



# Specification

Product Name: 48V100A LTO Battery Management System

Product Number: 48100-1102-10E-20S

| Configuration           | Parameter       | Function |
|-------------------------|-----------------|----------|
| Single voltage platform | 2.4V            |          |
| PCS                     | 20S             | Options  |
| Capacity                | 100AH           | Settable |
| External switch         | ON              | Options  |
| Current limiting        | ON              | Options  |
| LCD                     | ON              | Options  |
| Bluetooth               | ON              | Options  |
| Dry contact             | ON              | Options  |
| Storage                 | ON              | Own      |
| Heating                 | ON              | Options  |
| Precharge               | ON              | Own      |
| Communication           | CAN、RM485、RS485 | Options  |

| Signature and seal of supplier |          |            | Signature and seal of client |             |           |
|--------------------------------|----------|------------|------------------------------|-------------|-----------|
|                                |          |            |                              |             |           |
| Executed By                    | Zhou Jun | Checked By | Wei Qi                       | Approved By | Huang Bin |



|      |  |      |  |      |  |
|------|--|------|--|------|--|
| Date |  | Date |  | Date |  |
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| Version | Date       | Editor   | Version Revision Note   |
|---------|------------|----------|-------------------------|
| V1.0    | 2024.03.18 | Zhou Jun | Create first draft      |
| V1.1    | 2024.07.22 | Zhou Jun | Modify reference images |
|         |            |          |                         |



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## 1. Application scope

This product is a fully functional 17-24 series LTO battery pack management system, with monomer overvoltage / undervoltage, total voltage undervoltage / overvoltage, charge / discharge overcurrent, high temperature, low temperature and short circuit protection and recovery functions. to achieve accurate measurement of SOC during charge and discharge, SOH health status statistics. realize voltage equalization during charging. Data communication is carried out with the host computer through RS485 communication, and the parameter configuration and data monitoring are carried out through the human-computer interaction of the upper computer software.

Note: The baud rate of the host computer is 19200.

## 2. Normative citation documents

The following documents are essential for the application of this document. The date-only version of the reference file is applicable to this file. The latest version of any undated reference file (including all modifications) applies to this file.

|                   |                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GB/T 191          | Marking of Packaging Storage and Transportation                                                                                                                    |
| GB/T 2408-2008    | plastic Determination of combustion properties Horizontal and vertical test                                                                                        |
| YD/T 983-2013     | Electromagnetic Compatibility Limit and Measurement Method for Communication Power Equipment                                                                       |
| GB/T 17626.5-2008 | Electromagnetic compatibility test and surge (shock) immunity test for measuring technology                                                                        |
| GB/T 17626.2-2006 | Electromagnetic Compatibility Test and Measurement Technology                                                                                                      |
| YD/T 2344.1—2011  | Lithium iron phosphate battery pack for communications - Part 1: integrated battery pack                                                                           |
| YD/T 2344.2—2015  | Lithium iron phosphate battery pack for communications - Part 2: discrete batteries                                                                                |
| YD/T 1363.3       | Communications Bureau (Station) Power, Air Conditioning and Environmental Centralized Monitoring Management System Part 3:Front-end Intelligent Equipment Protocol |
| YD/T 1058-2015    | High Frequency Switching Power Supply System for Communication                                                                                                     |



### 3. Functional characteristics

#### 3.1. Battery voltage detection

Real-time acquisition and monitoring of the voltage of the series cell to realize the alarm and protection of overvoltage and undervoltage. The voltage detection accuracy of the cell is  $\pm 10\text{mV}$  at  $0 \sim 45^\circ\text{C}$  and  $\pm 30\text{mV}$  at  $-20 \sim 70^\circ\text{C}$ .

Alarm, protection parameter setting can be changed by the upper computer.

#### 3.2. Cell, environment and power temperature detection

The BMS measure the cell temperature, ambient temperature and power temperature in real-time via NTC to provide high temperature or low temperature warnings and protections. The measured temperature difference is within  $\pm 2^\circ\text{C}$

Cell temperature sensor USES 10K, B value 3435.

Alarm, protection parameter setting can be changed by the upper computer.

#### 3.3. Battery charge/discharge current detection

The charge and discharge current of the battery pack is collected and monitored in real time by detecting the resistance of the current connected in the charge and discharge main circuit, The current accuracy is better than  $\pm 1\%$ .

Alarm, protection parameter setting can be changed by the upper computer.

#### 3.4. Short circuit protection function

Has the function of detecting and protecting the output short circuit.

#### 3.5. Battery capacity and cycle times

Real-time calculation of battery residual capacity, complete the learning of total charging and discharging capacity at one time, SOC estimation accuracy is better than  $\pm 5\%$ . It has the function of counting the number of charge and discharge cycles. When the accumulative discharge capacity of the battery pack reaches 80% of the set full capacity, the number of cycles will increase once.

Alarm, protection parameter setting can be changed by the upper computer.

#### 3.6. Charge, Discharge MOSFET switch

Low internal resistance, high current, high capacitance for backup power applications load startup, zero switching, double charging voltage optimization design.

#### 3.7. Balance of intelligent single cell

Unbalanced cells can be balanced when charging or standby, which can effectively improve the service time and cycle life of the battery.

Equalizing open voltage and equalizing differential voltage can be set by upper computer.



### 3.8.LED indication function

There are 6 LED indicators, 4 white LED indicators for the current battery SOC, 1 red LED indicator for alarm and protection failure, and 1 white LED indicator for battery standby, charging and discharging state.

### 3.9.Dormant function

BMS has manual and automatic sleep functions;

Automatic sleep function: The battery will automatically sleep for 48 hours when there is no external charging or discharging. When the battery pack is over-discharged, the communication is maintained for 1 minute, and the BMS enters the dormant state.

Manual sleep function: 1. By manually pressing the 6S reset button, the BMS enters sleep after the 6 LED lights light up in sequence.

2. The switch is controlled by an external switch, the switch is turned on when the switch is closed, and the switch is turned off when the switch is off.

The standby and hibernation can be set through the host computer.

### 3.10.One-key switch machine

BMS in parallel, the host can control the slave machine and boot. The host must dial the code according to the parallel mode, the host dial code address can not achieve one-click switch machine. (The batteries return to each other during the machine and can not be shut down by one button)

### 3.11.CAN 、RM485 and RS485 communication interfaces

CAN communication according to each inverter protocol to do communication, can connect inverter communication. (Note: Compatibled with Pylon, Goodwe, Deye, Luxpower, TBB; and can be switched to Growatt, Victron, SMA, SOFAR, Ginlong, and Studer)

RM485 communication according to each inverter protocol to do communication, can connect inverter communication. (Note: Compatibled with Pylon,Growatt, SRNE )

PC machine or intelligent front end can realize the data monitoring, operation control and parameter setting of the battery by RS485 communication telemetry, remote signal, remote adjustment, remote control and other commands.

### 3.12.Communications

Can be set through RS485, through 8 dial address address setting.

Two ways to view data:

1.Connect the upper computer through RS485 set

2. After the RS485 set is connected, the host CAN/RM485 interface is connected to the inverter

### 3.13.Historical data records are stored and read

Historical data is to store a piece of data according to the BMS state transition; to



store all kinds of alarm, protection trigger and elimination measurement data in real time; to store the measurement data in a certain time period by setting the record start time, record end time and record interval time. Currently can store not less than 300 historical data records, through the PC to read historical data and save as excel files into the computer.

### 3.14. Battery Management Parameters

The battery management parameters, such as cell overvoltage, total cell voltage overvoltage, charge and discharge overcurrent, core high and low temperature, environment high and low temperature, equalization strategy, battery series number, battery capacity, etc., can be reset by the upper computer.

### 3.15. Battery management functions

Voltage related functions, temperature related functions, current related functions (**Note: The output short-circuit function does not support the shutdown setting**), capacity related functions can be turned on or off through the upper computer setting.

### 3.16. Precharge function

The precharge function can be started immediately after starting up or discharging tube is turned on. The precharge time can be set (1mS to 5000mS) to cope with various capacity load scenarios and avoid short circuit protection of BMS output.

### 3.17. 2-way dry contact (Options)

There 2-way alarm output dry contacts in BMS.

Channel 1: SOC alarm, temperature alarm and protection, undervoltage alarm and protection, charge and discharge overcurrent alarm and protection (no prompt for overvoltage alarm and protection).

Channel 2: temperature failure, short circuit, monomer overvoltage protection + 30 mV, cell differential voltage failure, transient overcurrent protection.

### 3.18. Aerosol support (optional)

Through the aerosol dry contact, the BMS generates a BMS fault alarm to remind the user to handle the abnormal battery pack in time to avoid accidents.

### 3.19. Bluetooth (Options)

Through the wireless connection between mobile phone Bluetooth and battery pack Bluetooth module, the functions of battery pack management and alarm information collection, query, display, configuration modification and so on are realized.

Bluetooth app can realize the following functions:

- 1、Basic information display of battery pack
- 2、Communication configuration between BMS and inverter



3、Battery pack alarm / protection parameters and control switch configuration

4、Support single machine and parallel machine; Support real-time switching of battery pack single machine connection

5、Chinese and English display switching

### 3.20. Connect the compensation

To prevent excessive voltage difference between cells or modules, 2 compensation points can be provided. When a wire or a long copper bar is used between the cells, a voltage difference will be generated, and impedance compensation is required. You can check whether the voltage difference between the cells is too large through the host computer.

When discharging, measure the voltage difference between the wire and the long copper bar; if the voltage difference is too large, according to the voltage difference/current=impedance, manually fill in the calculated impedance into the upper computer parameters. In the upper computer parameters, the default is the compensation impedance of the 9th and 13th wire connection, and the 2-way compensation impedance can be set according to the actual battery cell module.

