is a 12S 81A smart Battery Management System (BMS) for drone lithium battery packs. It uses MOSFET output and a common charge/discharge port, is suitable for a cell-voltage range of 3.0 V to 4.25 V, and uses PCBA conformal coating. It integrates cell-voltage sampling, charge/discharge control, passive balancing, temperature monitoring, CAN communication, and BLE.

BMS 在地面工况下对电压、电流和温度异常执行保护；飞行工况下，相关异常以告警和通信数据形式提示，不产生保护作用。

The BMS provides protection against voltage, current, and temperature anomalies during ground operations; during flight operations, such anomalies are indicated through alarms and communication data but do not trigger protective actions.

1.2 功能配置

1.2 Functional Configuration

功能 Function	配置 Configuration	功能 Function	配置 Configuration
支持串数 Number of strings supported	12S	485(隔离) 485 Communication Isolated	/
放电持续电流 Discharging Continuous current	81A	UART(隔离) UART Communication Isolated	/
充电持续电流 Charging continuous current	27A	CAN 通讯 CAN Communication Isolated	标配 Standard option
NTC 数量 Number of NTCs	3 路电池 3-cell battery 1 路 MOS 1-Channel MOS	加热功能 Heating Function	/
均衡功能 Balance Function	被动均衡 Passive balance	蓝牙模块 Bluetooth Module	标配 Standard option
开关功能 Switch Function	/	电池组串联 Battery packs in series	/
充电限流功能 Charging current limit	/	二次保护功能 Secondary protection	/
电池组并联 Battery packs in parallel	/	LCD 显示屏 LCD Display	/
履历 History storage	标配 Standard option	LED 指示灯接口 LED indicator interface	/
预充电功能 Pre-discharge function	标配 Standard option	GPS 接口 GPS interface	/

备注：非隔离通信不支持与充电器或负载通讯

Note: 1. Non-isolated communication with charger or loads is not supported.



2 电气特性

2 Electrical Characteristics

2.1 基本参数

2.1 Basic Parameters

注：除非另有说明，以下参数在 25°C 环境温度下测试。

Note: Unless otherwise specified, the following parameters are tested at an ambient temperature of 25°C.

项目 Item	规格 Specification
电池包规格 battery pack Specifications	12 串 12S
接口类型 Interface type	充放电同口 Charge and discharge are both at the same port
充电电压 Charging voltage	50.4v
单体电压范围 Cell voltage range	三元锂 3.0~4.2v NMC 3.0~4.2V
持续充电电流 Continuous charging current	27A
持续放电电流 Continuous discharging current	81A
通信接口 Communication Interface 连接上位机波特率，ID Connected upper computer Baud Rate and ID	BLE Baud Rate: 115200 ID:1 CAN Baud Rate: 1000K ID:1
运行功耗 Consumption of running	≤10mA
休眠功耗 Consumption of sleep	≤3mA (蓝牙正常工作)
休眠条件 Sleep conditions	无电流、通讯、保护状态下 No current, communication, protection state
深度休眠功耗 Consumption of deep sleep	≤50uA
深度休眠条件 Deep sleep conditions	单体欠压状态下 (In cell under voltage state)
工作温度 Operating temperature	-20°C~70°C
板子结构尺寸 Size	(L*W*H) 123.8*94.8*11mm±1mm



2.2 主要参数

2.2 Main Parameter

注：以下保护参数为来源产品规格书列示值。

Note: The following protection parameters are values stated in the source product specification.

项目 Project		规格 Specification				备注 Notes
		最小 MIN	典型 TYP	最大 MAX	单位 Unit	
单串电池参数 Cell Parameter						
单节过充保护 Single Cell Over-Charge Protection	过充保护 Over-Charge Voltage Protection	4.225	4.25	4.275	V	单体过压仅关闭 充电 MOS Cell overvoltage only turns off the charge MOSFET.
	过充保护延时时间 Over-Charge voltage Protection Delay Time	2	3	4	S	
	过充保护恢复电压 Over-Charge voltage Protection Release	4.075	4.1	4.125	V	
单节过放保护 Single Cell Over-Discharge Protection	过放保护 Over-Discharge Voltage Protection	2.975	3.0	3.025	V	单体过放保护关 闭放电 MOS , 飞 行中无效 Cell over-discharge protection turns off the discharge MOSFET and is inactive during flight.
	过放保护延时时间 Over-Discharge voltage Protection Delay Time	2	3	4	S	
	过放恢复电压 Over-Discharge voltage Protection Release	3.475	3.5	3.525	V	
均衡功能 Balance Function						
均衡电压 Balanced Voltage	均衡开启电压 Balanced Opening Voltage	3.775	3.8	3.825	V	
	均衡开启压差 Balanced Opening Voltage Different	0.03	0.05	0.07	V	
	均衡电流 Balanced Opening Current	40	50	60	mA	
	均衡方式 Balanced Opening Mode	被动均衡 Passive Balancing				/
电流保护参数 Current Protection Parameter						
充电过流保 护 Over Charge Current Protection	充电过流保护电流 Over-Current Charge Protection	28	30	32	A	充电过流保护会 关闭充电 MOS Charge overcurrent protection turns off the charge MOSFET.
	充电过流保护延时 Over-Current Charge Protection Delay Time	4	5	6	S	
	充电过流保护解除 Over-Current Charge Protection is lifted	30S 自动恢复 Delay 30S Self-recovery				



