

产品规格承认书

Product Specification Approval

产品名称(Product Name):	智能板铁锂 16 串 48V100A 同口带均衡 (212) Smart BMS LiFePO4 16S48V100A Common port with Balance	
产品型号(Product Number):	DL-R16L-F16S48V100ATJ (212)	
客户名(Customer Name):		
客户料号(Customer P/N):		
送样日期: (Sample delivery date):	版次 (Version)	文件编号 (Document No.)
	A6	
编制(Prepared by)	核准(Approved)	审核(Audit)
杨伟滢	林田生	冯耀辉
客户确认栏 Customer Confirmation Column		
确认意见: Confirm opinion:		
客户签章 Customer signature:		
日期 Date:		
注意 (Note):		
1. 收到样机确认 OK 后请及时回签, 7 天内没有回签及问题反馈, 我司默认客户测试合格; 规格书中的图片为通用机型图片, 可能与送样样机有差异, 此份规格书达锂电子保留最终解释权。		
After receiving the prototype confirmation, please sign back in time. If there is no sign back and problem feedback within 7 days, our company defaults that the customer test is qualified specifications. The pictures in the specification are general model pictures, which may be different from the sample. Daly reserves this specification as final right of interpretation.		
2. 客户批量前, 请在规格书中签字回传, 并说明详细功能说明, 我司才安排批量。		
Before the customer batches, please sign the specification and return it, and explain the detailed function description, and our company will arrange the batch.		

修订记录

Revision record

日期 (Date)	版本号 (Version)	修订说明 (Note)	制定人 (Modifier)	核准人 (Approver)
2023/3/3	A0	初版 First edition	蒋慧明	梁连虎
2023/3/18	A1	内容优化 Content optimization	蒋慧明	梁连虎
2023/3/22	A2	增加过充标定解除、更正 SOC 的 0-25%时指示灯状态描述，更新蜂鸣器逻辑 Added the release of overcharge calibration, corrected the description of indicator status at 0-25% SOC, and updated the buzzer logic	蒋慧明	梁连虎
2023/4/8	A3	更新上位机恢复出厂设置的说明 Updated the instructions for restoring factory Settings of the upper computer	蒋慧明	梁连虎
2023/4/12	A4	更新唤醒、复位按键等说明 Updated descriptions of wake up and reset keys	杨伟滢	闫连红、林田生
2023/5/18	A5	增加显示屏描述、增加英文描述、调整配置表描述 Add display description	杨伟滢	闫连红、林田生
2023/6/19	A6	修改相关参数描述 Modify the description of some parameters	杨伟滢	闫连红、杨飞贵

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1. 简介 Introduction

- 随着铁锂电池在家储和基站的广泛应用，对电池管理系统也提出了高性能、高可靠性及高性价比等要求。DL-R16L-F16S48V100ATJ 是专门针对储能电池设计的 BMS，采用集成化的设计，将采集、管理、通信等功能集成于一体。
- With the widespread application of iron-lithium batteries in home storage and base stations, requirements for high performance, high reliability, and high cost performance have also been put forward for battery management systems. DL-R16L-F16S48V100ATJ is a BMS specially designed for energy storage batteries. It adopts an integrated design and integrates collection, management, communication and other functions into one.
- 该 BMS 产品以一体化作为设计理念，可广泛应用在室内室外储能电池系统，如家庭储能、光伏储能、通信储能等。
- The BMS product takes integration as the design concept and can be widely used in indoor and outdoor energy storage battery systems, such as home energy storage, photovoltaic energy storage, communication energy storage, etc.
- BMS 采用一体化设计，对于 Pack 厂家有更高的组装效率和测试效率，降低生产投入成本，对于整体安装质量保障有较大提升。
- BMS adopts an integrated design, which has higher assembly efficiency and testing efficiency for Pack manufacturers, reduces production input costs, and greatly improves the overall installation quality assurance.

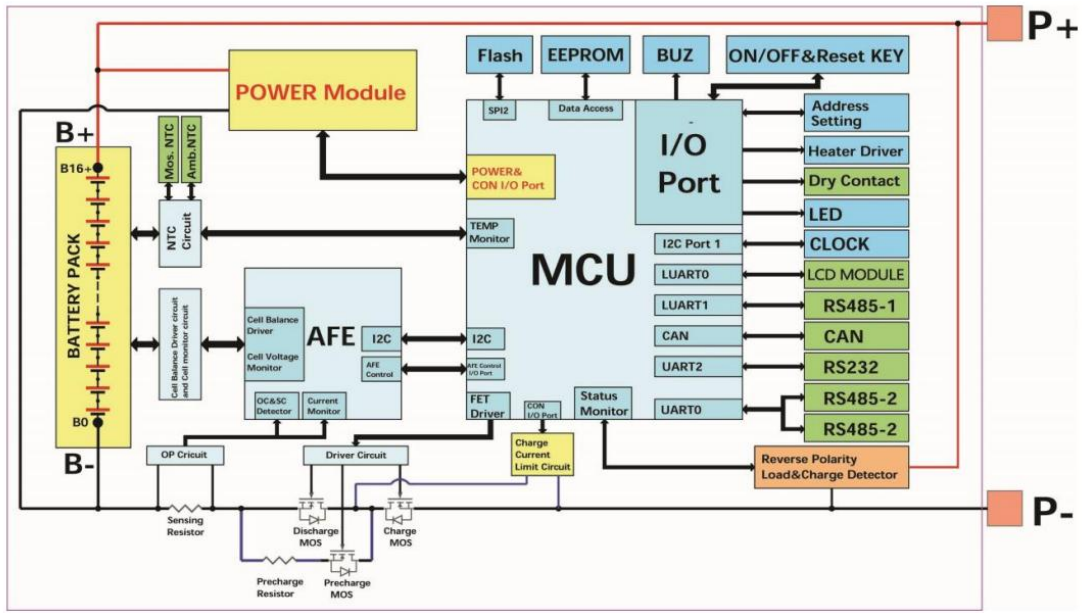
2. 功能说明 Function description

配置表 Collocation table

功能 Function	故障存储 /Fault storage	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 存储_10000_条/Store_10000_items
	充电限流 /Charge current limit	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 10A <input type="checkbox"/> 20A <input type="checkbox"/> ___A 定义：当充电电流>110A 时开启 Definition: Open when charging current > 110A
	显示屏 /Display screen	<input type="checkbox"/> 无/No <input type="checkbox"/> 中英文智能/Chinese and English intelligence <input checked="" type="checkbox"/> 默认不配显示屏，支持选配/The default is not equipped with a display screen, support optional
	干接点 /Dry contact	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 有，一路/Yes, 1-Way 定义：干接点(PIN1 to PIN2)：平时打开，低电量时闭合 Definition: Dry contact (PIN1 to PIN2): usually open, closed when low battery
	加热	<input type="checkbox"/> 无/No <input type="checkbox"/> 有/Yes

/Heating	<input checked="" type="checkbox"/> 选配, 默认不支持/Optional, not supported by default
反接保护 /Reverse connection protection	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 有/Yes
钥匙开关 /Key Switch	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 有, 1 个/Yes, 1pcs
蜂鸣器 /Buzzer	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> 有, 1 个/Yes, 1pcs
无线通讯 /Wireless Communication	<input type="checkbox"/> 蓝牙/Bluetooth <input type="checkbox"/> 蓝牙+WIFI / Bluetooth+WIFI <input type="checkbox"/> 4G+GPS <input checked="" type="checkbox"/> 选配, 默认不支持/Optional, not supported by default
拨码开关 /Toggle Switches	<input type="checkbox"/> 无/No <input type="checkbox"/> 2 位/2 Digits <input checked="" type="checkbox"/> 4 位/4 Digits <input type="checkbox"/> 6 位/6 Digits 无编码开关时采用软件自适应编码/Use software adaptive encoding when there is no encoding switch
LED 灯 /LED	<input type="checkbox"/> 无/No <input checked="" type="checkbox"/> ALM <input checked="" type="checkbox"/> RUN <input checked="" type="checkbox"/> SOC (4pcs)
电流检测电阻 /Current sense resistor	10 个 1mΩ /10 pieces of 1mΩ
备用电流采集 /Standby Current Harvesting	<input checked="" type="checkbox"/> 无/No <input type="checkbox"/> 有/Yes
采样插座 /Sampling socket	<input checked="" type="checkbox"/> 立式/Vertical <input type="checkbox"/> 卧式/Horizontal
陀螺仪防盗	<input type="checkbox"/> 无/No <input type="checkbox"/> 有/Yes <input checked="" type="checkbox"/> 选配, 默认不支持/Optional, not supported by default
外扩继电器	<input checked="" type="checkbox"/> 无/No <input type="checkbox"/> 有/Yes
二次保护 (认证)	<input type="checkbox"/> 无/No <input type="checkbox"/> 有/Yes <input checked="" type="checkbox"/> 选配, 默认不支持/Optional, not supported by default
温度检测 /NTC	6 路 (4 路电池+1 路环境+1 路 MOS) /6-way (4-way battery + 1-way environment + 1-way MOS)
预充 /Precharge	支持 30000UF 电容上电 /Support 30000UF capacitor power on
通讯方式 /Communication	<input checked="" type="checkbox"/> RS232/1 Way <input checked="" type="checkbox"/> 并联双 CAN/Parallel dual CAN <input checked="" type="checkbox"/> 并联双 RS485/Parallel dual RS485