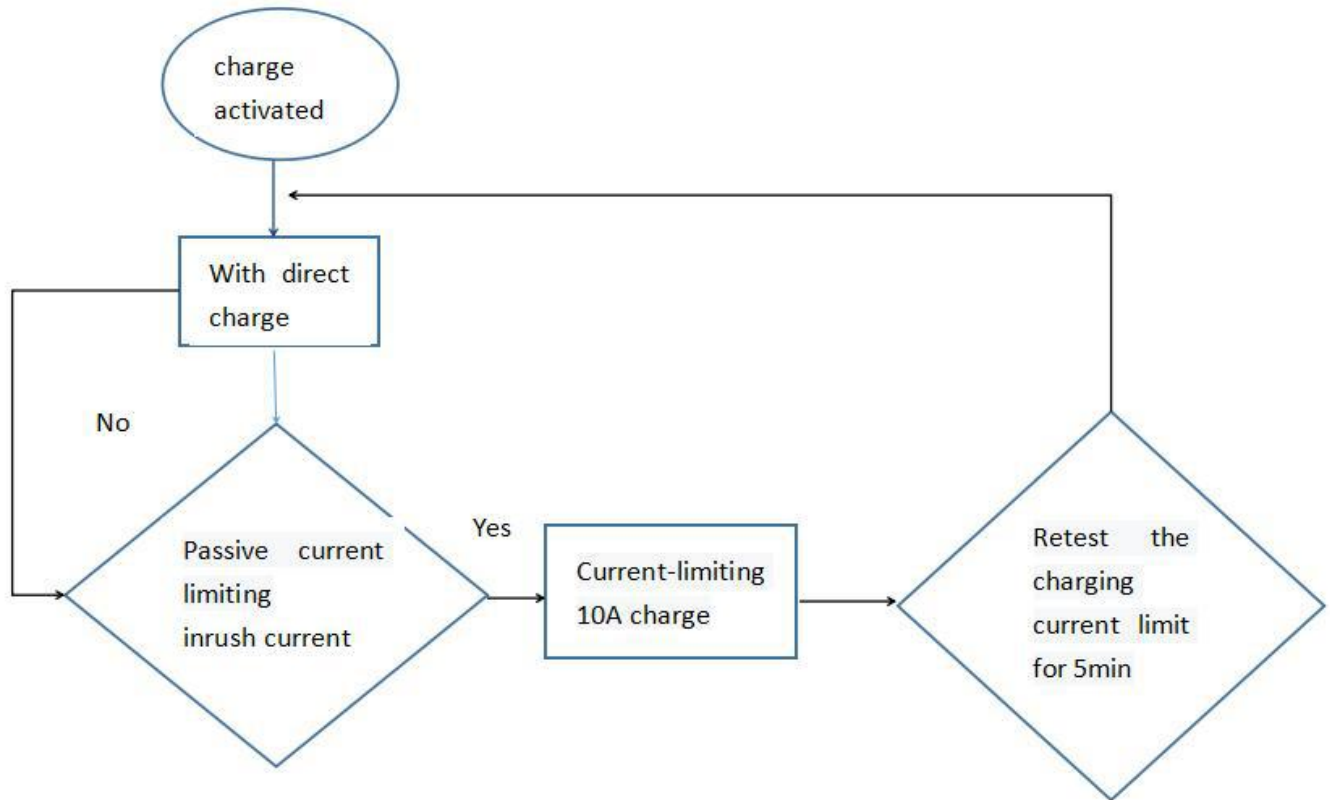
**Note:** If the battery cell module is assembled with long wires and long copper bars, it must be communicated with the BMS manufacturer for impedance compensation. Otherwise it will affect the battery consistency.

### 3.21. Charging current limit

Charging current limiter can be divided into two modes: active current limiter and passive current limiter. (**Note: Customers choose passive current limiting**)

1. Active current limiting: In the charging state of BMS, BMS keeps the current limiting module MOS tube open and actively restricts the charging current to 10A.

2. Passive current limiting: In the charging state of BMS, BMS opens the charging module MOS tube. If the charging current reaches the overcurrent warning value of charging (**Note: current setting 100A**), open the current limiting module MOS tube 10A, and re-test whether the charger current reaches the passive current limiting condition after 5 minutes of current limiting. (The passive current limit value can be set on)



### 3.22. Automatic dip switch (optional)

The user can choose to enable the automatic DIP function. After the function is enabled, the parallel communication connection can be realized without manual DIP after the automatic DIP connection is connected.

### 3.23. PC

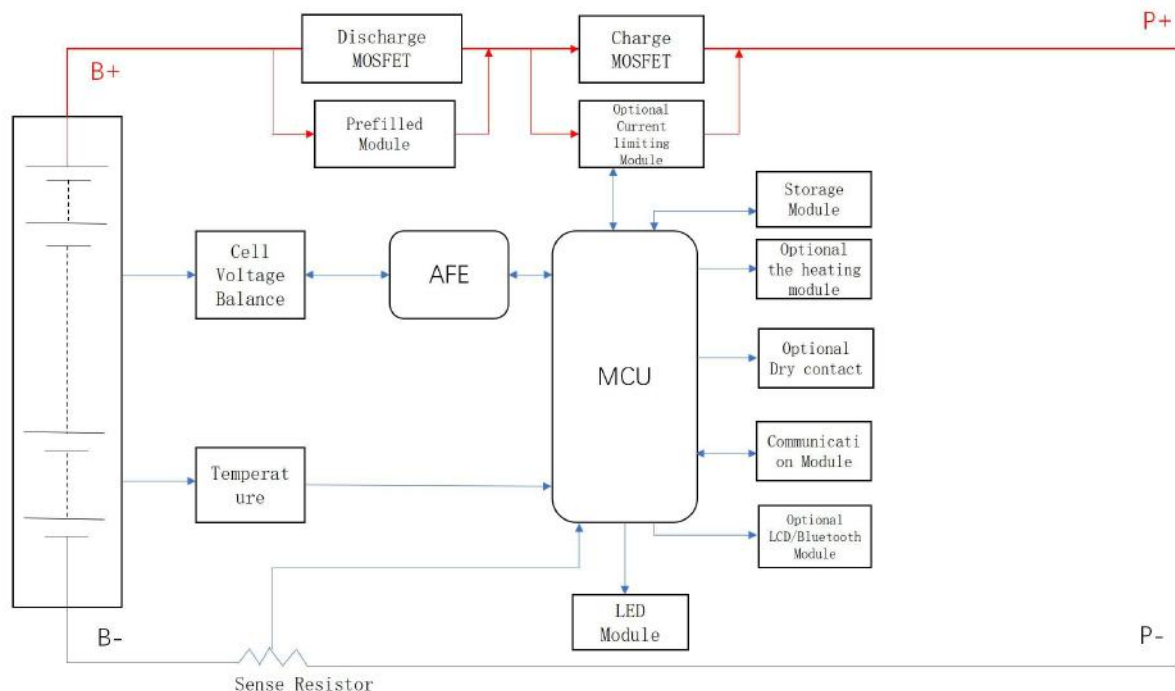
The host computer uses BatteryMonitorV2.1.9. It can switch between English and Chinese (English protocol is loaded when switching to English) and the loading protocol (Chinese file name: 16S\_V20\_ADDR, English protocol name: 16S\_V20\_ADDR\_EN). Please check the operation method in the file of host computer for the operation instructions.

### 3.24. Program upgrades

The main program version can be upgraded through the firmware update in the upper computer software.

The upper computer and the BMS are connected via RS485.

## 4. Functional framework



## 5. Electrical characteristics

| Project                      | Min  | Max  | Type | Unit |
|------------------------------|------|------|------|------|
| Normal operating voltage     | 30.0 | 56.0 | 48   | V    |
| Normal charging voltage      | /    | 58.4 | 57.2 | V    |
| Operating temperature range  | -20  | 70   | 25   | °C   |
| Storage temperature          | -40  | 85   | 25   | °C   |
| Use environment humidity     | 10   | 85   | /    | %    |
| Continuous charging current  | /    | 110  | 100  | A    |
| Continuous discharge current | /    | 110  | 100  | A    |
| Discharge output resistance  | <2   |      |      | mΩ   |
| Normal operating power       | <40  |      |      | mA   |
| Dormancy power consumption   |      | 50   | 0    | uA   |



## 6. Basic parameters

### 6.1. Basic parameters

| Function name                   | Function settings | Item list                         | Set value                                                                                                                                                                     | Setting range |
|---------------------------------|-------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Single voltage alarm            | Open              | Single high voltage alarm         | 2500mV                                                                                                                                                                        | Can be set    |
|                                 |                   | High voltage recovery of monomer  | 2400mV                                                                                                                                                                        | Can be set    |
|                                 | Open              | Single low voltage alarm          | 1700mV                                                                                                                                                                        | Can be set    |
|                                 |                   | Low voltage recovery of monomer   | 2200mV                                                                                                                                                                        | Can be set    |
| Monomer overweight protection   | Open              | Monomer overweight protection     | 2800mV                                                                                                                                                                        | Can be set    |
|                                 |                   | Recovery of monomeric overvoltage | 2400mV                                                                                                                                                                        | Can be set    |
|                                 |                   | Overvoltage recovery conditions   | 1.monomer voltage drop<br>overvoltage recovery point<br>2.residual capacity below<br>intermittent recharge capacity 96%<br><b>Note: Two conditions must be met to recover</b> |               |
|                                 |                   |                                   | It is detected that the battery has a discharge current > 10A                                                                                                                 |               |
| Monomer undervoltage protection | Open              | Under voltage protection voltage  | 1500mV                                                                                                                                                                        | Can be set    |
|                                 |                   | Under voltage recovery voltage    | 2200mV                                                                                                                                                                        | Can be set    |
|                                 |                   | Single under voltage shutdown     | Shut down after undervoltage protection and maintain 1 minute communication                                                                                                   |               |
|                                 |                   | Under voltage recovery conditions | Charging current detected >3 A                                                                                                                                                |               |
| Battery Total voltage Alarm     | Open              | Total voltage high voltage alarm  | 50.0V                                                                                                                                                                         | Can be set    |
|                                 |                   | Total voltage recovery            | 48.0V                                                                                                                                                                         | Can be set    |
|                                 | Open              | Total voltage Low voltage Alarm   | 34.0V                                                                                                                                                                         | Can be set    |