放电过流保护 Over Discharge Current Protection	峰值电流 Peak Current	130	180	230	A	放电过流，飞行中无效 Discharge Overcurrent, Inactive During Flight
	峰值电流持续时间 Duration of Peak Current	4	5	6	S	
	放电过流保护电流 Level Over Protection Current	31	81	131	A	
	放电过流保护延时 Level Over Protection Current Delay Time	23	25	27	S	
	放电过流保护解除 Over-Current Discharge Protection Release	延时 30S 自动恢复 Delay 30S Self-recover				
短路保护参数 Short-Circuit Protection Parameter						
短路保护 Shor-Circuit Protection	短路保护电流 Short-Circuit Protection Current	390	440	490	A	飞行中无效 Inactive During Flight
	短路保护延时 Short-Circuit Protection Delay Time	200	400	600	uS	
	短路保护解除 Short-Circuit Protection is lifted	延时 30S 自动恢复 Delay 30S Self-recover				
	短路说明：表中的短路电流最小值与最大值是短路保护功能的有效作用范围，电流低于最小值或高于最大值，都会可能导致短路保护功能失效。请充分评估实际的短路电流值，或者串联电阻，再进行短路测试！ Short-Circuit Description: The minimum and maximum values of the short-circuit current listed in the table define the effective range of the short-circuit protection function. If the current is lower than the minimum value or higher than the maximum value, it may cause the short-circuit protection to fail. Please thoroughly assess the actual short-circuit current value or series resistance before conducting short-circuit tests.					
电池温度保护参数 Cell Temperature Protection Parameter						
充电温度保护 Charging Temperature Protection	充电高温保护 Charging High Temperature Protection	53	55	57	℃	放电高低温只有警告，不会关闭放电 MOS Discharge high- and low-temperature conditions only generate warnings and do not turn off the discharge MOSFET.
	充电高温恢复 Charging High Temperature Protection Release	43	45	47	℃	
	充电低温保护 Charging Low Temperature Protection	-2	0	2	℃	
	充电低温恢复 Charging Low Temperature Protection Release	1	3	5	℃	
放电温度保护 Discharging Temperature Protection	放电高温保护 Discharging High Temperature Protection	73	75	77	℃	
	放电高温恢复 Discharging High Temperature Protection Release	53	55	57	℃	
	放电低温保护 Discharging Low Temperature Protection	-22	-20	-18	℃	



	放电低温恢复 Discharging Low Temperature Protection Release	-12	-10	-7	°C	
MOS 温度保护参数 MOS Temperature Protection Parameter						
MOS 高温保护 High Temperature Protection of MOS	MOS 温度保护值 Temperature Protection Value	85	90	95	°C	MOS 过温保护会 关闭充电 MOS MOS overtemperature protection turns off the charge MOSFET.
	MOS 温度保护解除值 Temperature Protection Release Value	65	75	80	°C	
电池总压保护参数 Total Voltage Protection Parameter						
总压过充保护 Total Voltage Over charge Protection	总压过充保护电压 Overall Overcharge Protection Voltage	50.7	51.0	51.3	V	总压过放不会关 闭放电 MOS Total-voltage over-discharge does not turn off the discharge MOSFET
	总压过充保护延时 Overall Overcharge Protection Delay	2	3	4	S	
	总压过充保护解除电压 Overall Overcharge Protection Release Voltage	48	49.2	49.5	V	
总压过放保护 Total Voltage Over discharge Protection	总压过放保护电压 Overall Over discharge Protection Voltage	35.7	36	36.3	V	
	总压过放保护延时 Overall Over discharge Protection Delay	2	3	4	S	
	总压过放保护解除电压 Overall Over discharge Protection Release Voltage	41.7	42	42.3	V	
加热管理 Heating Manage						
加热管理 Heating Manage	加热开启温度 Heating Opening temperature	/	/	/	°C	
	加热停止温度 Heating Stop temperature	/	/	/	°C	
	加热电流 Heating Current	/	/	/	A	
	加热方式 Type Of Heating	充电加热 Heating By Charge				

重点说明：本产品为适应钠锂混合电芯的 BMS. 针对不同电芯有两套电压保护参数。

Note: This product is suitable for the BMS of sodium battery and lithium. There are two sets of voltage protection parameters for different cells.



3 工作模式与指示

3 Operating Modes and Indication

3.1 工作模式说明

3.1 Operating Mode Description

BMS 上电自检正常后进入正常工作模式，实时监测电芯电压、电流、温度、保护状态和通信状态。无电流、无通信且无保护动作时，BMS 可进入休眠；任一电芯进入欠压状态时，BMS 可进入深度休眠。

After passing power-on self-test, the BMS enters normal operating mode and monitors cell voltage, current, temperature, protection status, and communication status in real time. It may enter sleep when there is no current, no communication, and no protection event; it may enter deep sleep when any cell reaches the under-voltage state.

可通过外部开关、充电或放电动作唤醒休眠状态。

Sleep mode can be woken by the external switch, charging, or discharging.

3.2 指示灯说明

3.2 LED Indication

指示状态 <i>Indication</i>	含义 <i>Meaning</i>
约每秒闪烁 1 次 <i>Approx. 1 flash per second</i>	BMS 自检与运行正常 <i>BMS self-test and operation are normal</i>
约每秒闪烁 3 次 / 快闪 <i>Approx. 3 flashes per second / fast flashing</i>	存在告警或保护异常，请通过 CAN 或蓝牙读取状态 <i>Alarm or protection abnormality; read status via CAN or BLE</i>
约每 10 秒闪烁 1 次 <i>Approx. 1 flash per 10 seconds</i>	BMS 处于休眠状态 <i>BMS is in sleep mode</i>

3.3 均衡功能

3.3 Balancing Function

产品采用被动均衡。达到均衡开启电压且单体压差满足开启条件时，BMS 对最高电压单体进行均衡；均衡电流典型值为 50 mA。

The product uses passive balancing. When the balancing start voltage is reached and the cell-voltage difference meets the start condition, the BMS balances the highest-voltage cell. The typical balancing current is 50 mA.