3. 系统框图 System block diagram



4. 电气特性 Electrical characteristics

4.1 基本参数 Basic parameters

(以下部分参数可配置/The following parameters are configurable)

序号 No	检测内容 Test content	出厂默认参数 Factory default parameters	单位 Unit	备注 Remark	
1	放电 Discharge	额定放电电流 Rated discharge current	100	A	
	充电 Charging	满充电压 Full charge voltage	> 56	V	同时满足后停止充电并更新SOC 为100% ; 当SOC < 96%或有放电电流时允许再次充电。 At the same time, stop charging and update SOC to 100%; when SOC < 96% or there is discharge current, it is allowed to charge again.
		截止电流 Cut-off current	< 2	A	
		建议充电电流 Recommended charging current	50	A	
2	被动均衡功能 Passive balance	均衡开启电压 Balanced turn-on voltage	3.4	V	
		均衡开启压差 Balanced turn-on voltage difference	30	mV	

		Balanced opening voltage difference			
		均衡电流 Balance current	150±30	mA	
		均衡开启条件 Equilibrium opening condition	1.有充电电流/With charging current 2.达到设定均衡开启压差/Reach the set equilibrium opening pressure difference 3.达到设定均衡开启电压/Reach the set balanced turn-on voltage		
3	单体过充告警 Cell overcharge warning	单体过充告警电压 Single overcharge warning voltage	3.60±0.05	V	
		单体过充告警延时 Cell overcharge alarm delay	1±0.8	S	
		单体过充告警解除电压 Cell overcharge alarm release voltage	3.50±0.05	V	
	单体过充保护 Single Cell over-charge protection	单体过充保护电压 Single Cell over-charge protection voltage	3.65±0.05	V	
		单体过充保护延时 Single Cell over-charge protection delay	1±0.8	S	
		单体过充保护解除电压 Single Cell over-charge protection release voltage	3.5±0.05	V	
	单体过充保护解除 Single overcharge protection released	剩余容量 SOC 解除 Remaining capacity SOC released	< 96%		
		放电电流解除 Discharge current release	> 1	A	
4	单体过放告警 Single Cell over-discharge warning	单体过放告警电压 Single Cell over-discharge warning voltage	2.8±0.05	V	
		单体过放告警延时 Single cell over-discharge alarm delay	1±0.8	S	
		单体过放告警解除电压 Cell over-discharge alarm release voltage	2.9±0.05	V	
	单体过放保护 Single Cell over-discharge protection	单体过放保护电压 Single Cell over-charge protection voltage	2.7±0.05	V	过放保护30秒后，仍无法恢复时，将进入休眠模式。 After 30 seconds of over-discharge protection, if it still cannot be recovered, it will enter sleep mode.
		单体过放保护延时 Single Cell over-charge protection delay	1±0.8	S	
	单体过放保护解除 Single Cell	单体过放保护解除电压 Single over-discharge protection release voltage	2.9±0.05	V	

	over-discharge protection released	充电电流解除 Charge current release	> 1	A		
5	总压过充告警 Total voltage overcharge warning	总体过充告警电压 Overall overcharge warning voltage	57.6±0.5	V		
		总体过充告警延时 Overall overcharge warning delay	1±0.8	S		
		总体过充告警解除电压 Overall overcharge warning release voltage	56±0.5	V		
	总压过充保护 Total voltage overcharge protection	总体过充保护电压 Overall voltage overcharge protection	58.4±0.8	V		
		总体过充保护延时 Overall voltage overcharge protection delay	1±0.8	S		
	总压过充保护解除 Total voltage overcharge protection released	总体过充保护解除电压 Overall overcharge protection release voltage	56±0.8	V		
6	总压过放告警 Total voltage over-discharge alarm	总体过放告警电压 Overall over-discharge warning voltage	44.8±0.8	V		
		总体过放告警延时 Overall over-discharge alarm delay	1±0.8	S		
		总体过放告警解除电压 Overall over-discharge alarm release voltage	46.4±0.8	V		
	总压过放保护 Total voltage over-discharge protection	总体过放保护电压 Overall over-discharge protection voltage	44±0.8	V	过放保护30秒后，仍无法恢复时，将进入休眠模式。 After 30 seconds of over-discharge protection, if it still cannot be recovered, it will enter sleep mode.	
		总体过放保护延时 Overall over-discharge protection delay	1±0.8	S		
	总压过放保护解除 Total voltage over-discharge protection released	总体过放保护解除电压 Overall over-discharge protection release voltage	46.4±0.8	V		
充电电流解除 Charge current release		> 1	A			
7	放电过流保护 Discharge overcurrent protection	放电过流一级告警电流 Discharge overcurrent level 1 alarm current	105±3	A		<2%FSR 放电过流二级保护 Discharge overcurrent secondary protection
		放电过流一级告警延时 Discharge overcurrent level 1 alarm delay	1±0.8	S		
		放电过流一级保护电流 Discharge overcurrent primary protection current	110±3	A		
		放电过流一级保护延时 Discharge overcurrent primary protection delay	1±0.8	S		
		放电过流二级保护电流 Discharge overcurrent secondary protection current	150±3	A		

		Discharge overcurrent secondary protection current				
		放电过流二级保护延时 Discharge overcurrent secondary protection delay	1±0.8	S		
		解除条件 Cancellation conditions	1、1min 后自动解除，连续出现 10 次将锁定该状态，不再自动解除。 It will be automatically released after 1 minute. If it occurs 10 times in a row, the status will be locked, and it will no longer be automatically released. 2、充电解除：充电电流 > 1A。 Charging release: charging current > 1A. 3、达到以上任一条件可解除。 Can be canceled when any condition is met.			
8	充电过流保护 Charging overcurrent protection	充电过流一级告警电流 Charging overcurrent level 1 alarm current	105±3	A	<2%FSR	
		充电过流一级告警延时 Charging overcurrent first level alarm delay	1±0.8	S		
		充电过流一级保护电流 Charging overcurrent level 1 protection current	110±3	A		
		充电过流一级保护延时 Charge overcurrent first level protection delay	1±0.8	S		
		充电过流二级保护电流 Charging overcurrent secondary protection current	110±3	A		
		充电过流二级保护延时 Charge overcurrent secondary protection delay	1±0.8	S		
		解除条件 Cancellation conditions	1、1min 后自动解除，连续出现 10 次将锁定该状态，不再自动解除。 It will be automatically released after 1 minute. If it occurs 10 times in a row, the Status will be locked and will not be automatically released. 2、放电解除：放电电流 > 1A。 Discharge release: discharge current > 1A. 3、无限流模块时自动解除功能有效，达到以上任一条件可解除，有限流模块时要放电才能解除。 When there is no "current limiting module", the automatic release function is valid, and it can be released when any of the above conditions is met. When there is a "current limiting module", it needs to be discharged to release it.			
9	短路保护 Short circuit protection	短路保护电流 Short circuit protection current	1000A			
		短路保护延时 Short circuit protection delay	10-500	uS	实际以客户寄回我司测试为准	