|                                         |      |                                        |                                                                                                                                                                         |            |
|-----------------------------------------|------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                                         |      | Total voltage and low voltage recovery | 44.0V                                                                                                                                                                   | Can be set |
| Total voltage overvoltage protection    | Open | Total voltage overvoltage protection   | 56.0V                                                                                                                                                                   | Can be set |
|                                         |      | Total voltage relief                   | 48.0V                                                                                                                                                                   | Can be set |
|                                         |      | Overvoltage recovery conditions        | 1.monomer voltage drop overvoltage recovery point<br>2.residual capacity below intermittent recharge capacity 96%<br><b>Note: Two conditions must be met to recover</b> |            |
|                                         |      |                                        | It is detected that the battery has a discharge current > 10A                                                                                                           |            |
| Total voltage undervoltage protection   | Open | Total voltage undervoltage protection  | 30.0V                                                                                                                                                                   | Can be set |
|                                         |      | Total undervoltage recovery            | 33.0V                                                                                                                                                                   | Can be set |
|                                         |      | Total undervoltage shutdown            | Shut down after undervoltage protection and maintain 1 minute communication                                                                                             |            |
|                                         |      | Undervoltage recovery conditions       | Charging current detected >3A                                                                                                                                           |            |
| Cell temperature forbidden to charge    | Open | Charge High Temperature Alarm          | 50°C                                                                                                                                                                    | Can be set |
|                                         |      | Charging High Temperature Recovery     | 47°C                                                                                                                                                                    | Can be set |
|                                         |      | Overcharge protection                  | 55°C                                                                                                                                                                    | Can be set |
|                                         |      | Overcharge recovery                    | 50°C                                                                                                                                                                    | Can be set |
|                                         |      | Charge Low Temperature Alarm           | 2°C                                                                                                                                                                     | Can be set |
|                                         |      | Low temperature charging recovery      | 5°C                                                                                                                                                                     | Can be set |
|                                         |      | Undercharge protection                 | -10°C                                                                                                                                                                   | Can be set |
|                                         |      | Recovery of undercharging              | 0°C                                                                                                                                                                     | Can be set |
| Cell temperature forbidden to discharge | Open | High Temperature Discharge Alarm       | 52°C                                                                                                                                                                    | Can be set |
|                                         |      | High temperature discharge recovery    | 47°C                                                                                                                                                                    | Can be set |



|                                      |      |                                            |      |            |
|--------------------------------------|------|--------------------------------------------|------|------------|
|                                      |      | Discharge overtemperature protection       | 55℃  | Can be set |
|                                      |      | Discharge overtemperature recovery         | 50℃  | Can be set |
|                                      |      | Low temperature discharge alarm            | -10℃ | Can be set |
|                                      |      | Low temperature discharge recovery         | 3℃   | Can be set |
|                                      |      | Discharge undertemperature protection      | -15℃ | Can be set |
|                                      |      | Discharge undertemperature recovery        | 0℃   | Can be set |
|                                      |      |                                            |      |            |
| Environmental temperature protection | Open | Environmental High Temperature Alarm       | 50℃  | Can be set |
|                                      |      | Environmental High Temperature Recovery    | 47℃  | Can be set |
|                                      |      | Environmental Over-temperature Protection  | 60℃  | Can be set |
|                                      |      | Environmental Overheating Recovery         | 55℃  | Can be set |
|                                      |      | Environmental Low Temperature Warning      | 0℃   | Can be set |
|                                      |      | Environmental Low Temperature Recovery     | 3℃   | Can be set |
|                                      |      | Environmental under-temperature protection | -10℃ | Can be set |
|                                      |      | Environmental undertemperature recovery    | 0℃   | Can be set |
|                                      |      |                                            |      |            |
| Power temperature protection         | Open | Power High Temperature Alarm               | 90℃  | Can be set |
|                                      |      | Power High Temperature Recovery            | 85℃  | Can be set |
|                                      |      | Overpower protection                       | 100℃ | Can be set |
|                                      |      | Power overtemperature recovery             | 85℃  | Can be set |



|                                   |                     |                                   |                                                             |                                                                                                                     |
|-----------------------------------|---------------------|-----------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Charging Current Limit            | Closed              | Active Current                    | 10A                                                         | Charger current greater than 10A, opening limit                                                                     |
|                                   | Open                | Passive limit flow                |                                                             | Charger current is greater than charging overcurrent alarm (value can be set), start current limit                  |
|                                   |                     | Charge Limit Delay                | 5 minutes                                                   | After the current limit is switched on, check again 5 minutes later whether the current limit is switched on or not |
| Charge Overcurrent Alarm          | Open                | Charge Overcurrent Alarm          | 110A                                                        | Can be set                                                                                                          |
|                                   |                     | Charging Overcurrent Recovery     | 105A                                                        | Can be set                                                                                                          |
| Charging Overcurrent Protection   | Open                | Charging Overcurrent Protection   | 120A                                                        | Can be set                                                                                                          |
|                                   |                     | Charge Overcurrent Delay          | 10S                                                         | Can be set                                                                                                          |
|                                   |                     | Overcurrent recovery conditions   | Discharge recovered immediately or automatically after 60 S |                                                                                                                     |
| Effective charging current        | Charge into current |                                   | 600mA                                                       |                                                                                                                     |
|                                   | Charge Exit Current |                                   | 500mA                                                       |                                                                                                                     |
| Discharge Overflow Warning        | Open                | Discharge Overflow Warning        | -110A                                                       | Can be set                                                                                                          |
|                                   |                     | Discharge overcurrent recovery    | -105A                                                       | Can be set                                                                                                          |
| Discharge over-current protection | Open                | Discharge over-current protection | -120A                                                       | Can be set                                                                                                          |
|                                   |                     | Discharge Overcurrent Delay       | 10S                                                         | Can be set                                                                                                          |
|                                   |                     | Overcurrent recovery conditions   | Charge immediately, or after 60 S automatically             |                                                                                                                     |



|                                   |                              |                                            |                                                                                          |            |  |
|-----------------------------------|------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------|------------|--|
| Transient Overcurrent Protection  | Open                         | Transient Overcurrent Protection           | -180A                                                                                    | Can be set |  |
|                                   |                              | Transient Overcurrent Delay                | 30mS                                                                                     | Can be set |  |
|                                   |                              | Transient Overcurrent Recovery             | Charge immediately, or after 60 S automatically                                          |            |  |
|                                   | Closed                       | Transient Overcurrent Lock                 | Continuous secondary overcurrent, exceeding the number of overcurrent locks              |            |  |
|                                   |                              | Overcurrent locking times                  | 5 times                                                                                  |            |  |
|                                   |                              | Transient lockout                          | Connect charger                                                                          |            |  |
|                                   |                              |                                            |                                                                                          |            |  |
| Output short circuit              | Open                         | Short circuit protection current and delay | Write program ( <b>Note: Cannot be set</b> )                                             |            |  |
|                                   |                              | Recovery of short circuit protection       | Charge immediately, or after 60 S automatically                                          |            |  |
|                                   | Open                         | Short circuit protection lock              | Continuous output short circuit, over-current lock times                                 |            |  |
|                                   |                              | Short circuit locking times                | 5 times                                                                                  |            |  |
|                                   |                              | Short circuit lock release                 | Connect charger                                                                          |            |  |
|                                   |                              |                                            |                                                                                          |            |  |
| Effective discharge current       | Discharge into current       |                                            | -500mA                                                                                   |            |  |
|                                   | Discharge withdrawal current |                                            | -400mA                                                                                   |            |  |
|                                   |                              |                                            |                                                                                          |            |  |
| Core equalization function        | Open                         | Standby balance                            | Uncharged/discharge state open equilibrium                                               |            |  |
|                                   |                              | Standby equalization time                  | 10 hours                                                                                 | Can be set |  |
|                                   | Open                         | Charge Balance                             | Open equalization in charging state and floating state                                   |            |  |
|                                   | On voltage condition         | Balanced on voltage                        | 2350mV                                                                                   | Can be set |  |
|                                   |                              | Equilibrium Open voltage                   | 30mV                                                                                     |            |  |
|                                   |                              | Equilibrium end differential voltage       | 20mV                                                                                     |            |  |
|                                   |                              |                                            |                                                                                          |            |  |
|                                   | Open                         | Equilibrium temperature limits             | Close the temperature range evenly according to the ( <b>ambient alarm temperature</b> ) |            |  |
|                                   |                              | Equilibrium High Temperature Ban           | 50℃                                                                                      | Can be set |  |
| Equilibrium cryogenic prohibition |                              | 0℃                                         |                                                                                          |            |  |



|                                 |                            |                                                                                    |                                                                                                                                                           |                        |
|---------------------------------|----------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Core Failure Alarm              | Open                       | Failure voltage Differential                                                       | 600mV                                                                                                                                                     | Can be set             |
|                                 |                            | Core recovery voltage differential                                                 | 400mV                                                                                                                                                     |                        |
|                                 |                            |                                                                                    |                                                                                                                                                           |                        |
| Battery capacity setting        | Battery rated capacity     |                                                                                    | 100Ah                                                                                                                                                     | 5Ah~300Ah              |
|                                 | Battery residual capacity  |                                                                                    | Estimation of core voltage                                                                                                                                | Can be set             |
|                                 | Accumulated cycle capacity |                                                                                    | 80%                                                                                                                                                       | Number of cycles (Set) |
|                                 | Open                       | Residual capacity alarm                                                            | 15%                                                                                                                                                       |                        |
|                                 | Open                       | Residual capacity protection                                                       | 5%                                                                                                                                                        | Turn off output        |
|                                 |                            |                                                                                    |                                                                                                                                                           |                        |
| Precharge function              | 2000ms                     | 0~5000ms                                                                           | BMS boot up precharge function                                                                                                                            |                        |
| BMS Power Management            | Open                       | Maximum standby time                                                               | 48h (Charger is not present and no effective discharge current)                                                                                           |                        |
| Low temperature heating of core | Open                       | Low temperature heating of core                                                    | 0℃                                                                                                                                                        | Can be set             |
|                                 |                            | Core heating recovery                                                              | 10℃                                                                                                                                                       |                        |
|                                 |                            | Heating on logic                                                                   | The charger is on line and the temperature of the cell reaches the opening condition. Turn on and heat up.No heating in standby state and discharge state |                        |
| External switches               | Open                       | BMS in standby state can operate external switch off and turn on BMS.              |                                                                                                                                                           |                        |
| LCD screen                      | Open                       | Simple monitoring software, can view the core,temperature, current and other data. |                                                                                                                                                           |                        |
| Manual charging activation      | Open                       | 1 point                                                                            | After undervoltage protection BMS shut down,manual ly press the button to clear the undervoltage protection                                               | Can be set             |
|                                 |                            |                                                                                    | Forced output                                                                                                                                             |                        |



|                        |                      |             |    |            |
|------------------------|----------------------|-------------|----|------------|
| Compensation impedance | Compensation point 1 | 0m $\Omega$ | 9  | Can be set |
|                        | Compensation point 2 | 0m $\Omega$ | 13 |            |

## 6.2. Basic mode of work

### 6.2.1. charging mode

When the BMS detects that the charger is connected and the external charging voltage is greater than the internal battery voltage by more than 0.5V, when the charging current reaches the effective charging current, it enters the charging mode.