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4 功能示意图

4 Functional Diagram

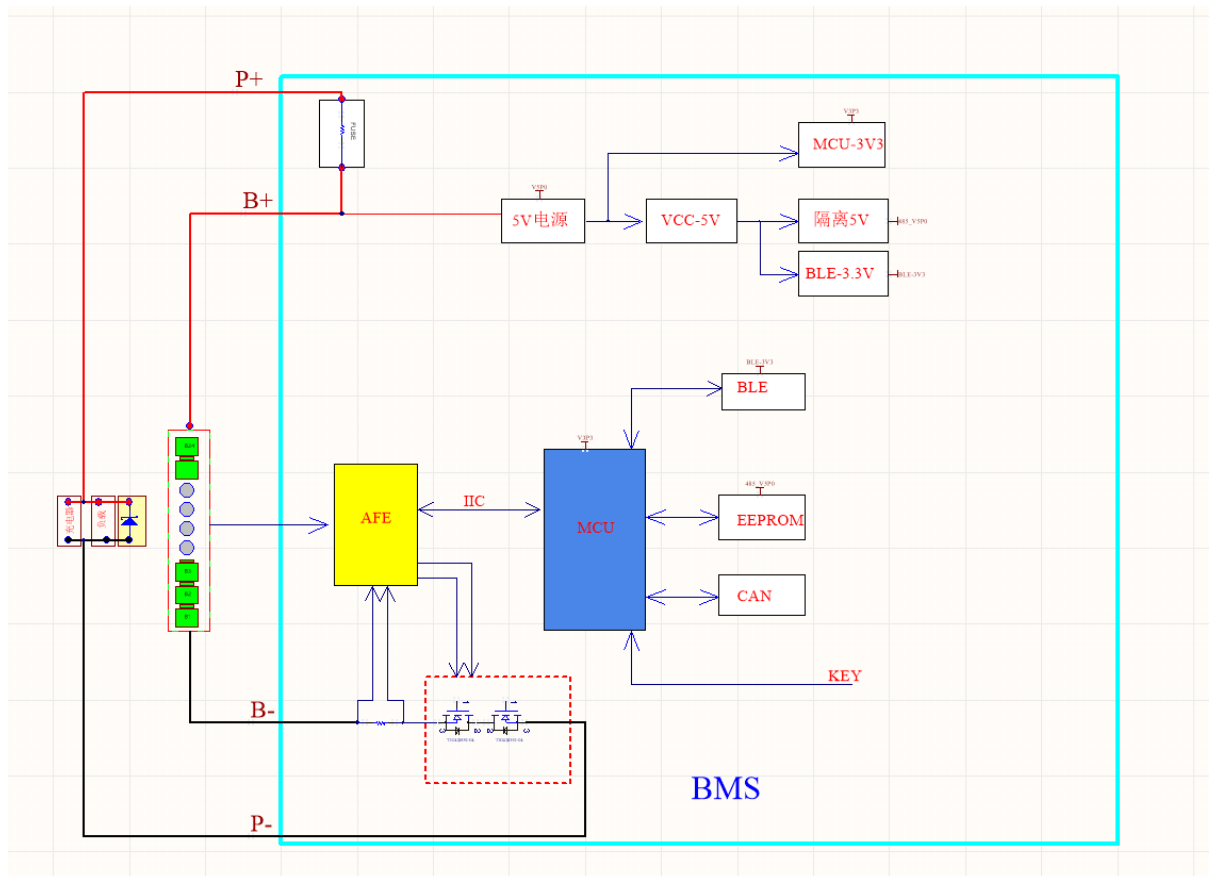


图 1 BMS 功能示意图

Figure 1 BMS Functional Block Diagram

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5 PCB、接口与尺寸

5 PCB, Interfaces and Dimensions

5.1 产品实物图

5.1 Product Photographs

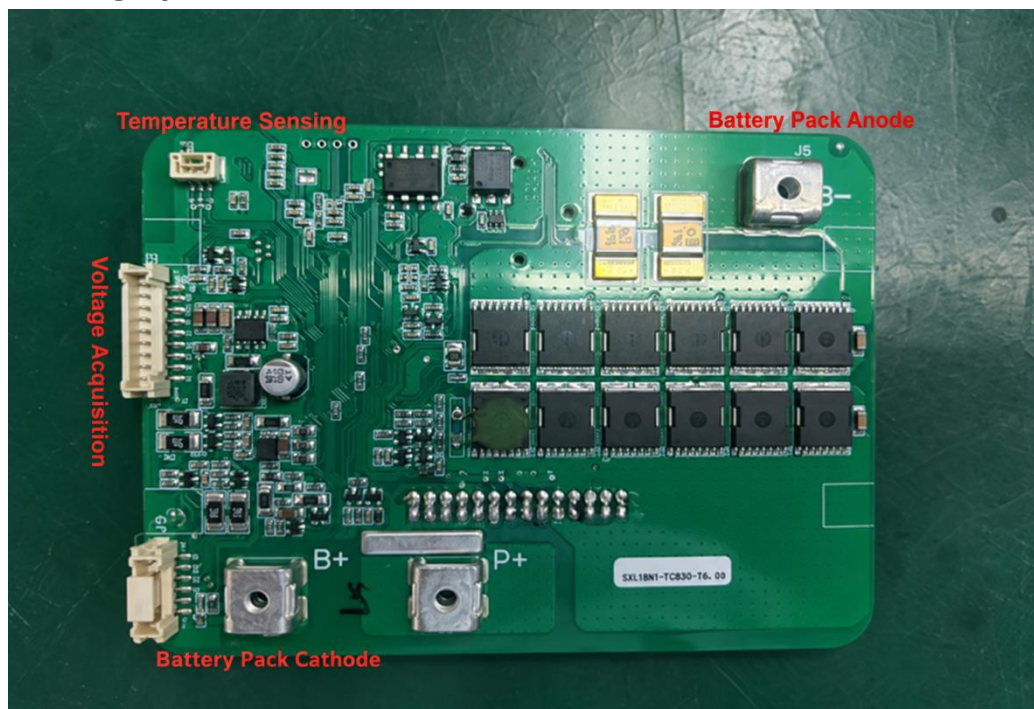


图 2 BMS 正面

Figure 2 Front View of the BMS

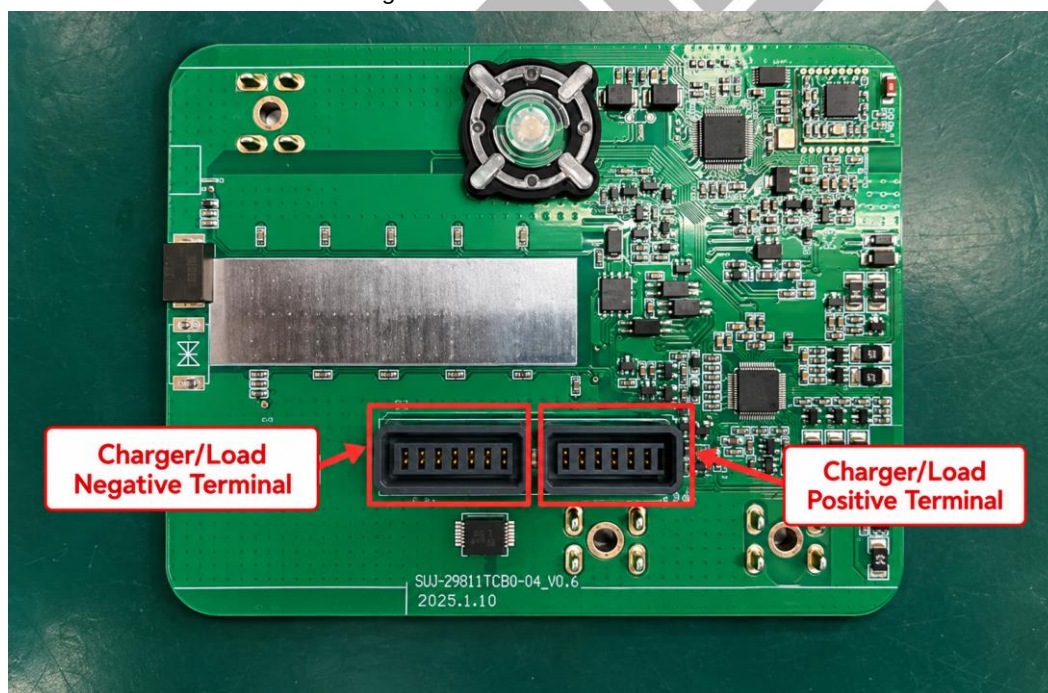


图 3 BMS 背面

Figure 3 BMS Rear View



5.2 电压采样接口定义

5.2 Cell Voltage Sampling Interface

低位电池采样线束接口定义 Low Cell Voltage Sampling Interface					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	GND	接 1 串电池负极 Connect to Negative side of cell 1	2	B0	接 1 串电池负极 Connect to Negative side of cell 1
3	B1	第 1 串电池正极 Connect to Positive side of cell 1	4	B2	第 2 串电池正极 Connect to Positive side of cell 2
5	B3	第 3 串电池正极 Connect to Positive side of cell 3	6	B4	第 4 串电池正极 Connect to Positive side of cell 4