					The actual test shall be subject to the customer sending back to our company for testing
		短路保护解除 Short circuit protection released	移除负载解除/充电解除 Remove load release/charge release		
10	充电高温保护 Charging high temperature protection	充电高温告警温度 Charging high temperature, alarm temperature	55±2	°C	
		充电高温告警延时 Charging high temperature, alarm delay	1±0.8	S	
		充电高温告警释放温度 Charging high temperature alarm release temperature	52±2	°C	
		充电高温保护温度 Charging with high temperature protection temperature	60±2	°C	
		充电高温保护延时 Charging with a high-temperature protection delay	1±0.8	S	
		充电高温保护释放温度 Charging high temperature protection release temperature	57±2	°C	
		充电低温保护 Charging low temperature protection	充电低温告警温度 Charging low temperature alarm temperature	5±2	°C
	充电低温告警延时 Charging low temperature, alarm delay		1±0.8	S	
	充电低温告警解除 Charging at low temperature, the alarm is lifted		8±2	°C	
	充电低温保护温度 Charging for the low-temperature protection temperature		0±2	°C	
	充电低温保护延时 Charging with a low-temperature protection delay		1±0.8	S	
	充电低温释放温度 Charging at low temperature release temperature		3±2	°C	
	放电高温保护 Discharge high temperature protection		放电高温告警温度 Discharge high temperature alarm temperature	60±2	°C
		放电高温告警延时 Discharge at high temperature, and alarm delay	1±0.8	S	
		放电高温告警解除 Discharge at a high temperature, and the alarm is relieved	57±2	°C	
		放电高温保护温度 Discharge at a high-temperature protection temperature	65±2	°C	
		放电高温保护延时 Discharge with high-temperature protection delay	1±0.8	S	
		放电高温释放温度 Discharge at a high-temperature release temperature	62±2	°C	
		放电低温保护 Discharge low	放电低温告警温度 Discharge low-temperature alarm temperature	-15±2	°C

	temperature protection	放电低温告警延时 Discharge at low temperature, and alarm delay	1±0.8	S			
		放电低温告警解除 Discharge at low temperature, and the alarm is discharged	-12±2	°C			
		放电低温保护温度 Discharge at a low-temperature protection temperature	-25±2	°C			
		放电低温保护延时 Discharge with low-temperature protection time delay	1±0.8	S			
		放电低温释放温度 Discharge at a low-temperature release temperature	-22±2	°C			
		11	环境温度保护 Protection of the ambient temperature	环境高温告警温度 Ambient high temperature alarm temperature	65±2	°C	
				环境高温保护温度 Environmental high-temperature protection temperature	70±2	°C	
环境高温保护延时 Environmental high temperature protection delay	1±0.8			S			
环境高温保护解除温度 Environmental high temperature protection to release the temperature	65±2			°C			
12	MOS 温度保护 The MOS temperature protection	MOS 高温告警温度 MOS high temperature alarm temperature	90±2	°C			
		MOS 高温告警解除温度 MOS high temperature alarm release temperature	85±2	°C			
		MOS 过温保护温度 The MOS over-temperature protection temperature	100±2	°C			
		MOS 保护解除温度 MOS protection release temperature	65±2	°C			
		13	压差告警 Voltage differential alarm	压差大一级告警 Voltage difference level 1 alarm	0.3	V	压差 > 1V (不可设置) 为电芯失效保护, 不允许充放电 Pressure difference > 1V (not set) is the cell failure protection, charge and discharge are not allowed
压差大一级告警恢复 Voltage difference level 1 recovery	0.25			V			
压差大二级告警 Voltage difference level 2 alarm	0.5			V			
压差大二级告警恢复 Voltage difference level 2 recovery	0.45			V			
14	温差告警 Temperature difference alarm			温差大一级告警 An alarm with a large temperature difference	10±2	°C	
		温差大一级告警恢复 An alarm with a large temperature difference	7±2	°C			
		温差大二级告警 Large temperature difference and a secondary alarm	15±2	°C			
		温差大二级告警恢复 Recovery of secondary alarm for large temperature difference	12±2	°C			

15	SOC 告警 SOC report an emergency	电量低告警门槛 Power quantity is low for alarm threshold	< 10%		
16	NTC	电池温度检测路数 Battery temperature detection path number	4		
17	内阻 Internal resistance	主回路导通内阻 The main loop has an open internal resistance	<20	mΩ	
18	消耗电流 Consumption of current	工作时自耗电电流 Self-consuming current at operation	≤60	mA	带显示屏 With a display
		休眠模式自耗电电流 Dormant mode consumption current	≤45	mA	不带显示屏 Without display
		休眠时间 Sleep time	<800	uA	默认 default
			3600	S	
19	通讯方式 Communication	<input checked="" type="checkbox"/> UART <input checked="" type="checkbox"/> CAN <input checked="" type="checkbox"/> 485 <input checked="" type="checkbox"/> 232			

4.2 LED 指示说明 LED instruction

指示灯工作状态 Indicator operating Status

状态 Status	正常/告警/保护 Normal / Alarm / Protection	RUN	ALM	电量指示 LED Power quantity indicates the LED				说明 description
								
关机 Shut down	休眠 Sleep	灭 OFF	灭 OFF	灭 OFF	灭 OFF	灭 OFF	灭 OFF	全灭 OFF
待机 Standby	正常 Normal	闪 1 Flash 1	灭 OFF	依据电量指示 According to the electric quantity indication				待机状态 Standby status
	告警 Alarm	闪 1 Flash 1	闪 3 Flash 3					模块低压 Module low pressure
充电 Charge	正常 Normal	常亮 Solid Green	灭 OFF	依据电量指示 According to the electric quantity indication (电量指示最高 LED 闪 2) (Power indicates maximum LED flash 2)				最高电量 LED 闪动(闪 2) , 过充告警时 ALM 闪烁(闪 3) Maximum power LED flash (flash 2),ALM flashing during overcharge alarm (flash 3)
	告警 Alarm	常亮 Solid Green	闪 3 Flash 3					
	过充保护 Overcharge protection	常亮 Solid Green	灭 OFF	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	若无市电 , 指示灯转为待机状态 If there is no mains supply, the indicator turns to standby
	温度、过流、失效保护 Temperature、Overcurrent、Failure protection	灭 OFF	常亮 Solid Green	灭 OFF	灭 OFF	灭 OFF	灭 OFF	停止充电 Stop charging

放电 Discharge	正常 normal	闪 3 Flash 3	灭 OFF	依据电量指示 According to the electric quantity indication				
	告警 alarm	闪 3 Flash 3	闪 3 Flash 3					
	欠压保护 Under-voltage protection	灭 OFF	灭 OFF	灭 OFF	灭 OFF	灭 OFF	灭 OFF	停止放电 Stop discharging
	温度、过流、短路、反接、失效保护 Temperature, overcurrent, short circuit, reverse connection, failure protection	灭 OFF	常亮 Solid Green	灭 OFF	灭 OFF	灭 OFF	灭 OFF	停止放电 Stop discharging
失效 Lose efficacy		灭 OFF	常亮 Solid Green	灭 OFF	灭 OFF	灭 OFF	灭 OFF	停止充、放电 Stop charging and discharging

指示灯 SOC 说明 Indicator lamp SOC instructions

状态 Status		充电 Charge				放电 Discharge			
		L4	L3	L2	L1	L4	L3	L2	L1
容量指示灯 Capacity indicator light		●	●	●	●	●	●	●	●
电量 (%)	0~25%	灭 OFF	灭 OFF	灭 OFF	闪 2 Flash 2	灭 OFF	灭 OFF	灭 OFF	常亮 Solid Green
	25~50%	灭 OFF	灭 OFF	闪 2 Flash 2	常亮 Solid Green	灭 OFF	灭 OFF	常亮 Solid Green	常亮 Solid Green
	50~75%	灭 OFF	闪 2 Flash 2	常亮 Solid Green	常亮 Solid Green	灭 OFF	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green
	75~100%	闪 2 Flash 2	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green	常亮 Solid Green
运行指示灯 ● Running indicator light		常亮 Solid Green				闪烁(闪 3) Flash (Flash 3)			

LED 闪动说明 LED Flash Description

闪动方式 Flash Mode	亮 ON	灭 OFF
闪 1 Flash 1	0.25S	3.75S
闪 2 Flash 2	0.5S	0.5S
闪 3 Flash 3	0.5S	1.5S