### 6.2.2. discharge mode

BMS into discharge mode when the load connection is detected and the discharge current reaches the effective discharge current.

### 6.2.3. standby mode

When the above two modes are not satisfied, enter standby mode.

### 6.2.4. shutdown mode

Normal standby for 48 hours, battery triggers under-voltage protection, key-press shutdown or external switch shutdown, BMS enters shutdown mode.

Wake-up conditions for shutdown mode: 1. Charge activation; 2. 48V voltage activation; 3. Press the key to turn on; 4. External switch.

## 6.3. LED light indication instructions

### 6.3.1. LED lamp sequence

1 operational light ,1 alarm light ,4 capacity indicator lights

|     |  |  |  |       |     |
|-----|--|--|--|-------|-----|
|     |  |  |  |       |     |
| SOC |  |  |  | ALARM | RUN |

### 6.3.2. Capacity indication

| Status                    |        | Status      |             |             |             | Discharge   |             |             |             |
|---------------------------|--------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Capacity indicator        |        | L4 ●        | L3 ●        | L2 ●        | L1 ●        | L4 ●        | L3 ●        | L2 ●        | L1 ●        |
| The remaining capacity    | 0~25%  | OFF         | OFF         | OFF         | Flash       | OFF         | OFF         | OFF         | Solid Green |
|                           | 25~50% | OFF         | OFF         | Flash       | Solid Green | OFF         | OFF         | Solid Green | Solid Green |
|                           | 50~75% | OFF         | Flash       | Solid Green | Solid Green | OFF         | Solid Green | Solid Green | Solid Green |
|                           | ≥75%   | Flash       | Solid Green | Solid Green | Solid Green | Solid Green | Solid Green | Solid Green | Solid Green |
| Running indicator light ● |        | Solid Green |             |             |             | Flash       |             |             |             |

### 6.3.3.Light Blink explanation

| Flash Mode | ON    | OFF   |
|------------|-------|-------|
| Flash 1    | 0.25s | 3.75s |
| Flash 2    | 0.5s  | 0.5s  |
| Flash 3    | 0.5s  | 1.5s  |

### 6.3.4.State indication

| System state | Running state                                       | RUN         | ALM         | SOC                            |     |     |     | Note                                                                                 |
|--------------|-----------------------------------------------------|-------------|-------------|--------------------------------|-----|-----|-----|--------------------------------------------------------------------------------------|
|              |                                                     | ●           | ●           | ●                              | ●   | ●   | ●   |                                                                                      |
| Shutdown     | Sleep                                               | OFF         | OFF         | OFF                            | OFF | OFF | OFF | OFF                                                                                  |
| Standby      | Normal                                              | Flash1      | OFF         | OFF                            | OFF | OFF | OFF | Standby status                                                                       |
| Charge       | Normal                                              | Solid Green | OFF         | According to battery indicator |     |     |     | Highest LED flash 2                                                                  |
|              | Alarm                                               | Solid Green | Flash2      | According to battery indicator |     |     |     | Highest LED flash 2                                                                  |
|              | overvoltage protection                              | Flash1      | OFF         | OFF                            | OFF | OFF | OFF |                                                                                      |
|              | Temperature ,overcurrent protection                 | Flash1      | Flash1      | OFF                            | OFF | OFF | OFF |                                                                                      |
| Discharge    | Normal                                              | Flash3      | OFF         | According to battery indicator |     |     |     | According to battery indicator                                                       |
|              | Alarm                                               | Flash3      | Flash3      |                                |     |     |     |                                                                                      |
|              | Temperature ,overcurrent , short circuit protection | OFF         | Solid Green | OFF                            | OFF | OFF | OFF | Stop discharging, forced dormancy without action after 48h when the mains is offline |
|              | Under-voltage protection                            | OFF         | OFF         | OFF                            | OFF | OFF | OFF | Stopping Discharge                                                                   |



## 7. Functional description

### 7.1. Standby state

BMS the correct connection on the power, in no overvoltage, undervoltage, overcurrent, short circuit, over temperature, under temperature and other protection state, press the reset button to boot, BMS in standby state.

BMS standby state, the running lamp flashes, and the battery can be charged and discharged.

### 7.2. Over-protection and rehabilitation

#### 7.2.1. Monomer overcharge protection and recovery

If any section of the battery core is higher than the set value of the monomer overcharge protection, the BMS enters the overcharge protection state, and the charging equipment can not charge the battery.

After the monomer overvoltage protection, when the maximum monomer voltage drops below the monomer overcharge recovery value and the SOC is below 96%, the overcharge protection state is relieved. can also discharge release.

#### 7.2.2. Total voltage overcharge protection and recovery

If the battery voltage is higher than the set value of the total voltage overcharge protection, the BMS enters the overcharge protection state, and the charging equipment can not charge the battery. If the total voltage drops below the recovery value and SOC below 96%, the overcharge protection is relieved. It can also be released Except.

### 7.3. Protection and rehabilitation

#### 7.3.1. Protection and restoration of monomers

If any section of the battery core is lower than the set value of the monomer over-discharge protection, the BMS enters the over-discharge protection state, and the load can not discharge the battery. Hold 1 minute communication after BMS shutdown.

After over-discharge protection occurs, charging the battery pack can release the over-discharge protection state. or press the reset button, BMS will boot to re- detect whether the battery pack voltage reaches the recovery value.

**Note:** After the BMS discharges under-voltage protection, it is shut down, and the button is activated or the charging is activated. The BMS keeps the output voltage for 1 minute for the inverter to detect the battery voltage, so it is not allowed to discharge within 1 minute.

#### 7.3.2. Total voltage protection and recovery

When the battery voltage is lower than the total voltage over-discharge protection set value, the BMS enters the over-discharge protection state, and the load can not discharge the battery. Hold 1 minute communication after BMS shutdown.



After over-discharge protection occurs, charging the battery pack can release the over-discharge protection state. or press the reset button, BMS will boot to re-detect whether the battery pack voltage reaches the recovery value.

Note: After the BMS discharges under-voltage protection, it is shut down, and the button is activated or the charging is activated. The BMS keeps the output voltage for 1 minute for the inverter to detect the battery voltage, so it is not allowed to discharge within 1 minute.

#### **7.4. Charging overcurrent protection and recovery**

Charging overcurrent protection can be triggered when there is no charging current limiting function. when the charging current exceeds the charging overcurrent protection setting value and reaches the delay time. BMS access charging overcurrent protection, charging equipment can not charge the battery.

After charging overcurrent protection occurs, the BMS automatically delays recovery and re-detects the external charger current. discharge can also remove the charging overcurrent protection.

#### **7.5. Discharge overcurrent protection and recovery**

When the discharge current exceeds the discharge overcurrent protection setting value and reaches the delay time. BMS into the discharge overcurrent protection, the load can not charge the battery.

After the discharge overcurrent protection occurs, the BMS automatically delays recovery and re-detects the external load current. charging can also release the discharge overcurrent protection.

Discharge over-current protection has two-stage protection to achieve transient over-current protection and discharge over-current protection recovery. Transient protection occurs when the number of times the condition will be locked, recovery must be turned off in the boot or charge release.

#### **7.6. Temperature protection and recovery**

BMS there are 6 temperature detection ports, the implementation of monitoring temperature changes to achieve protection measures.

##### **7.6.1. Charge/discharge high temperature protection and recovery**

When charging and discharging state ,4 cores NTC arbitrarily one higher than the high temperature protection set value, BMS into the high temperature protection. BMS stop charging or discharging.

If the temperature of the core is lower than the high temperature recovery value, the charge or discharge BMS resume.

##### **7.6.2. Charge/discharge low temperature protection and recovery**

When charging and discharging state ,4 cores NTC randomly one lower than the low temperature protection set value, BMS into the low temperature protection. BMS stop charging or discharging.

If the core temperature is higher than the low temperature recovery value, the



charge or discharge BMS resume.

### 7.6.3.Ambient temperature protection, power temperature protection

When the NTC detects that the ambient temperature is higher than the ambient high temperature setting value, the BMS enters the ambient high temperature protection. The BMS stops charging and discharging.

When NTC detects that the power temperature is higher than the power protection setting value, the BMS enters the power high temperature protection. The BMS stops charging and discharging.

### 7.7.Balanced function

BMS should have standby and charge equalization function, the system adopts energy consumption type equalization circuit, the equalization open voltage software is adjustable, the equalization open condition any section is higher than the equalization open voltage and the voltage difference reaches the condition together.

When stop charging or the core voltage difference is less than the set value.