7	B5	第 5 串电池正极 Connect to Positive side of cell 5	8	B6	第 6 串电池正极 Connect to Positive side of cell 6
9	B7	第 7 串电池正极 Connect to Positive side of cell 7			

高位电池采样线束接口定义 High Cell Voltage Sampling Interface					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	B8	第 8 串电池正极 Connect to Positive side of cell 8	2	B9	第 9 串电池正极 Connect to Positive side of cell 9
3	B10	第 10 串电池正极 Connect to Positive side of cell 10	4	B11	第 11 串电池正极 Connect to Positive side of cell 11
5	B12	第 12 串电池正极 Connect to Positive side of cell 12	6	B+	第 12 串电池正极 Connect to Positive side of cell 12

温度线束接口定义 Temperature Sampling Interface					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	T3+	温度传感器 3 正极 Positive side of temperature sensor3	2	T2+	温度传感器 2 正极 Positive side of temperature sensor2
3	T1+	温度传感器 1 正极 Positive side of temperature sensor3			



5.3 产品尺寸

5.3 Product Dimensions

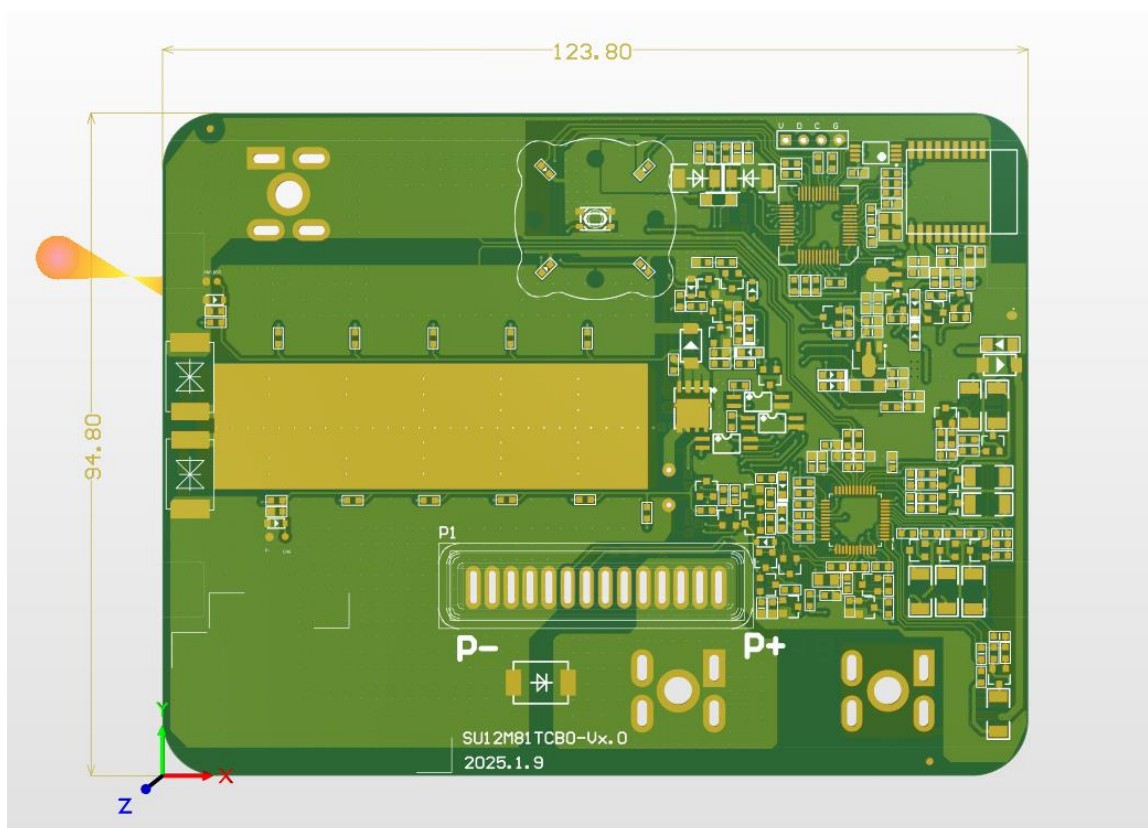


图 4 BMS 板尺寸图 (123.8 mm × 94.8 mm)

Figure 4 BMS Dimensions (123.8 mm × 94.8 mm)