4.3 可靠性参数 Reliability Parameters

序号 numerical order	项 目 project	条 件 condition
1	检测精度 detection precision	电流检测精度: $\leq 2\%FSR$ Current detection accuracy: $\leq 2\%FSR$ 电压检测精度: $\leq 15mV$ Voltage detection accuracy: $\leq 15mV$ 温度检测精度: $\leq 2^{\circ}C$ (常温下) Temperature detection accuracy: $\leq 2^{\circ}C$ (at normal temperature) SOC 精度($\leq 5\%$ @50%容量量程以上) SOC accuracy($\leq 5\%$ @50% capacity range or above)
3	信息存储 information storage	最大存储 10000 条履历信息, 含保护次数, 当前总电压、电流、温度、SOC、等 Maximum 10000 pieces of resume information can be stored, including protection times, current total voltage, current, temperature, SOC, etc
4	SOC 计量 SOC metering	采用电流积分法, 精度 $\leq 10\%$ (受环境温度影响) Adopting current integration method, accuracy $\leq 10\%$ (affected by ambient temperature)
5	工作环境条件 Working environment condition	工作温度: $-40^{\circ}C \sim 85^{\circ}C$ Operating temperature : $-40^{\circ}C \sim 85^{\circ}C$
		相对湿度: $5\% \sim 90\%RH$ Relative humidity : $5\% \sim 90\%RH$
6	存储环境条件 Storage environment condition	存储温度: $-40^{\circ}C \sim 85^{\circ}C$ Storage temperature : $-40^{\circ}C \sim 85^{\circ}C$
		相对湿度: $5\% \sim 90\%RH$ Relative humidity : $5\% \sim 90\%RH$

4.4 按键说明 Button description

4.4.1、BMS 处于休眠状态时 , 按下按键 (3~6S) 后松开 , 保护板被激活 , LED 指示灯从 "RUN" 开始依次点亮 0.5 秒。
 When the BMS is in sleep mode, press the button for 3 to 6S and release it. The protection board is activated and the LED indicator lights up successively for 0.5 seconds from "RUN".

4.4.2、BMS 处于激活状态时 , 按下按键 (3~6S) 后松开 , 保护板被休眠 , LED 指示灯从最低电量灯开始依次点亮 0.5 秒。
 When the BMS is activated, press the button for 3 to 6S and release it. The protection board is put to sleep and the LED indicator lights up successively for 0.5 seconds from the lowest power indicator.

4.4.3、BMS 处于激活状态时，按下按键（6~10S）后松开，保护板被复位，LED 灯全部同时熄灭。

When the BMS is activated, press the button (6-10s) and release it. The protection board is reset and all LED lights are off at the same time.

4.5 蜂鸣器逻辑 Buzzer logic

4.5.1、故障时，每 1S 鸣叫 0.25S；

When the fault occurs, the sound is 0.25S every 1S.

4.5.2、保护时，每 2S 鸣叫 0.25S (过压保护除外，欠压时 3S 响 0.25S)；

When protecting, chirp 0.25S every 2S (except for overvoltage protection, 3S ring 0.25S when undervoltage);

4.5.3、告警时，每 3S 鸣叫 0.25S (过压告警除外)；

When an alarm is generated, the alarm buzzes for 0.25S every 3S (except the overvoltage alarm).

4.5.4、蜂鸣器功能可通过上位机使能或禁止，出厂默认是禁止的

The buzzer function can be enabled or disabled by the upper computer, but is forbidden by factory default

4.6 参数配置说明 Parameter configuration description

保存/加载配置：用户可对出厂配置或设置好的参数，通过上位机保存配置和加载；

The buzzer function can be enabled or disabled by the upper computer, but is forbidden by factory default

5. 休眠唤醒 Wake up from sleep

5.1 休眠 Sleep

当满足以下任意一条件时，系统进入休眠模式：

- 1) 单体或总体过放保护 30 秒内仍未解除。
- 2) 按下按键（3~6S），松开按键后。
- 3) 同时满足无通信、无保护、无均衡、无电流，且持续时间达到休眠延迟时间。

进入休眠前，需确保输入端未接入外部电压，否则将无法进入休眠模式。

When any of the following conditions are met, the system enters the sleep mode:

- 1) Cell or total undervoltage protection is not removed within 30 seconds.
- 2) Press the button (for 3~6S) and release the button.
- 3) No communication, no protection, no balance, no current, and the duration reaches the sleep delay time.

Before entering hibernation mode, ensure that no external voltage is connected to the input terminal. Otherwise, the hibernation mode cannot be entered.

5.2 唤醒 Wake up

当系统处于休眠模式，满足以下任意一条件时，系统将退出休眠模式，进入正常运行模式：

- 1) 接入充电器，充电器输出电压需大于 48V。
- 2) 按下按键（3~6S），松开按键后。
- 3) 具 485、CAN 通讯 激活。

备注：单体或总体过放保护后进入休眠模式，每 4 个小时定时唤醒一次，开启充放电 MOS。如可以充电，将退出休眠状态进入正常充电；如果连续 10 次自动唤醒无法充电，将不再自动唤醒。

When the system is in sleep mode and any of the following conditions are met, the system exits the hibernation mode and enters the normal operation mode:

- 1) Connect the charger, and the output voltage of the charger must be greater than 48V.
- 2) Press the button (for 3~6S) and release the button.
- 3) With 485, CAN communication activation.

Note: After cell or total undervoltage protection, the device enters sleep mode, wakes up periodically every 4 hours, and starts charging and discharging MOS. If it can be charged, it will exit the resting status and enter normal charging; If the automatic wake up fails to charge for 10 consecutive times, it will no longer wake up automatically.

6. 通讯说明 Description of communication

6.1、RS232 通信 RS232 communication

BMS 可以通过 RS232 接口与上位机进行通讯，从而可通过上位机监控电池的各种信息，包括电池电压、电流、温度、状态及电池生产信息等，默认波特率为 9600bps。

BMS can communicate with the upper computer through RS232 interface, so that the upper computer can monitor various information of the battery, including battery voltage, current, temperature, status and battery production information, etc. The default baud rate is 9600bps.

6.2、CAN 通信 CAN communication

BMS 可以通过 CAN 接口与上位机进行通讯，从而可通过上位机监控电池的各种信息，包括电池电压、电流、温度、状态及电池生产信息等，默认波特率为 250K，对接逆变器时通讯为 500K。

The BMS CAN communicate with the upper computer through the CAN interface, so that the upper computer can monitor various information of the battery, including battery voltage, current, temperature, status, and battery production information. The default baud rate is 250K, and the communication rate is 500K when interconnecting with the inverter.

6.3、RS485 通信 RS485 communication

具有双 RS485 接口，可以查看 PACK 的信息，默认波特率为 9600bps。如需通过 RS485 与监控设备通信，监控设备作为主机，依据地址轮询数据，地址设置范围为 1~16。

With dual RS485 ports, you can view PACK information. The default baud rate is 9600bps. If you need to communicate with the monitoring device over the RS485 port, the monitoring device serves as the host. The address range is 1 to 16 based on the address polling data.

6.4、拨码开关设置 Dial switch Settings



地址 address	拨码开关位置 Dip switch position				说明 Introductions	
	#1	#2	#3	#4		
0	OFF	OFF	OFF	OFF	设为主 PACK1 Let PACK1 set to be host	无级联, 单机使用 PACK1 Uncascade, single machine using PACK 1
1	ON	OFF	OFF	OFF	设为从 PACK2 Let PACK2 set to be slave	
2	OFF	ON	OFF	OFF	设为从 PACK3 Let PACK3 set to be slave	
3	ON	ON	OFF	OFF	设为从 PACK4 Let PACK4 set to be slave	
4	OFF	OFF	ON	OFF	设为从 PACK5 Let PACK5 set to be slave	
5	ON	OFF	ON	OFF	设为从 PACK6 Let PACK6 set to be slave	
6	OFF	ON	ON	OFF	设为从 PACK7	

					Let PACK7 set to be slave	
7	ON	ON	ON	OFF	设为从 PACK8 Let PACK8 set to be slave	
8	OFF	OFF	OFF	ON	设为从 PACK9 Let PACK9 set to be slave	
9	ON	OFF	OFF	ON	设为从 PACK10 Let PACK10 set to be slave	
10	OFF	ON	OFF	ON	设为从 PACK11 Let PACK11 set to be slave	
11	ON	ON	OFF	ON	设为从 PACK12 Let PACK12 set to be slave	
12	OFF	OFF	ON	ON	设为从 PACK13 Let PACK13 set to be slave	
13	ON	OFF	ON	ON	设为从 PACK14 Let PACK14 set to be slave	
14	OFF	ON	ON	ON	设为从 PACK15 Let PACK15 set to be slave	
15	ON	ON	ON	ON	设为从 PACK16 Let PACK16 set to be slave	

7. 逆变器通讯 Inverter communication

保护板支持 RS485 和 CAN 通信接口的逆变器协议，上位机工程模式可以选择设置。

The protection board supports the inverter protocol of RS485 and CAN communication interface. The engineering mode of the upper computer can be set.