### 7.8. Turn on and off

| Serial number | Function          | Definition                                                                                                                                                                                   |
|---------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | Boot/boot         | BMS in hibernation, press the reset button, the BMS is activated, After the LED indicator lights shine in turn, turn to normal working state.                                                |
| 2             | Shutdown / Sleep  | BMS in standby or discharge state, press this key, after 6 s, the BMS is dormant, and the LED indicator lights shine in turn, and turn to sleep state. Sleep after BMS no power consumption. |
| 3             | External switches | External switch can control BMS switch machine, external switch priority                                                                                                                     |

### 7.9.Storage functions

Storage content includes: protection and alarm and its category, protection and alarm recovery time, single battery voltage, total battery voltage, charge/discharge capacity, charge/discharge current, temperature, etc.

It records in year/month/day/hour/minute/second, and can also be set to record the information content within a certain period of time.

The amount of information storage is not less than 300.

The historical data can be read through the host computer and saved as an excel file to the computer.

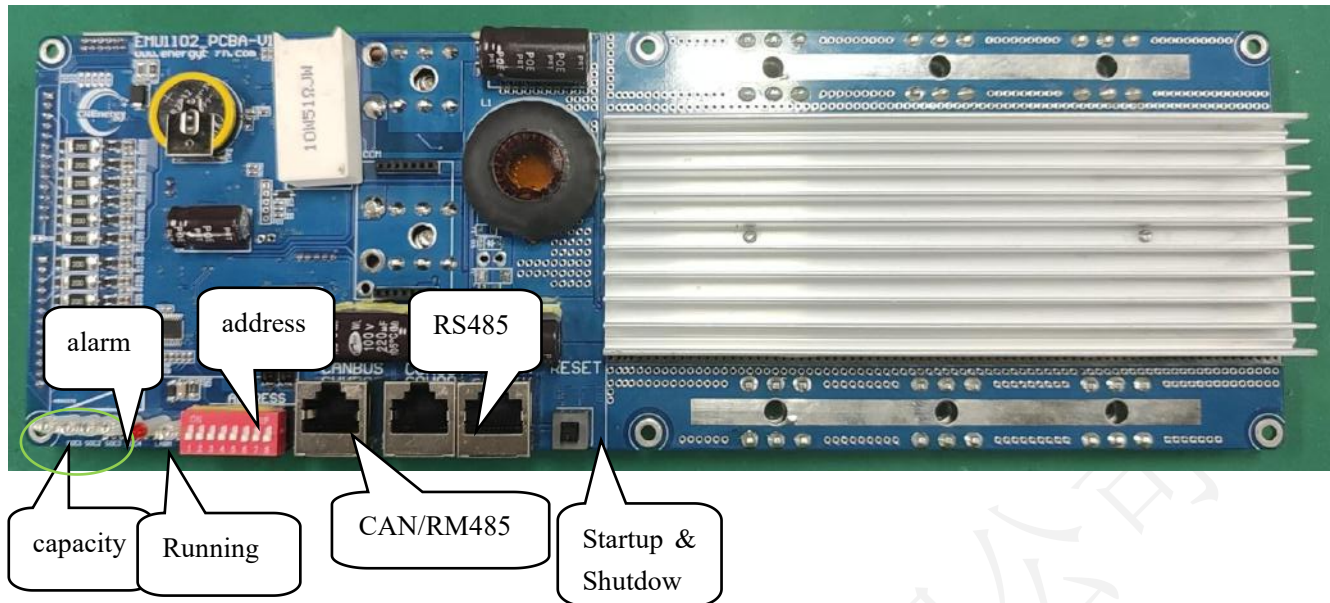
Technical drawing of a PCB layout for a 100W LED module. The drawing shows the top and bottom views of the board with various components and dimensions.

**Top View Components and Dimensions:**

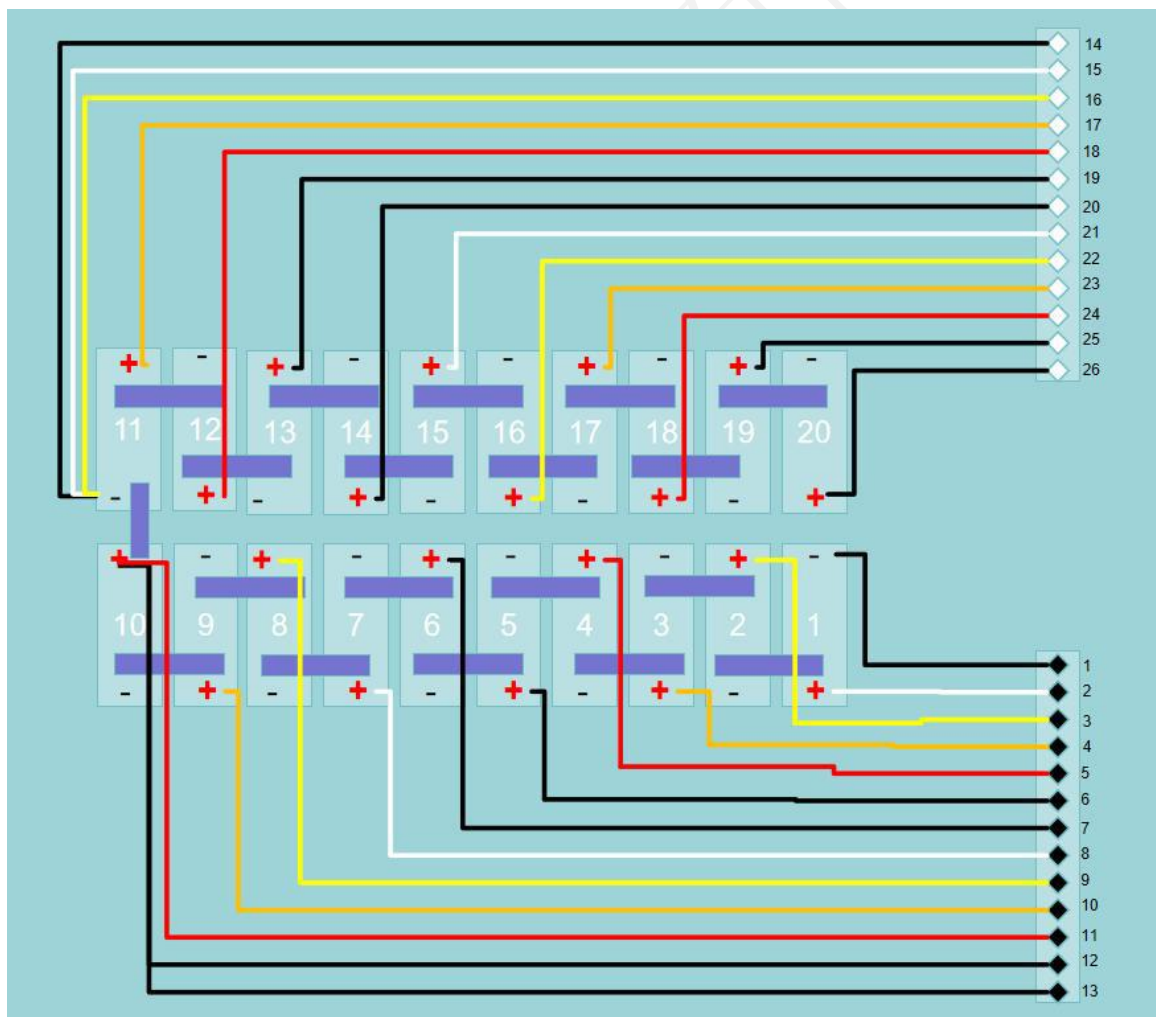
- Overall Dimensions:** 300 (mm) by 225 (mm).
- LED Array:** Located at the bottom left, with a width of 45.35 mm and a height of 16 mm. Individual LED pitch is 2.15 mm.
- Address Pins:** A row of pins with a pitch of 5.00 mm, total width 12.00 mm.
- CAN/232:** A component with a width of 15.90 mm and a height of 16.70 mm.
- RS485:** A component with a width of 32.00 mm and a height of 16.70 mm.
- Reset Button:** A small component with a width of 8.36 mm and a height of 4.36 mm.
- Cooling Fin:** A large rectangular area with a width of 160 mm and a height of 55 mm.
- Copper Bar:** A horizontal bar at the bottom with a width of 94.68 mm and a height of 10.00 mm.
- Other Dimensions:** 145.00 mm (top width), 92.00 mm (left height), 146.00 mm (top width), 160 mm (cooling fin width), 55 mm (cooling fin height), 123.57 mm (LED array width), 45.35 mm (LED array width), 12.00 mm (address pins width), 15.90 mm (CAN/232 width), 32.00 mm (RS485 width), 8.36 mm (reset button width), 4.36 mm (reset button height), 16.70 mm (CAN/232 height), 16.70 mm (RS485 height), 16 mm (LED height), 2.15 mm (LED pitch), 5.00 mm (address pins pitch), 12.00 mm (address pins width), 94.68 mm (copper bar width), 10.00 mm (copper bar height).

**Bottom View Components and Dimensions:**

- LED Array:** Located at the bottom left, with a width of 45.35 mm and a height of 16 mm. Individual LED pitch is 2.15 mm.
- Address Pins:** A row of pins with a pitch of 5.00 mm, total width 12.00 mm.
- CAN/232:** A component with a width of 15.90 mm and a height of 16.70 mm.
- RS485:** A component with a width of 32.00 mm and a height of 16.70 mm.
- Reset Button:** A small component with a width of 8.36 mm and a height of 4.36 mm.
- Cooling Fin:** A large rectangular area with a width of 160 mm and a height of 55 mm.
- Copper Bar:** A horizontal bar at the bottom with a width of 94.68 mm and a height of 10.00 mm.
- Other Dimensions:** 145.00 mm (top width), 92.00 mm (left height), 146.00 mm (top width), 160 mm (cooling fin width), 55 mm (cooling fin height), 123.57 mm (LED array width), 45.35 mm (LED array width), 12.00 mm (address pins width), 15.90 mm (CAN/232 width), 32.00 mm (RS485 width), 8.36 mm (reset button width), 4.36 mm (reset button height), 16.70 mm (CAN/232 height), 16.70 mm (RS485 height), 16 mm (LED height), 2.15 mm (LED pitch), 5.00 mm (address pins pitch), 12.00 mm (address pins width), 94.68 mm (copper bar width), 10.00 mm (copper bar height).