5.4 线束定义

5.4 Wiring Harness Definitions

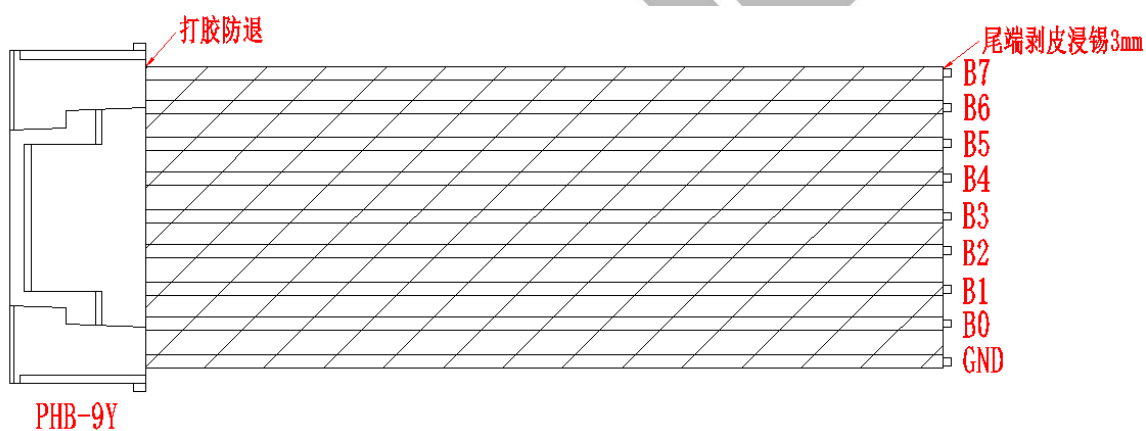


图 5 低位电池电压采样线束

Figure 5 Low-position Cell-voltage Sampling Harness

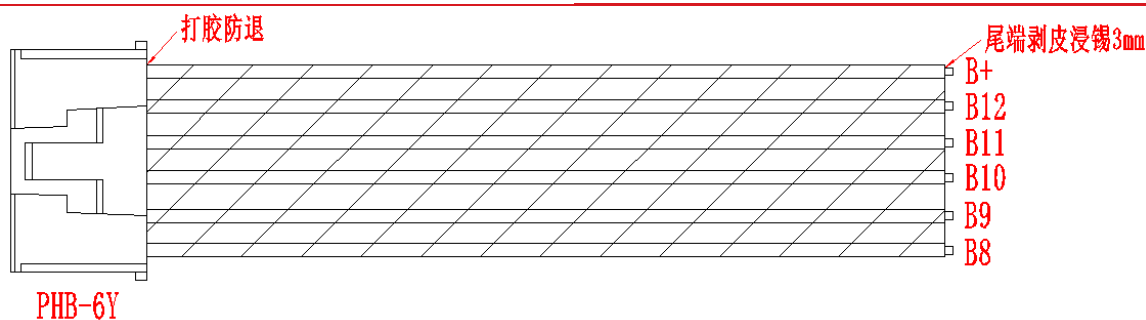


图 6 高位电池电压采样线束

Figure 6 High-position Cell-voltage Sampling Harness

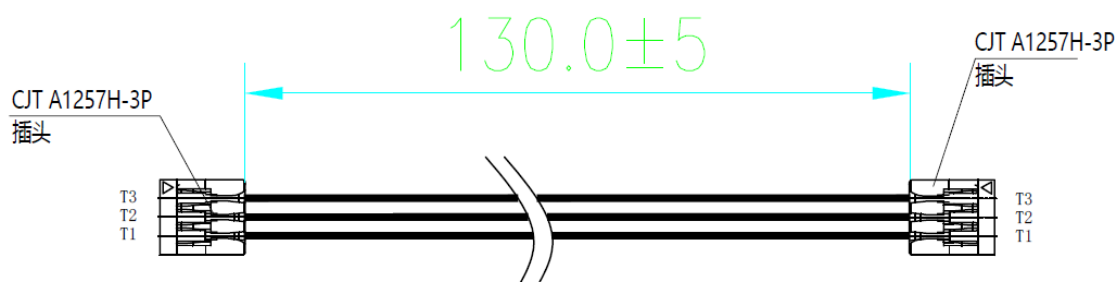


图 7 温度采样线束

Figure 7 Temperature Sampling Harness

5.5 面板接口定义

5.5 Panel Interface Definitions

面板接口定义 Panel Interface Definitions					
NO	PIN	PIN 功能定义 Pin Function	NO	PIN	PIN 功能定义 Pin Function
1	P-	负载/充电器负极 Load or Charger Negative	2	P-	负载/充电器负极 Load or Charger Negative
3	P-	负载/充电器负极 Load or Charger Negative	4	P-	负载/充电器负极 Load or Charger Negative
5	P-	负载/充电器负极 Load or Charger Negative	6	K-	唤醒开关负极 Wake-Up Switch Negative
7	K+	唤醒开关正极 Wake-Up Switch Positive	8	CANH	CAN 通讯高电平 CAN High Level
9	CANL	CAN 通讯低电平 CAN low Level	10	P+	负载/充电器正极 Load or Charger Positive
11	P+	负载/充电器正极 Load or Charger Positive	12	P+	负载/充电器正极 Load or Charger Positive
13	P+	负载/充电器正极 Load or Charger Positive	14	P+	负载/充电器正极 Load or Charger Positive



6 通信说明

6 Communication

6.1 CAN 通信

6.1 CAN Communication

产品支持 CAN 通信，波特率为 1 Mbps，默认 BMS ID 为 1；CAN 接口带 120 Ω 终端电阻。

The product supports CAN communication with a baud rate of 1 Mbps and a default BMS ID of 1. The CAN interface includes a 120 Ω termination resistor.