RS485 协议 RS485 protocol		
协议名称 Agreement name		适配逆变器 Adaptive inverter
Voltronicpower	日月元协议	Voltronicpower
Growatt	古瑞瓦特协议	Growatt、Sacolar
Srne	硕日协议	Srne
Pylon	派能协议	Pylon、首航
DeYe	德业协议	DeYe、Sacolar

CAN 协议 can protocol		
协议名称 Agreement name		可兼容逆变器 Compatible with inverters
Growatt	古瑞瓦特协议	Sacolar、Growatt
Victronenergy	威通协议	荷兰 Victron
Pylon	派能协议	固德威 (Goodwe)、Solark、Xtender (Xmt)
SMA	SMA	SMA
Aiswei	爱士惟	Aiswei
DeYe	德业协议	DeYe
Must	美克协议	SOFAR、MUST

8. 显示屏 Display screen

8.1 主页面 Main page

上电激活后，将会显示电池管理界面：When the battery management interface is displayed:

PackVlot: 电池总压 /Total battery pressure

Im: 电流/current

SOC: 剩余容量/State Of Charge

按 ENTER 键进入主页面。/Press the ENTER to enter the home page.

(可向上、下选择选中项目，再按 ENTER 键进入，长按确认键切换英文显示)

(You can select items up and down, then press the ENTER button to enter, long press the confirmation button to switch English display)



按 DOWN 键，进入电池参数详细信息/Press DOWN to enter the battery parameter details

CellVolt: 单体电压查询/Single-unit voltage query

TEMP: 温度查询/Temperature query

Capacity: 容量查询/Capacity query

BMS Status:BMS 状态查询/A BMS status query



ESC:退出 (在进入后的界面下，按此键可退回上级界面)

说明: 未操作按键超过 30s 时，界面会进入休眠状态；按任意界即可唤醒界面。

ESC: Exit (under the entry interface to return to the superior interface)

Note: If the inactive button exceeds 30s, the interface will enter a dormant Status; awaken the interface with any boundary.

8.2 BMS 状态 BMS State

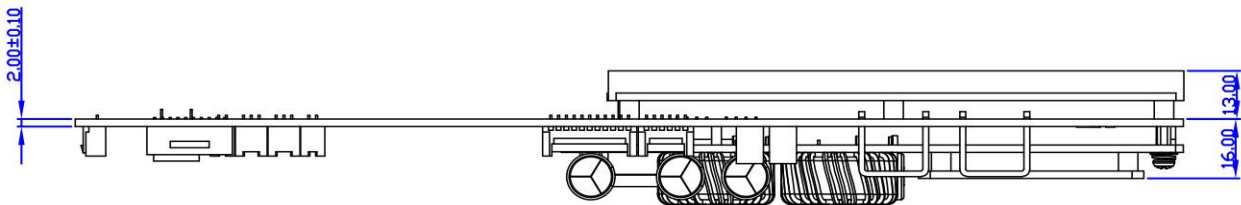
- Cell OV: 电池高压 Battery over voltage
- Cell OVP: 电池高压保护 Battery over-voltage protection
- Cell UV: 电池低压 Battery under voltage
- Cell OVP: 电池低压保护 Battery under-voltage protection
- Pack OV: 电池包高压 Battery pack over voltage
- Pack OVP: 电池包高压保护 Battery pack over-voltage protection
- Pack UV: 电池包低压 Battery pack is under voltage
- Pack OVP: 电池包低压保护 Battery pack under-voltage protection
- CHG OT: 充电过温 Charge is over-temperature
- CHG OTP: 充电过温保护 Charging for over-temperature protection
- CHG UT: 充电低温 charging low temperature
- CHG UTP: 充电低温保护 Charging for low-temperature protection
- DSG OT: 放电过温 discharge over temperature
- DSG OTP: 放电过温保护 discharge over temperature protection
- DSG UT: 放电低温 discharge low temperature

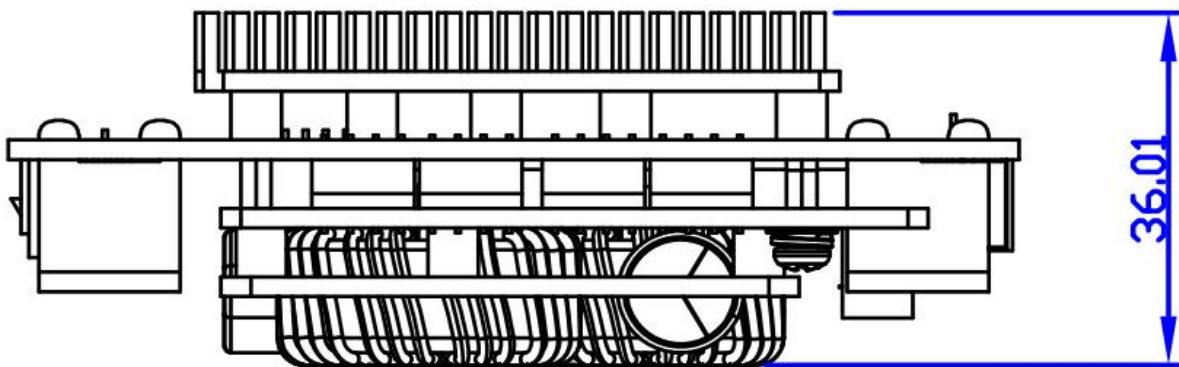
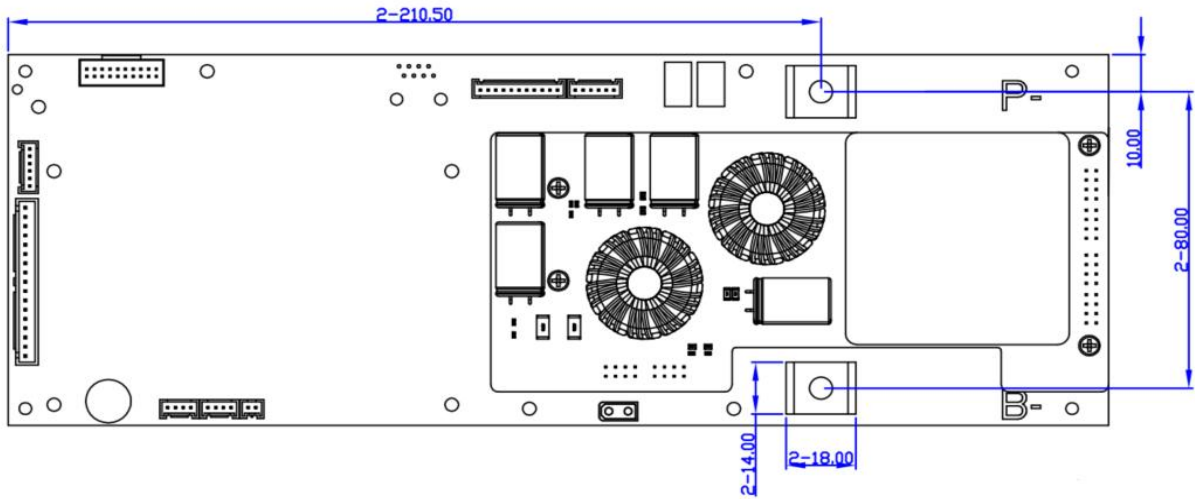
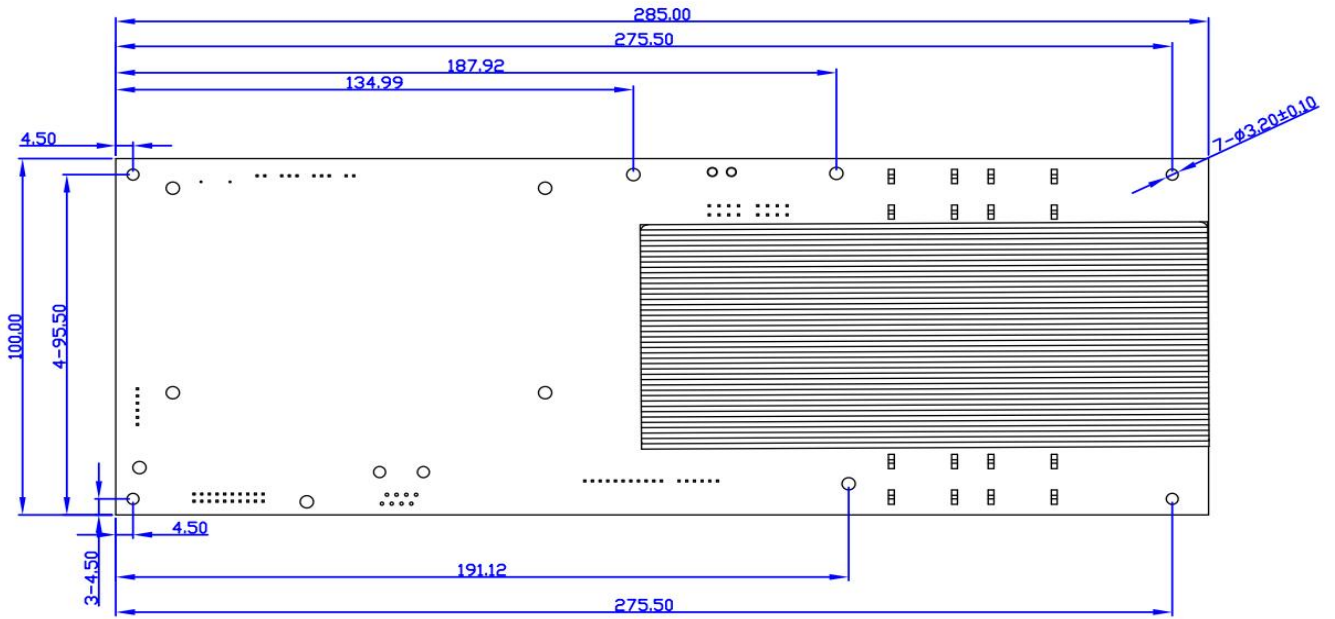
8.3 功耗说明 Power consumption specification