## 9.1. Wiring definition



Wire harness A (Black Socket)



|       |         |                                                     |
|-------|---------|-----------------------------------------------------|
| PIN1  | CELL1-  | Connect to the negative of the first battery        |
| PIN2  | CELL1+  | Connect to the positive pole of the first battery   |
| PIN3  | CELL2+  | Connect to the positive pole of the second battery  |
| PIN4  | CELL3+  | Connect to the positive pole of the third battery   |
| PIN5  | CELL4+  | Connect to the positive pole of the fourth battery  |
| PIN6  | CELL5+  | Connect to the positive pole of the fifth battery   |
| PIN7  | CELL6+  | Connect to the positive pole of the sixth battery   |
| PIN8  | CELL7+  | Connect to the positive pole of the seventh battery |
| PIN9  | CELL8+  | Connect to the positive pole of the eighth battery  |
| PIN10 | CELL9+  | Connect to the positive pole of the ninth battery   |
| PIN11 | CELL10+ | Connect to the positive pole of the tenth battery   |
| PIN12 | CELL10+ | Connect to the positive pole of the tenth battery   |
| PIN13 | CELL10+ | Connect to the positive pole of the tenth battery   |

| Wire harness B (White Socket) |         |                                                        |
|-------------------------------|---------|--------------------------------------------------------|
| PIN1                          | CELL11- | Connect the negative pole of the eleventh battery      |
| PIN2                          | CELL11- | Connect the negative pole of the eleventh battery      |
| PIN3                          | CELL11- | Connect the negative pole of the eleventh battery      |
| PIN4                          | CELL11+ | Connect the positive pole of the eleventh battery      |
| PIN5                          | CELL12+ | Connect to the positive pole of the twelfth battery    |
| PIN6                          | CELL13+ | Connect the negative pole of the thirteenth battery    |
| PIN7                          | CELL14+ | Connect to the positive pole of the fourteenth battery |
| PIN8                          | CELL15+ | Connect to the positive pole of                        |



|       |         |                                                        |
|-------|---------|--------------------------------------------------------|
|       |         | the fifteenth battery                                  |
| PIN9  | CELL16+ | Connect to the positive pole of the sixteenth battery  |
| PIN10 | CELL17+ | Connect the positive pole of the seventeenth battery   |
| PIN11 | CELL18+ | Connect to the positive pole of the eighteenth battery |
| PIN12 | CELL19+ | Connect to the positive pole of the nineteenth battery |
| PIN13 | CELL20+ | Connect to the positive pole of the twentieth battery  |

**Note:** CELL12+ and CELL13- are connected to the positive pole of the 12th cell and the negative pole of the 13th cell to provide cell sampling accuracy; CELL24+ is the B+ terminal of the cell.

## 9.2 Cell temperature

| Cell Temperature Sampling |       |      |
|---------------------------|-------|------|
| PIN1                      | NTC1+ | NTC1 |
| PIN2                      | NTC1- | NTC1 |
| PIN3                      | NTC2+ | NTC2 |
| PIN4                      | NTC2- | NTC2 |
| PIN5                      | NTC3+ | NTC3 |
| PIN6                      | NTC3- | NTC3 |
| PIN7                      | NTC4+ | NTC4 |
| PIN8                      | NTC4- | NTC4 |
| PIN9                      | NTC5+ | NTC5 |
| PIN10                     | NTC5- | NTC5 |
| PIN11                     | NTC6+ | NTC6 |
| PIN12                     | NTC6- | NTC6 |

## 9.3. Order of up and down

1) Assembly sequence: Connect the motherboard B- first, connect wiring harness A and Wiring harness B in turn, connect wiring harness B+ in the motherboard, and finally connect wiring P+ and P- to charger or load (**Note: After the motherboard is connected to the line, it is turned off, press the reset button to turn on or close the external switch, charging can also activate the BMS**)

2) Dismantling sequence: Disconnect charger or load first (**Note: Press the 6S reset button or disconnect the external switch, the circulation light will turn off once and shut down**), then disconnect B+, wire harness B, wire harness A successively, and finally Disconnect B-.

3) Input and output

When Charging: the positive pole of the charger is connected to the "P+" of the protection plate, and the negative pole of the charger is connected to the "P-" of the protection plate.

When Discharging: The positive pole of the load is connected to the "P+" of the protection plate, and the negative pole of the load is connected to the "P-" of the protection plate.

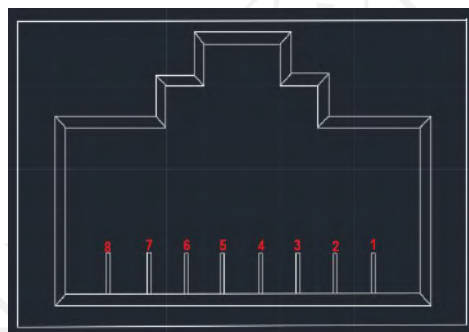
## 10. Communications

### 10.1. CAN communication and RM485 communication

BMS have battery pack upload CAN communication function, **Baud rate 500K**. CAN communication interface adopts 8P8C network interface. You can communicate with the inverter or CAN TEST via CAN interface. When the battery pack is connected, By RS485 communication sets, The data, status and information of battery pack are uploaded and PCS. by CAN communication.

BMS have battery pack upload RM485 communication function, **Baud rate 9600**. RM485 communication interface adopts 8P8C network interface. When the battery pack is connected, By RS485 communication sets, The data, status and information of battery pack are uploaded and PCS. by RM485 communication.

CAN and RM485 communication interface definition:

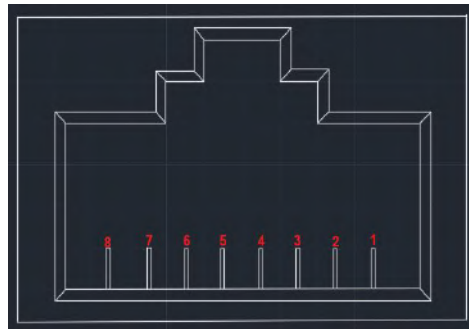


| PIN | Definitions |
|-----|-------------|
| 1、8 | RS485-B     |
| 2、7 | RS485-A     |
| 4   | CAN-H       |
| 5   | CAN-L       |
| 3、6 | GND         |

### 10.2. RS485 communications

BMS RS485 communication with battery packs, **baud rate 19200 bps**. RS485 communication interface adopts 8 P8C network interface.

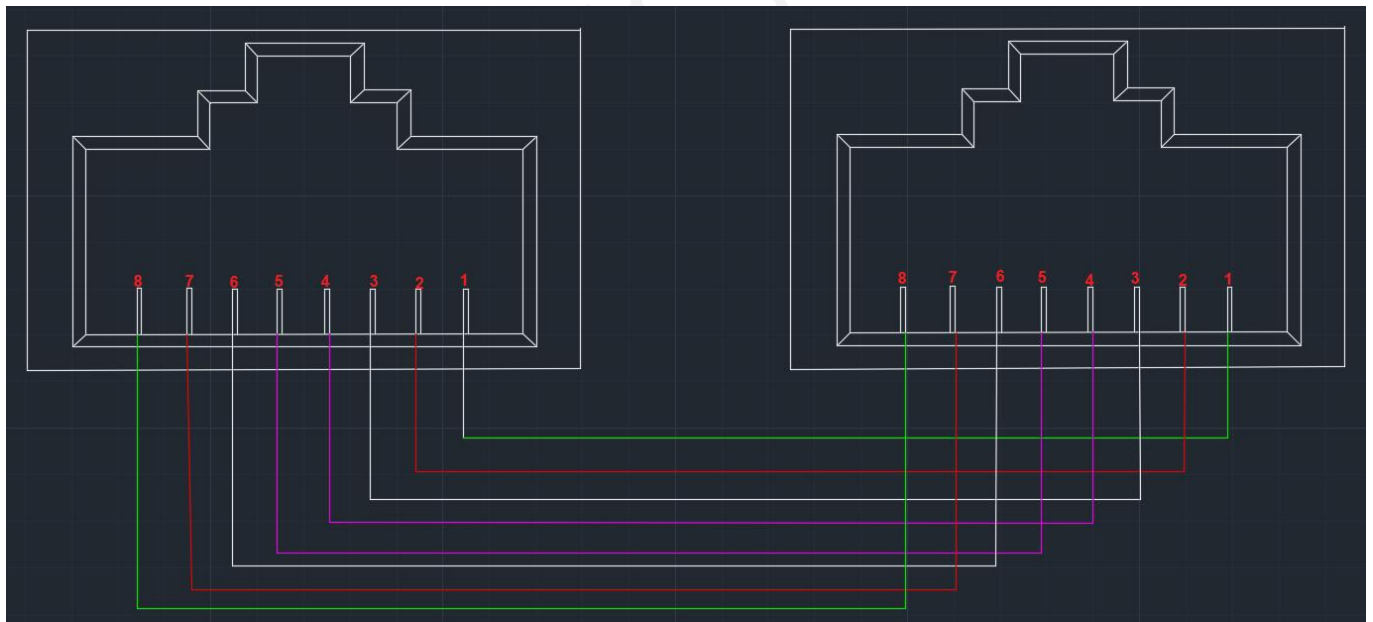
RS485 communication interface definition:



| PIN | Definitions            |
|-----|------------------------|
| 1、8 | RS485-B                |
| 2、7 | RS485-A                |
| 3、6 | GND                    |
| 4、5 | Internal communication |

### 10.3.Parallel communication

RS485 interface is used as parallel communication interface and CAN interface as upper communication interface. the terminal device can read the sum of battery data of all parallel PACK through the CAN interface. RS485 interface connection is shown in the following figure:



### 10.4.Dial code address selection

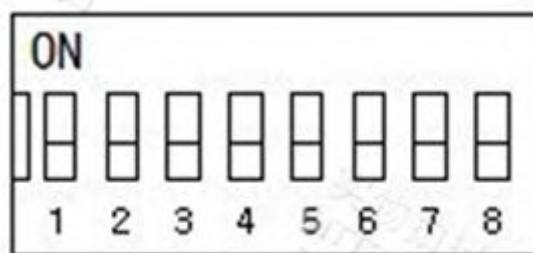
**Definition of parallel machine dialing switch:** multi-machine communication when the battery Pack is in parallel. The dial switch is used to distinguish the different PACK addresses. The hardware address can be set by the dial switch on the board.