6.2 上位机与蓝牙

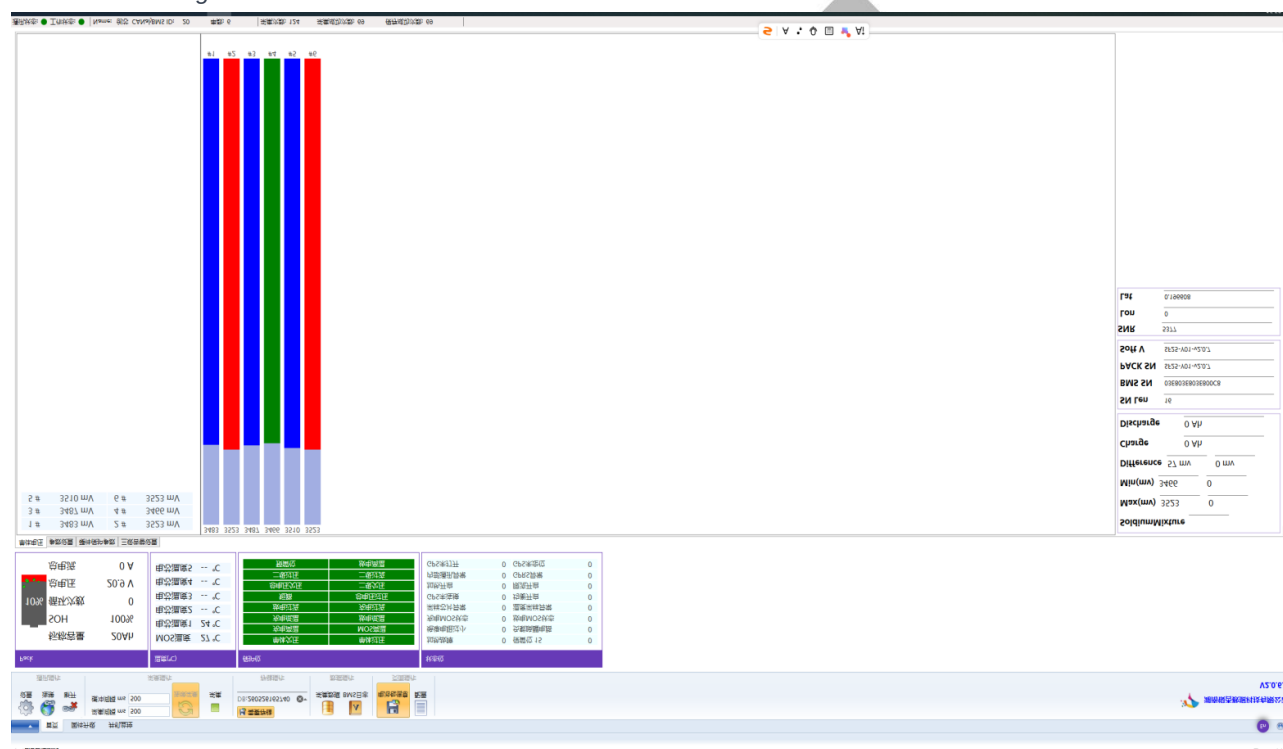
6.2 Host Computer and BLE

通过 CAN 上位机或蓝牙可读取单体电压、总压、电流、温度、保护状态和历史记录，并可用于工程调试。参数变更应由具备权限的工程人员执行。

The CAN host computer or BLE can read cell voltage, pack voltage, current, temperature, protection status, and historical records, and can be used for engineering commissioning. Parameter changes shall be performed only by authorized engineering personnel.

调试上位机使用 CAN 接口，软件界面如下，

The commissioning software uses the CAN interface. The software interface is shown below.



上位机主界面分为单体电芯电压显示，单体 1 电压为第一串电压（最低串，靠近总负极 B-），温度显示，电池信息显示（包括电池总压、SOC，剩余容量，充放电电流，充电电流为正，放电电流为负），MOS 状态包括充电 MOS、放电 MOS、和加热 MOS，导通即 MOS 管打开。

The main host-computer interface includes individual cell-voltage display (Cell 1 is the first series cell, nearest the pack negative terminal B-), temperature display, and battery information (including total pack voltage, SOC, remaining capacity, and charge/discharge current; charging current is positive and discharging current is negative). MOSFET status includes the charge, discharge, and heating MOSFETs; "on" indicates that the corresponding MOSFET is enabled.



(1) 单体电压可显示每串的电池电压，以及最高电压和最低电压，最高电压为红色背景框，最低电压为绿色背景框。

The cell-voltage panel displays the voltage of each series cell together with the maximum and minimum values. The maximum voltage is highlighted in red and the minimum voltage in green.

(2) 电池工作状态可显示各种保护标志以及单串电池状态，若变红且显示故障，则表示有相应的故障触发。

The battery operating-status panel displays protection indicators and individual-cell status. A red fault indication means that the corresponding fault has been triggered.

(3) 通讯状态可显示通讯状态，若没有数据显示，则通讯异常。

The communication-status panel indicates the communication state. If no data is displayed, communication is abnormal.

(4) 打开串口后，需要点击‘采集’才会开始通讯，打开后部分功能才会使能。

After opening the communication port, click “Acquire” to start communication. Some functions are enabled only after acquisition begins.

6.2.1 参数设置

6.2.1 Parameter Settings

(1) 参数设置分为系统信息、保护阈值、恢复阈值、延时和其它。

Parameter settings are divided into system information, protection thresholds, recovery thresholds, delays, and other settings.

(2) 系统信息包括了板子的一些基本信息。（警告参数仅用于客户特定需求，若不需要，则忽略不影响使用）

System information contains basic board information. (Warning parameters are intended only for customer-specific requirements; if not required, they may be ignored without affecting operation.)

(3) 保护阈值包括过充过放电压、高低温保护、以及充放电过流阈值。

Protection thresholds include overcharge/overdischarge voltage, high/low-temperature protection, and charge/discharge overcurrent thresholds.

(4) 恢复阈值包括过充过放、高低温恢复阈值。

Recovery thresholds include overcharge/overdischarge and high/low-temperature recovery thresholds.

(5) 延时包括过充过放电压、高低温保护、以及充放电过流延时。

Delay settings include overcharge/overdischarge voltage, high/low-temperature protection, and charge/discharge overcurrent delays

6.2.2 程序更新

6.2.2 Firmware Update

BMS 支持固件在线升级，在保证 BMS 通讯正常的情况下，可以通过 CAN 或者 UART 下载固件更新程序。

The BMS supports online firmware upgrades. When BMS communication is operating normally, firmware updates can be downloaded through CAN or UART.

6.2.3 历史数据

6.2.3 Historical Data

(1) BMS 具有历史故障和数据记录功能，可通过上位机查看故障记录和电池历史工作状态；

The BMS records historical faults and operating data. Fault records and historical battery operating status can be viewed using the host-computer software.

(2) 点击读取故障后，会出现相应的故障触发次数以及循环次数；

After clicking “Read Faults,” the number of occurrences of each fault and the cycle count are displayed.

实时数据可实时显示上位机读取的电池状态信息，并可以表格的形式导出到上位机根目录下。

The real-time data view displays battery-status information read by the host computer and can export the data as a table to the host-computer root directory.