- 1) 显示状态下, I 整机=45mA, I_{MAX}=50mA
Under the display Status, I complete machine = 45 mA and I MAX = 50 mA
- 2) 休眠状态下, I 整机=500uA, I_{MAX}=1mA
In the sleep mode, I complete machine = 500 uA and I MAX = 1 mA

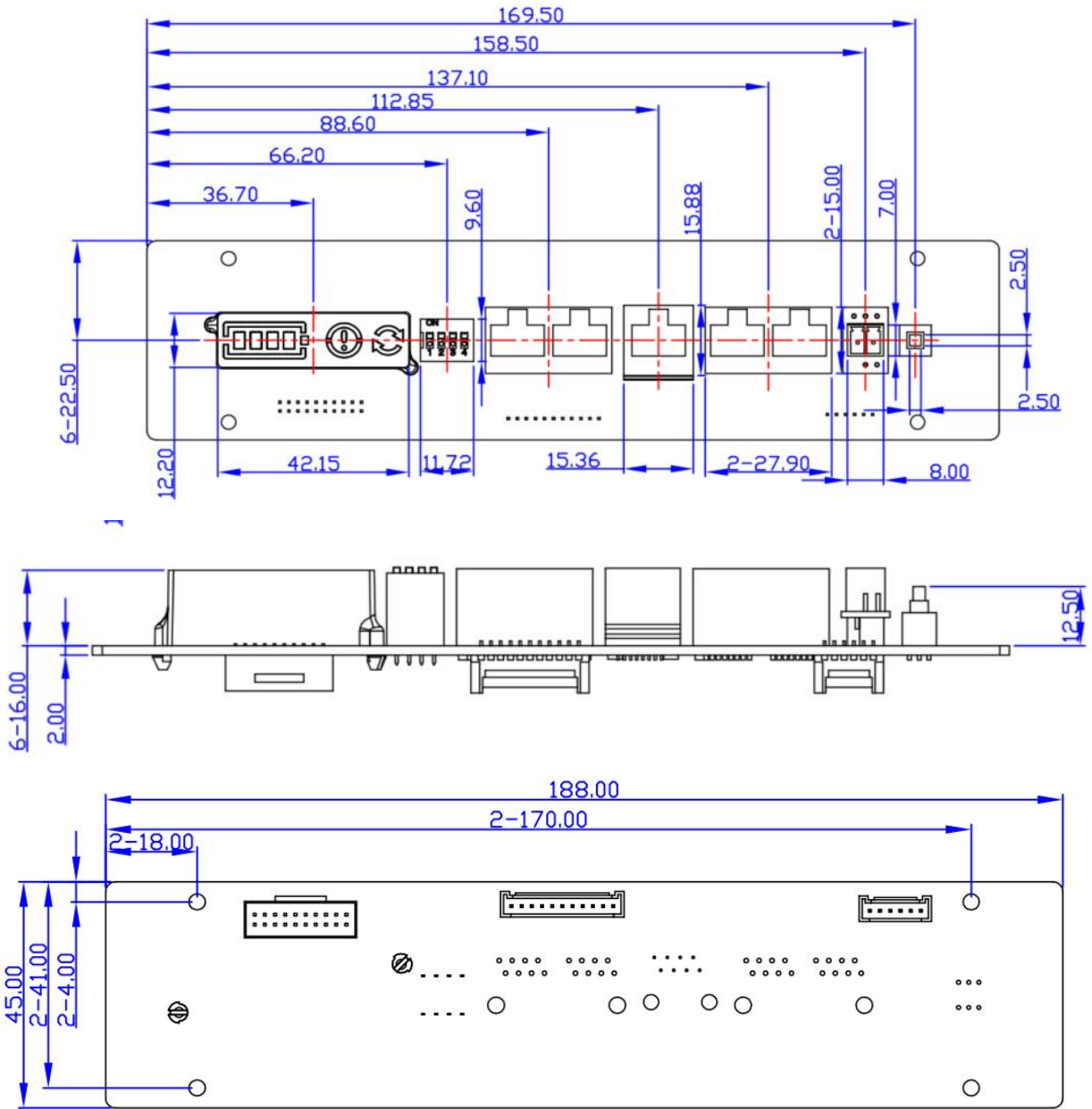
9. 尺寸图 Dimensional drawing

保护板尺寸 BMS size	长*宽*高 (mm) Long * Width * High (mm) 285*100*36
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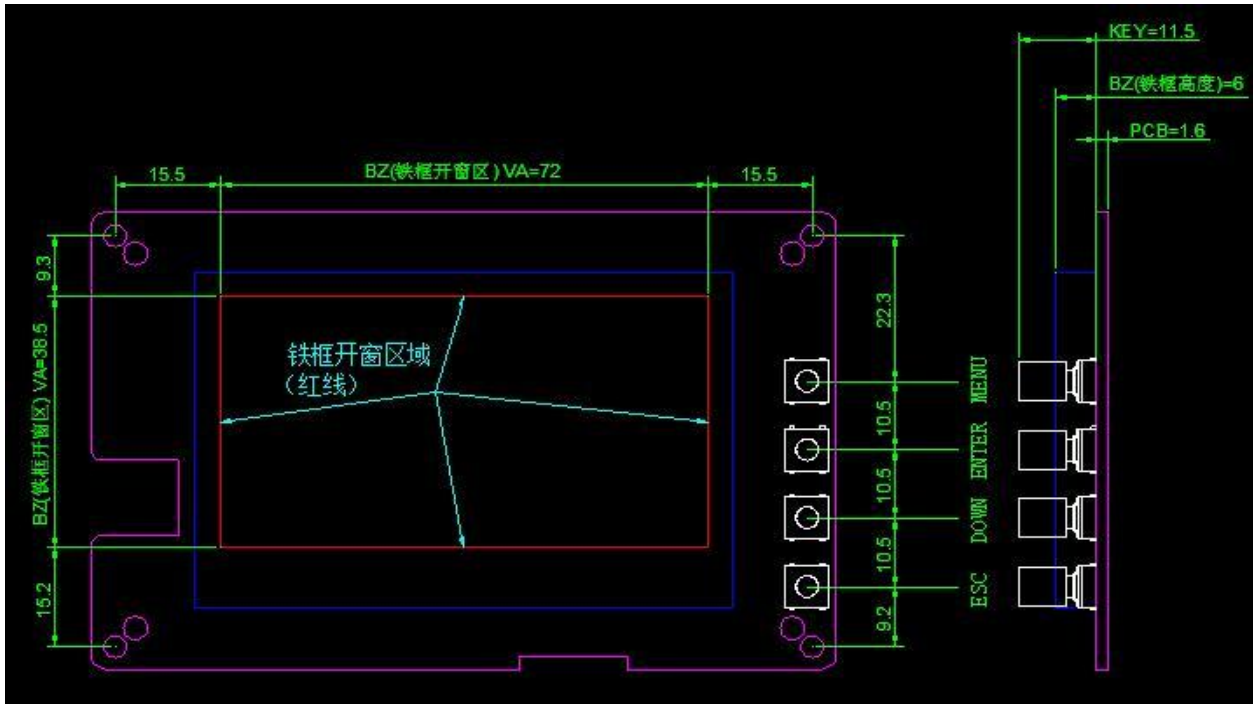
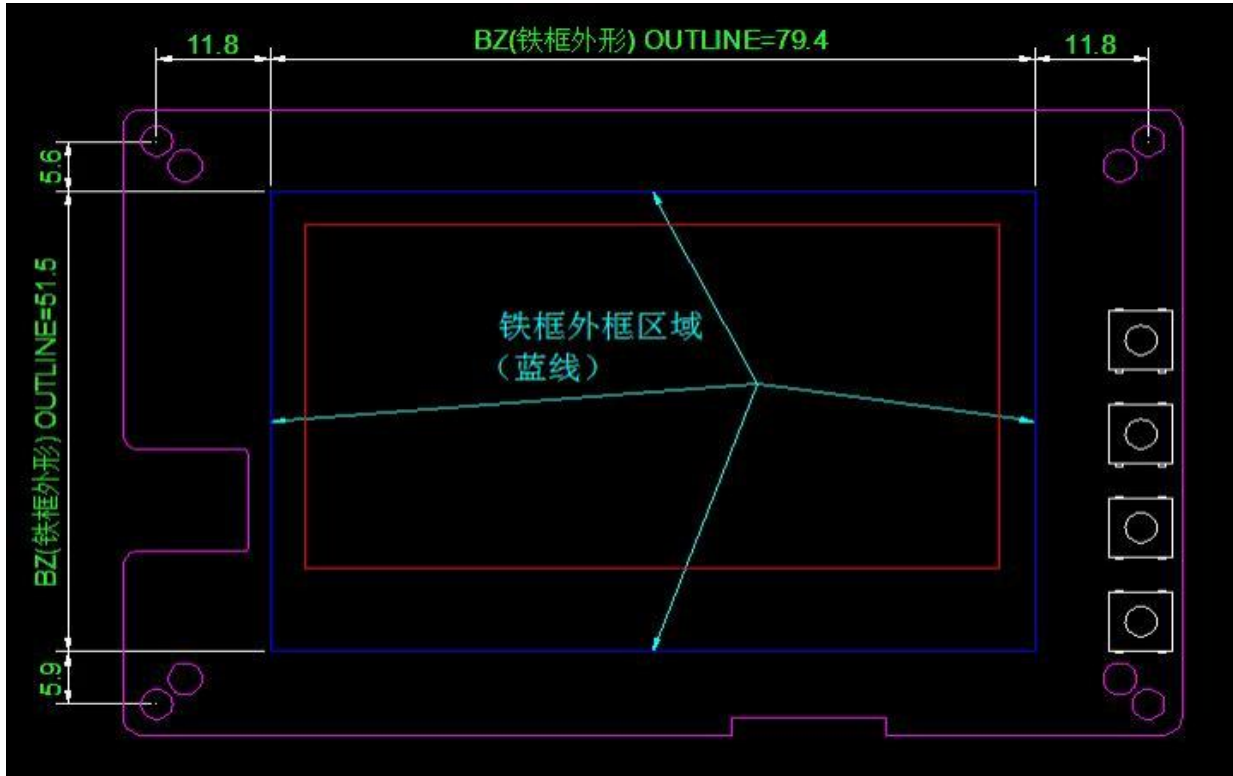


9.2 接口板尺寸图 Interface board size