The code dialing switches bit1 to bit8 define: bit1 to bit4 is used to set the address and bit5 to bit8 is used to set the number of slave machines.

**Host setting:** bit1 to bit4 is 0, host address is fixed at 0, bit5 to bit8 is set according to the number of parallel slave machines. (See Table 2)

**From machine:** bit1 to bit4 is set according to device order, from machine address range 1 to 15. Bit5 through bit8 is fixed at 0. (See table 1)

Address settings: Dial code switches are defined in the following table



**From the machine address(See Table 1)**

| address | Dial the code switch position |     |     |     | Note   |
|---------|-------------------------------|-----|-----|-----|--------|
|         | #1                            | #2  | #3  | #4  |        |
| 1       | ON                            | OFF | OFF | OFF | Pack1  |
| 2       | OFF                           | ON  | OFF | OFF | Pack2  |
| 3       | ON                            | ON  | OFF | OFF | Pack3  |
| 4       | OFF                           | OFF | ON  | OFF | Pack4  |
| 5       | ON                            | OFF | ON  | OFF | Pack5  |
| 6       | OFF                           | ON  | ON  | OFF | Pack6  |
| 7       | ON                            | ON  | ON  | OFF | Pack7  |
| 8       | OFF                           | OFF | OFF | ON  | Pack8  |
| 9       | ON                            | OFF | OFF | ON  | Pack9  |
| 10      | OFF                           | ON  | OFF | ON  | Pack10 |
| 11      | ON                            | ON  | OFF | ON  | Pack11 |
| 12      | OFF                           | OFF | ON  | ON  | Pack12 |
| 13      | ON                            | OFF | ON  | ON  | Pack13 |
| 14      | OFF                           | ON  | ON  | ON  | Pack14 |
| 15      | ON                            | ON  | ON  | ON  | Pack15 |

**Host address(See Table 2)**

| Number of | Dial the code switch position | Note |
|-----------|-------------------------------|------|
|-----------|-------------------------------|------|



| comp<br>uters |     |     |     |     |                      |
|---------------|-----|-----|-----|-----|----------------------|
|               | #5  | #6  | #7  | #8  |                      |
| 1             | OFF | OFF | OFF | OFF | Stand-alone use      |
| 2             | ON  | OFF | OFF | OFF | 2 units in parallel  |
| 3             | OFF | ON  | OFF | OFF | 3 units in parallel  |
| 4             | ON  | ON  | OFF | OFF | 4 units in parallel  |
| 5             | OFF | OFF | ON  | OFF | 5 units in parallel  |
| 6             | ON  | OFF | ON  | OFF | 6 units in parallel  |
| 7             | OFF | ON  | ON  | OFF | 7 units in parallel  |
| 8             | ON  | ON  | ON  | OFF | 8 units in parallel  |
| 9             | OFF | OFF | OFF | ON  | 9 units in parallel  |
| 10            | ON  | OFF | OFF | ON  | 10 units in parallel |
| 11            | OFF | ON  | OFF | ON  | 11 units in parallel |
| 12            | ON  | ON  | OFF | ON  | 12 units in parallel |
| 13            | OFF | OFF | ON  | ON  | 13 units in parallel |
| 14            | ON  | OFF | ON  | ON  | 14 units in parallel |
| 15            | OFF | ON  | ON  | ON  | 15 units in parallel |

### Example of parallel dial code setting

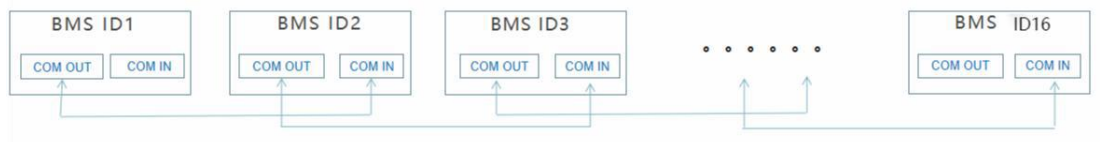
| Number of<br>computers | Dial the code switch position |     |     |     |     |     |     |     | Note             |
|------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|------------------|
|                        | #1                            | #2  | #3  | #4  | #5  | #6  | #7  | #8  |                  |
| Use single             | OFF                           | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Stand-alone use  |
| Two weaver             | OFF                           | OFF | OFF | OFF | ON  | OFF | OFF | OFF | The first host   |
|                        | ON                            | OFF | OFF | OFF | OFF | OFF | OFF | OFF | The second slave |
| Three weaver           | OFF                           | OFF | OFF | OFF | OFF | ON  | OFF | OFF | The first host   |
|                        | ON                            | OFF | OFF | OFF | OFF | OFF | OFF | OFF | The second slave |
|                        | OFF                           | ON  | OFF | OFF | OFF | OFF | OFF | OFF | The third slave  |
| ⋮                      | ⋮                             | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮                |
| ⋮                      | ⋮                             | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮   | ⋮                |
| 16 sets                | OFF                           | OFF | OFF | OFF | ON  | ON  | ON  | ON  | The first host   |
|                        | ON                            | OFF | OFF | OFF | OFF | OFF | OFF | OFF | The second slave |
|                        | OFF                           | ON  | OFF | OFF | OFF | OFF | OFF | OFF | The third slave  |



|        |     |     |     |     |     |     |     |     |                      |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|----------------------|
| weaver | ON  | ON  | OFF | OFF | OFF | OFF | OFF | OFF | The fourth slave     |
|        | OFF | OFF | ON  | OFF | OFF | OFF | OFF | OFF | The fifth slave      |
|        | ON  | OFF | ON  | OFF | OFF | OFF | OFF | OFF | The sixth slave      |
|        | OFF | ON  | ON  | OFF | OFF | OFF | OFF | OFF | Seventh slave        |
|        | ON  | ON  | ON  | OFF | OFF | OFF | OFF | OFF | Eighth slave         |
|        | OFF | OFF | OFF | ON  | OFF | OFF | OFF | OFF | The ninth slave      |
|        | ON  | OFF | OFF | ON  | OFF | OFF | OFF | OFF | The tenth slave      |
|        | OFF | ON  | OFF | ON  | OFF | OFF | OFF | OFF | The eleventh slave   |
|        | ON  | ON  | OFF | ON  | OFF | OFF | OFF | OFF | Twelfth slave        |
|        | OFF | OFF | ON  | ON  | OFF | OFF | OFF | OFF | The thirteenth slave |
|        | ON  | OFF | ON  | ON  | OFF | OFF | OFF | OFF | Fourteenth slave     |
|        | OFF | ON  | ON  | ON  | OFF | OFF | OFF | OFF | Fifteenth slave      |
|        | ON  | ON  | ON  | ON  | OFF | OFF | OFF | OFF | Sixteenth slave      |

## 10.5. Automatic DIP switch mode

The automatic dip connection diagram is as follows:

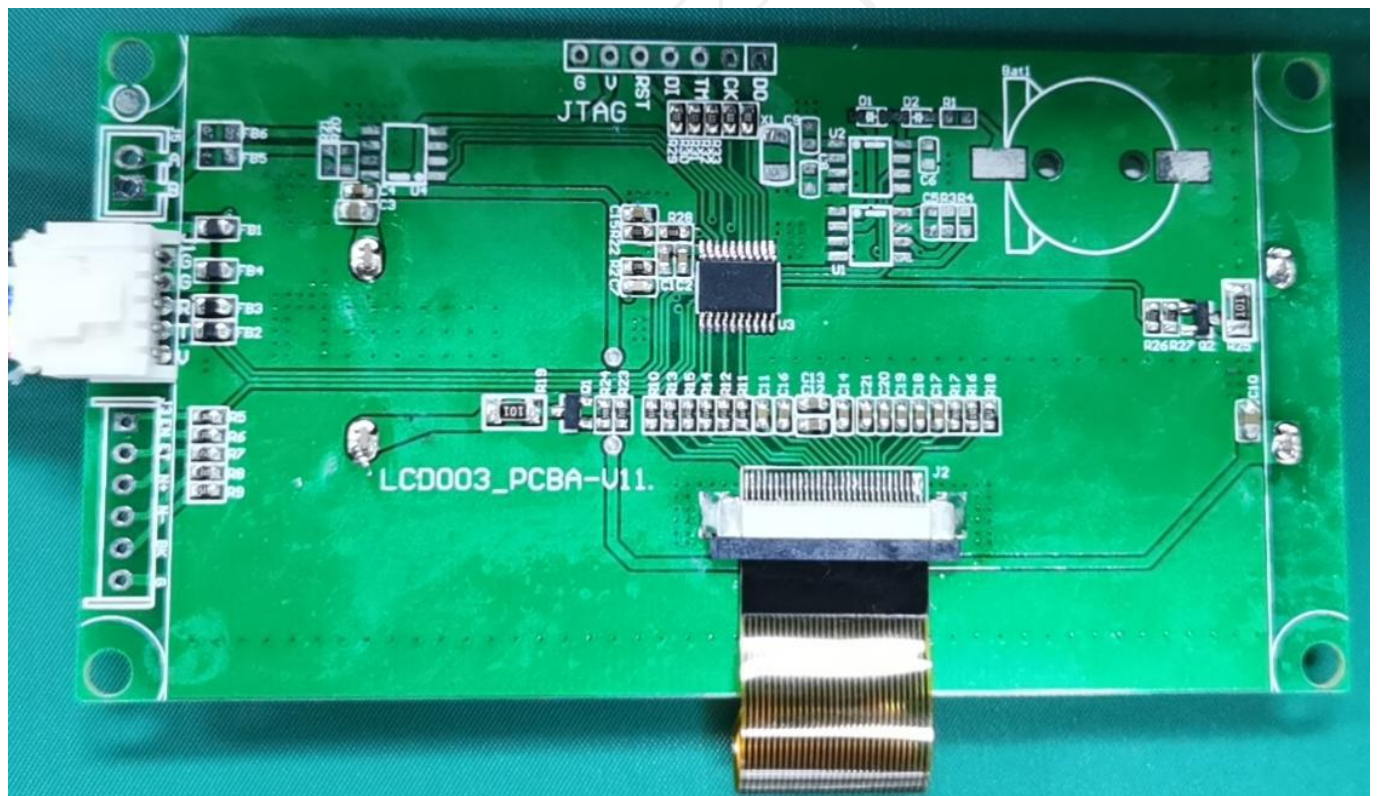
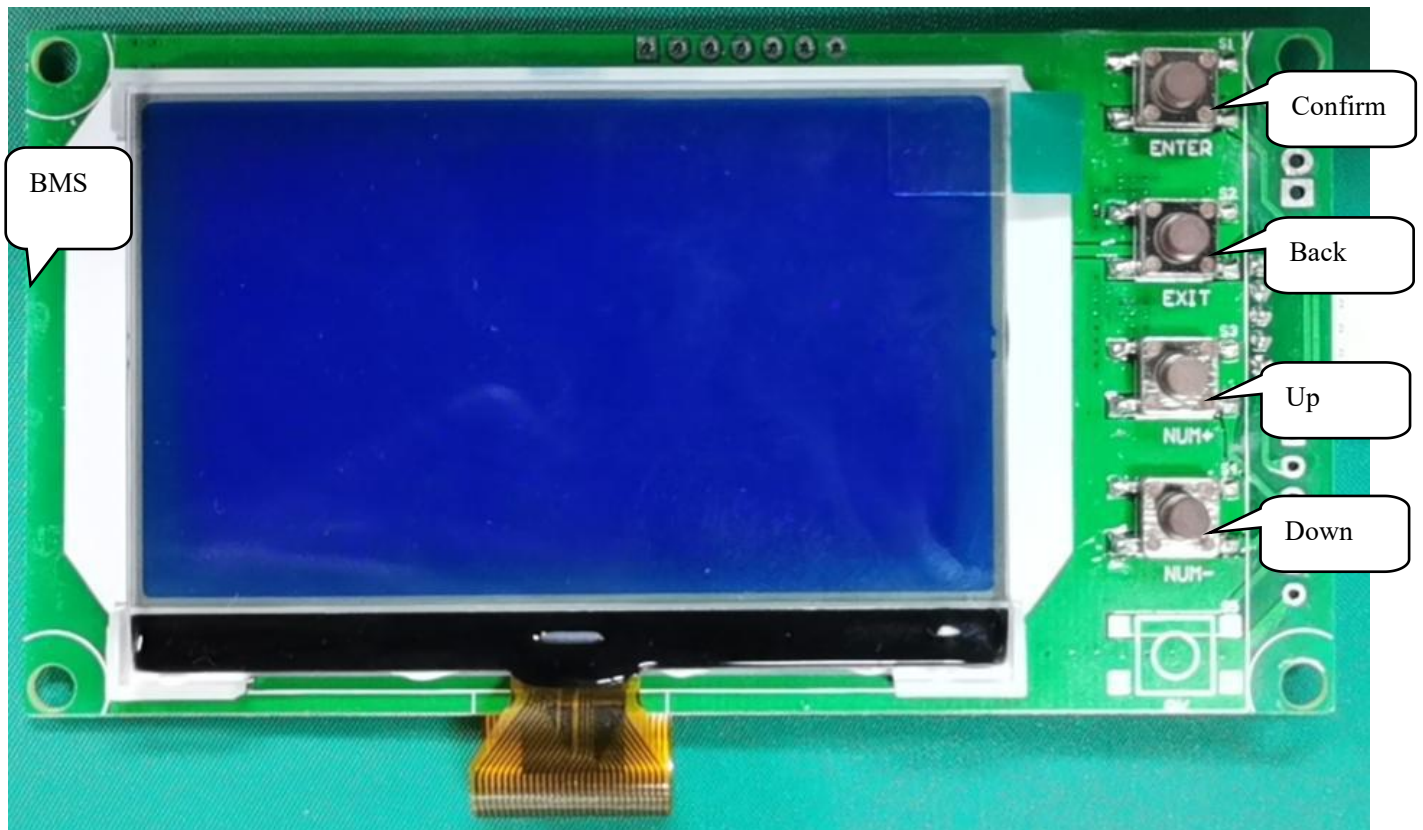


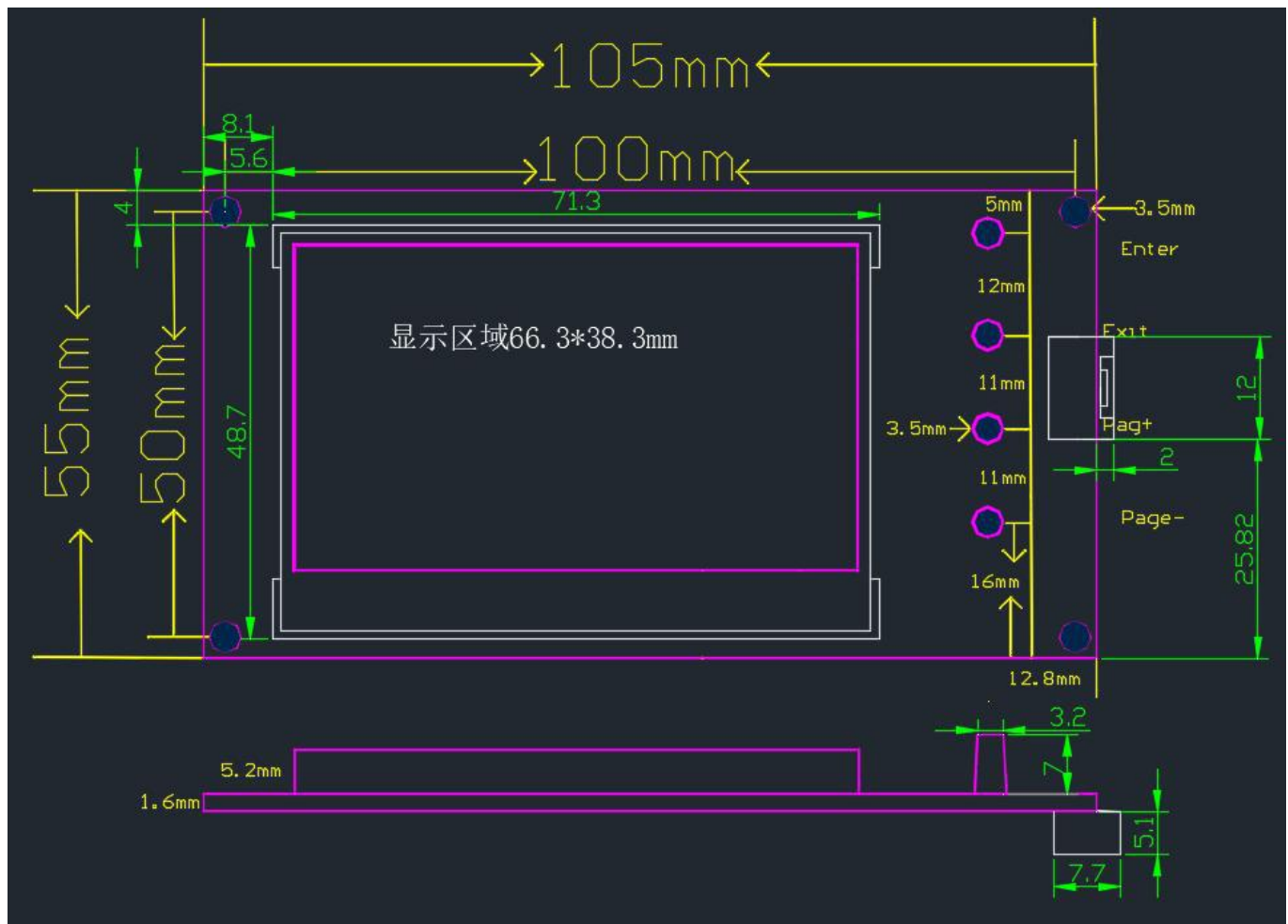
**Note:** The default limit is 16. If you need special customization, please contact the manufacturer



## 11. LCD Screen

Please refer to the LCD screen specification for detailed instructions





Note: The display screen is shipped according to the actual situation. Our company has three kinds of display screens LCD003 and LCD004.



## 12. Points for attention

- ❖ Battery management systems can not be used in series.
- ❖ BMS power components withstand voltage 100V.
- ❖ If the battery module is assembled in the form of long wire and long copper bar, it must communicate with the BMS manufacturer for impedance compensation. Otherwise, it will affect the consistency of the cell.
- ❖ The external switch on BMS is prohibited to connect with other equipment. If necessary, please confirm with the technology for docking. Otherwise, BMS will not bear any responsibility for damage.
- ❖ Do not touch the surface of the core directly when assembling, so as not to damage the core. The assembly should be firm and reliable.
- ❖ In use pay attention to lead wire head, soldering iron, solder and so on do not touch the components on the circuit board, otherwise it may damage the circuit board.
- ❖ Use process should pay attention to anti-static, moisture-proof, waterproof and so on.
- ❖ Please follow the design parameters and use conditions during use, must not exceed the value in this specification, otherwise it may damage the protection board.
- ❖ After combining the battery pack and the protection plate, if you find no voltage output or charge, please check the wiring is correct.
- ❖ The final interpretation right is owned by our company.