告警数据										
Addr: 20		Cell count: 6		读取告警数据	读取充放电运行数据	读取充放电运行数据 Flash	导出			
Index	Time	Alarm flag bit	Protection flag bit	SOC	Electric current (A)	#1 Voltage(mv)	#2 Voltage(mv)	#3 Voltage(mv)	#4 Voltage(mv)	#5 Voltage(mv)
1	2021-1-2 0:2:51	1[OCWDSG]	33280-3072[UV;OC_DSG;CHG;DSG]	0	-105.7	2380	2534	2536	2565	2565
2	2021-1-2 0:0:11	1[OCWDSG]	512-3072[OC_DSG;CHG;DSG]	3	-30.1	2897	2937	2946	2950	2950
3	2021-1-2 0:0:10	0	512-3072[OC_DSG;CHG;DSG]	3	-27.3	2906	2947	2956	2959	2959
4	2021-1-2 0:8:13	0	512-3072[OC_DSG;CHG;DSG]	3	-62.4	2735	2853	2865	2882	2882
5	2021-1-2 0:7:59	1[OCWDSG]	0-3072[CHG;DSG]	5	-96.4	2768	2875	2887	2903	2903
6	2021-1-2 0:3:51	8192	32768-3072[UV;CHG;DSG]	10	0	2265	3450	3444	3450	3450
7	2021-1-2 0:3:32	8192	0-3072[CHG;DSG]	10	0	2382	3450	3444	3450	3450
8	2021-1-2 0:0:1	8[OTWBD SG]	1-3072[OT_DSG;CHG;DSG]	12	-0.9	3298	3298	3297	3298	3298
9	2021-1-1 23:59:58	8[OTWBD SG]	0-3072[CHG;DSG]	12	-0.9	3299	3300	3299	3299	3299
10	2021-1-1 23:59:34	4[OTWBD SG]	8192-1024[OT_Bat;DSG]	0	1.6	3321	3321	3322	3319	3319
11	2021-1-1 23:59:30	4[OTWBD SG]	0-3072[CHG;DSG]	0	1.6	3320	3318	3320	3318	3318

6.2.4 历史放电数据

6.2.4 Historical Discharge Data

- (1) BMS 具有历史充放电数据记录功能，当开启充电或者开机放电后，每秒记录一次，可记录运行时间、电池电压、电流、温度、状态标志、容量等；

The BMS records historical charge and discharge data. Once charging is enabled or power-on discharge begins, data is recorded once per second, including operating time, battery voltage, current, temperature, status flags, and capacity.

- (2) 每次从静置状态进入充电或者放电状态，都会重新开始记录；

Recording restarts whenever the battery transitions from idle to charging or discharging.

- (3) 点击‘历史信息’，则会显示 BMS 存储的历史数据记录；

Click “Historical Information” to display the historical data records stored in the BMS.

- (4) 点击导出数据可将历史数据以表格的形式保存到上位机目录下；

Click “Export Data” to save the historical data in table format to the host-computer directory.

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HistoryData

列表

导出

个 文件名

创建时间

260724095001

26-07-24 09:50:01

260724095336

26-07-24 09:53:36

260724100614

26-07-24 10:06:14

260724104741

26-07-24 10:47:41

260724104815

26-07-24 10:48:15

260724104846

26-07-24 10:48:46

260724110102

26-07-24 11:01:02

260806094447

26-08-06 09:44:47

260806100559

26-08-06 10:05:59

260806100630

26-08-06 10:06:31

260806103716

26-08-06 10:37:16

260806104237

26-08-06 10:42:37

数据

时间

标志位

总电压

总电流

SOC

SOH

循环次数

cell1

cell2

cell3

cell4

cell5

cell6

温度1

温度2

温度3

温度4

温度5

温度6

2026-07-24 09:53:39 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:40 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:41 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:42 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:43 0-3072

20.8

0

10

100

0

3458

3450

3445

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:44 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:45 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:46 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:47 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:48 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:49 0-3072

20.8

0

10

100

0

3458

3450

3444

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:50 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:51 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:52 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3515

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:53 0-3072

20.8

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10

100

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3457

3450

3445

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:55 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3514

3527

26

22

1000

1000

1000

1000

2026-07-24 09:53:56 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:53:57 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:53:58 0-3072

20.8

0

10

100

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3457

3450

3445

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:53:59 0-3072

20.8

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10

100

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3458

3450

3445

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:54:00 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3515