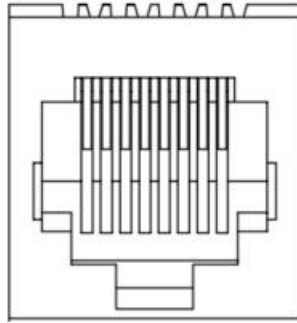
1		首次发行					
版本	ECN编号	修改内容				日期	修建人
≤50		.XX	±0.1°	料号	客户料号	-	
50~200		.X	±0.2°	描述	R16L		
≥200		.	±0.5°				

9.3 显示屏尺寸图 Screen size diagram

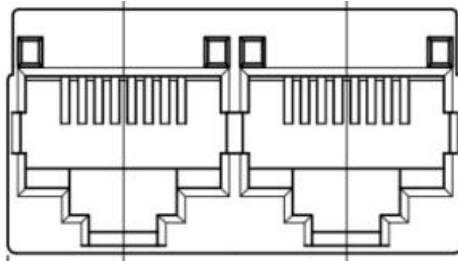


10. 接口定义 Interface definition

10.1 接口引脚说明 Description of the interface pin



RS232--采用 8P 立式插座 RS232-- 8P vertical socket	
RJ11 引脚 RJ11 pin	定义说明 defined declaration
1	485B1
2	481A1
3	ISO_GND
4	CAN1_H
5	CAN1_L
6	ISO_GND
7	232T
8	232R

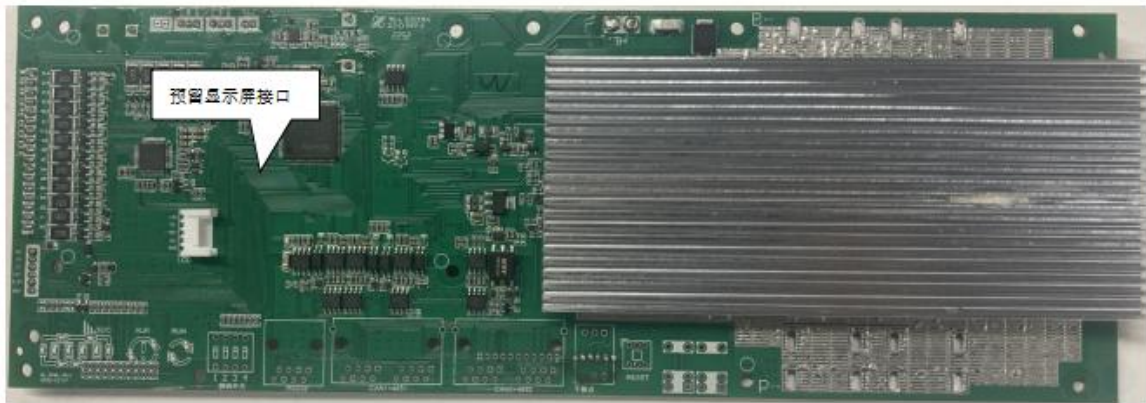
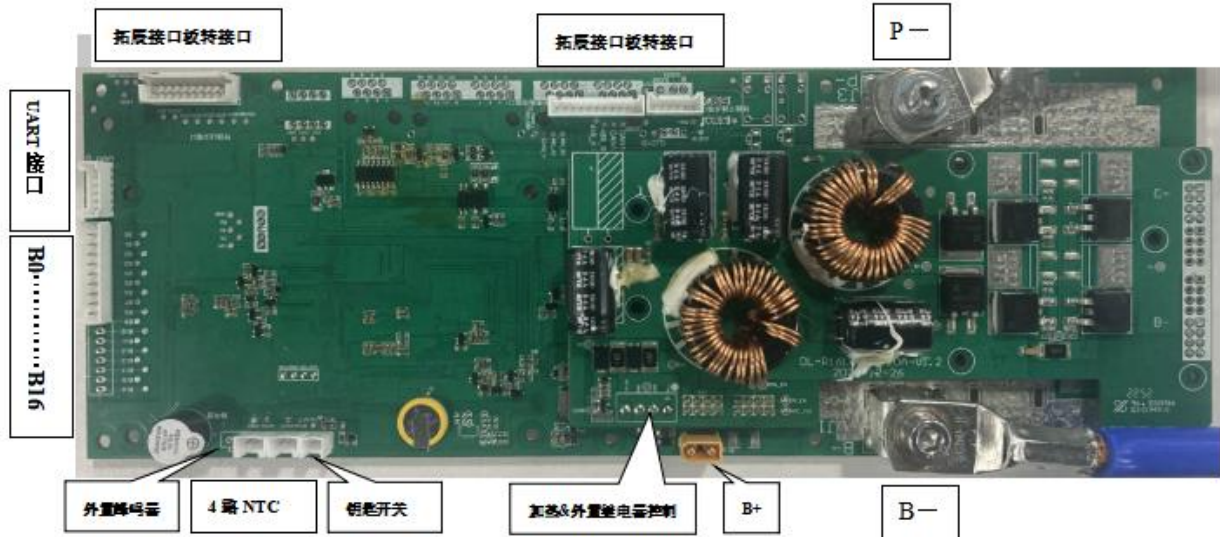