3527

26

23

1000

1000

1000

1000

2026-07-24 09:54:01 0-3072

20.8

0

10

100

0

3458

3450

3444

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:54:02 0-3072

20.8

0

10

100

0

3457

3450

3445

3450

3514

3527

26

23

1000

1000

1000

1000

2026-07-24 09:54:03 0-3072

20.8

0

10

100

0

3457

3450

3444

3450

3515

3527

26

23

1000

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1000

2026-07-24 09:54:04 0-3072

20.8

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10

100

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3457

3450

3445

3450

3514

3527

26

23

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2026-07-24 09:54:05 0-3072

20.8

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3457

3450

3444

3450

3514

3527

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23

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2026-07-24 09:54:06 0-3072

20.8

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3457

3450

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3450

3514

3527

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23

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2026-07-24 09:54:07 0-3072

20.8

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3457

3450

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3450

3514

3527

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23

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1000

2026-07-24 09:54:08 0-3072

20.8

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3457

3450

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3450

3514

3527

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23

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2026-07-24 09:54:09 0-3072

20.8

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3457

3450

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3450

3514

3527

26

23

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2026-07-24 09:54:10 0-3072

20.8

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3457

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3450

3514

3527

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23

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2026-07-24 09:54:11 0-3072

20.8

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3457

3450

3445

3450

3514

3527

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23

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2026-07-24 09:54:13 0-3072

20.8

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3457

3450

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3450

3514

3527

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23

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2026-07-24 09:54:14 0-3072

20.8

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3457

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2026-07-24 09:54:15 0-3072

20.8

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3457

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2026-07-24 09:54:16 0-3072

20.8

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3457

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23

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2026-07-24 09:54:17 0-3072

20.8

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3458

3450

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3515

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23

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2026-07-24 09:54:18 0-3072

20.8

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3457

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3514

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23

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2026-07-24 09:54:19 0-3072

20.8

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3457

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3515

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23

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2026-07-24 09:54:20 0-3072

20.8

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3457

3450

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3514

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23

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2026-07-24 09:54:21 0-3072

20.8

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3457

3450

3444

3450

3514

3527

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23

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2026-07-24 09:54:22 0-3072

20.8

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3457

3450

3445

3450

3514

3527

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23

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2026-07-24 09:54:23 0-3072

20.8

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3457

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3514

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23

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2026-07-24 09:54:24 0-3072

20.8

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3457

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3450

3514

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23

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2026-07-24 09:54:25 0-3072

20.8

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3457

3450

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2026-07-24 09:54:26 0-3072

20.8

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3457

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3527

26

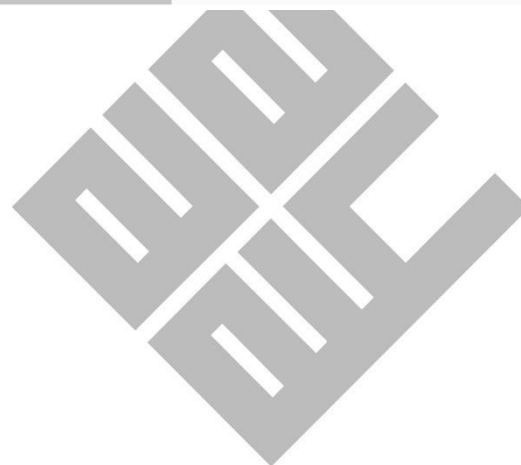
23

1000

1000

1000

1000



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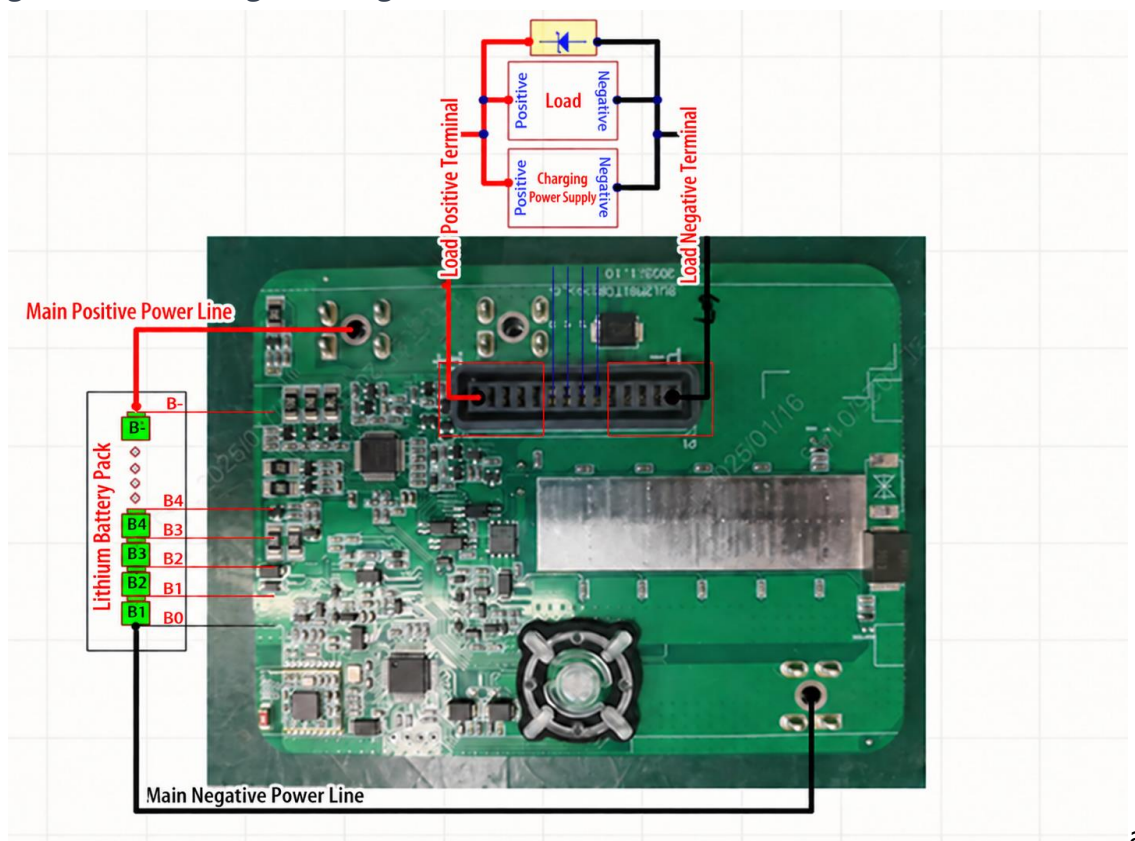


7 安装与接线

7 Installation and Wiring

7.1 充放电接线

7.1 Charge and Discharge Wiring



a

图 8 充放电接线示意图

Figure 8 Charge and Discharge Wiring Diagram

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8 保修条款

8 Warranty Terms

8.1 保修政策

8.1 Warranty Policy

本产品的保修期为 12 个月。在正常使用条件下发生的质量问题，由深圳市爱雅科技有限公司提供相应服务。

This product is covered by a 12-month warranty. Shenzhen Ayaa Technology Co., Ltd. provides applicable service for quality issues arising under normal use.

- 不正确的操作或使用
- *Incorrect operation or use*
- 使用环境条件超过规格要求
- *Operating conditions exceeding the specification*
- 擅自拆装、维修或人为损坏
- *Unauthorized disassembly, repair, or intentional damage*
- 进水、受潮或不可抗力造成的损坏
- *Damage caused by water ingress, moisture, or force majeure*
- PCB 条码损坏或撕毁
- *PCB barcode damaged or removed*

8.2 重要通知

8.2 Important Notice

本规格书由深圳市爱雅科技有限公司负责更改和更新。客户应在下单前获取并确认最新版本信息是否满足当前使用需求。

This specification is revised and updated by Shenzhen Ayaa Technology Co., Ltd. Customers shall obtain and confirm the latest version before placing an order to ensure it meets the intended application.

8.3 重要说明

8.3 Important Notice

客户签字或盖章确认本产品规格书，即表示已充分阅读、理解并认可本规格书所载的产品技术参数、配置要求、质量标准及其他约定内容。

By signing or affixing a seal to confirm this Product Specification Sheet, the Customer acknowledges that it has fully read, understood, and accepted the product technical parameters, configuration requirements, quality standards, and other agreed terms stated herein.

双方签字和/或盖章确认后，本规格书构成合同的组成部分；如与合同约定不一致，以双方书面确认的补充协议或合同约定的优先条款为准。

After confirmation by signatures and/or seals of both parties, this specification forms part of the Contract. In the event of inconsistency with the Contract, the written supplementary agreement confirmed by both parties or the priority provisions of the Contract shall prevail.