CAN1+4851 外部通讯接口 CAN1+4851 External communication port			
RJ45 引脚 RJ45 pin	定义说明 defined declaration	RJ45 引脚 RJ45 pin	定义说明 defined declaration
1	485B1	9	485B1
2	485A1	10	485A1
3	ISO-GND	11	ISO-GND
4	CAN1 H	12	CAN1 H
5	CAN1 L	13	CAN1 L
6	ISO-GND	14	ISO-GND
7	485A1	15	NC
8	485B1	16	NC

CAN2+4852 内部通讯并联接口 CAN2+4852 Parallel port for internal communication			
RJ45 引脚 RJ45 pin	定义说明 defined declaration	RJ45 引脚 RJ45 pin	定义说明 defined declaration
1	485B2	9	485B2
2	485A2	10	485A2
3	ISO-GND	11	ISO-GND
4	CAN2 H	12	CAN2 H
5	CAN2 L	13	CAN2 L
6	ISO-GND	14	ISO-GND
7	485A2	15	485A2
8	485B2	16	485B2

接口名称 Interface name	Pin 脚 Pin foot	标号 label	定义说明 defined declaration
B-接口 B- port	/	B-	电池总负, 接电池总负 The total negative of the battery.
P-接口 P- port	/	P-	保护板充放电负极, 接充放电负端 BMS charge and discharge negative electrode, charge and discharge negative terminal
B+接口 B+port	/	B+	电芯、PACK 正极, 用来给 BMS 供电; Cell、PACK anode, used to power the BMS.
采样线接口 立式 PHB2.54 17Pin 带扣 Sampling line interface Vertical PHB2.54 17Pin buckle	1	B0	接第 1 节电池负极 Connect the negative terminal of the first battery.
	2	B1+	接第 1 节电池正极 Connect the first battery positive terminal.
	3	B2+	接第 2 节电池正极 Connect the second battery positive terminal.
	接最后 1 节电池正极 Connect to the positive terminal of the highest battery.
NTC 接口 1 PHB2.0 4Pin 带扣 NTC Interface 1 PHB2.0 4Pin buckle	1	NTC1	1#温度线 1#Temperature line
	2	GND	地 GND
	3	NTC2	2#温度线 2#Temperature line
	4	GND	地 GND

NTC 接口 2 PHB2.0 4Pin 带扣 The NTC interface, 2 PH B 2.0 4 Pin band buckle	1	NTC3	3#温度线 3# Temperature line
	2	GND	地 GND
	3	NTC4	4#温度线 4#Temperature line
	4	GND	地 GND
UART 接口 PH B2.0 6 Pin 带扣 UART joggle PH B 2.0 6 Pin band buckle	1	GND	地 GND
	2	3.3	供电电源 3.3V Power supply is 3.3V
	3	12	12V 正极输出 12V positive electrode output
	4	S1	激活按键 the activate button
	5	TX	通讯发送端 The sender of UART communication
	6	RX	通讯接收端 The receiving end of UART communication
钥匙开关 PHB2.0 2Pin 带扣 key switch PH B 2.0 2 Pin band buckle	1	TRIG+	钥匙开关正极 Key switch positive pole
	2	GND	钥匙开关负极 Key switch negative electrode
LCD 转接口 PHB2.0 5Pin 带扣 LCD transfer interface PHB2.0 5Pin buckle	1	12V+	12V 正极输出 12V positive pole output
	2	TX5	通讯发送端 The sender of UART communication
	3	5V+	5V 正极输出 5V positive pole output
	4	RX5	通讯接收端 The receiving end of UART communication
	5	GND	电源输出负极 Power output negative electrode



10.2 主要线材说明 Description of the main wire material

线材名称 Name of wire	默认规格 Default specification
B- P-线 B-P-line	/
B+	输出线_并联模块-15A_B+线_XT30U-F+14AWG Output line _ Parallel module-15A_B + line _ XT 30 U-F + 14 AWG
采集线 Collection line	排线_17Pin_XHB2.5_1007_22AWG_600mm_打胶_带扣 Line line _17Pin_XHB2.5_1007_22AWG_600mm_glue _ buckle
NTC 线 NTC line	带插头 NTC_2路_PHB2.0_4Pin_3435_1%_24AWG_250mm NTC _ 2 with _PHB2.0_4Pin_3435_1% _ 24 AWG _ 250 mm
显示屏转接线 IDisplay transfer wiring	连接线_5Pin_XH2.5+5Pin_PHB2.0_24AWG_300mm_打胶_R16L 拓展板接 3.2 寸显示屏 Connecting line _5Pin_XH2.5+5Pin_PHB2.0_24AWG_300mm_glue _R16L expansion board is connected to the 3.2-inch display screen
接口板转接线 1 Interface board adapter connection	连接线_11Pin_PHB2.0_24AWG_打胶_带扣_R16L 接拓展板 Connecting line _11Pin_PHB2.0_24AWG_glue _buckle _R16L connected to the expansion board

line 1	
接口板转接线 2 Interface board adapter connection line 2	连接线_6Pin_PHB2.0_24AWG_打胶_带扣_R16L 接拓展板 Connecting line _6Pin_PHB2.0_24AWG_ glue _ buckle _R16L connected to the expansion board
接口板转接线 3 Interface board adapter connection line 3	连接线_2×10Pin_PHB2.0 双排_24AWG_300mm_R16L 接拓展板 Connecting line _210 Pin _ PHB 2.0 double row _ 24 AWG _ 300 mm _ R 16 L connecting to the extension board

11. 接线说明 The wiring instructions

- 先将保护板 B-用动力线接到电池组总负极；
protection board B - first with power line received a battery pack the cathode;
- 排线从细黑线连接 B-开始，第 2 根线连接第 1 串电池正极，后面依次连接每一串电池的正极；BMS 接入电
池 NIC 等线材，使用线序检测器检测排线连接正确后再把排线插入保护板；
The row of wires starts with the thin black wire connecting B-, the second wire connecting the first series of
positive battery terminals, and then connecting the positive terminals of each series of batteries in turn; Connect
the BMS to the battery, NIC and other wires. Use the sequence detector to check that the wires are correctly
connected, and then insert the wires into the BMS.
- 线完成后按键唤醒 BMS，测量电池 B+，B-电压与 P+，P-电压值是否相同，相同即保护板工作正常；否则请
按照上面重新操作；
After the wire is finished, press the button to wake up the BMS, and measure whether the B+, B- voltage and P+
P- voltage of the battery are the same. If they are the same, the BMS works normally; Otherwise, repeat the
operation as above.
- 拆卸保护板时，先拔排线（如果有两个排线，先拔高压排线，再拔低压排线），再拆动力线 B-。
When removing the BMS, remove the cable first (if there are two cables, remove the high-pressure cable first, and
then the low-pressure cable), and then remove the power cable B-

12. 注意事项 Points for attention

1. 不同电压平台的保护板不能混用；
1. BMS of different voltage platforms cannot be mixed;
2. 不同厂家的排线不通用，请确保使用我们公司配套排线；
2. The wiring of different manufacturers is not universal, please make sure to use our company's matching wiring;
3. 在测试、安装、接触和使用保护板时，要做好防静电措施；
3. When testing, installing, touching and using the BMS, take ESD measures;
4. 不要使保护板的散热面直接接触电芯，否则热量会传送到电芯，影响电池的安全；
4. Do not make the radiator surface of the BMS contact the battery directly, otherwise the heat will be transferred to
the battery, affecting the safety of the battery;
5. 不可自行拆卸、更改保护板元器件；
5. Do not disassemble or change BMS components by yourself;
6. 如果保护板出现异常，请停止使用，等问题解决了再使用；
6. If the BMS is abnormal, stop using it until the problem is resolved.