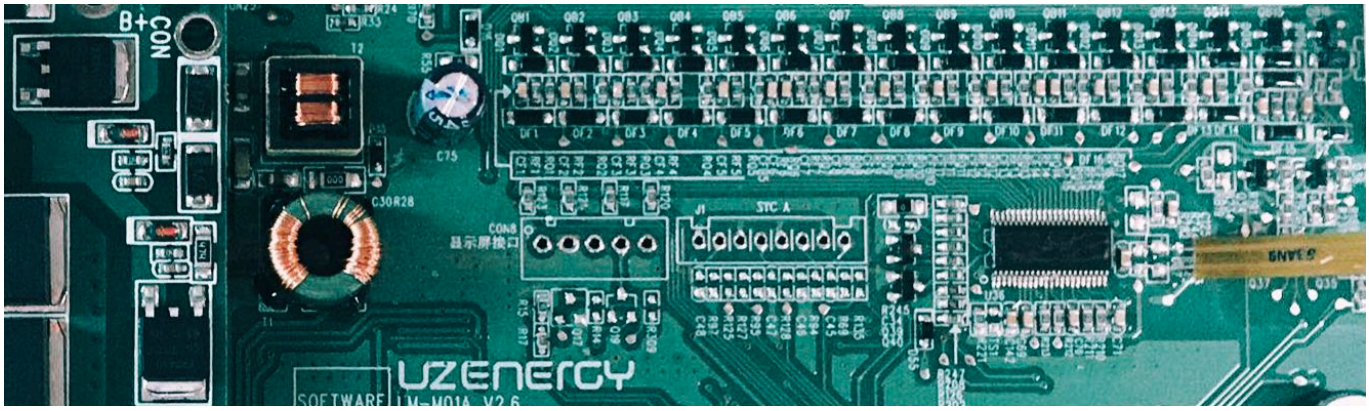

UZ Battery Management System (Low Voltage)

Ver 1.0

For the latest documents in all supported languanges, please visit:
www.uzenergy.com/

Warning: Read this entire document before installation.

PRODUCT SPECIFICATIONS
All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at UZ ENERGY, we reserve the right to make product modifications at any time.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

ERRORS OR OMISSIONS
To communicate any inaccuracies or omissions in this manual, send an email to wangyx@uzenergy.com

ELECTRONIC DEVICE: DO NOT THROW AWAY
Proper Disposal of batteries is required. Refer to your local codes for disposal requirements

MADE IN CHINA

1. BMS Hardware Block Diagram

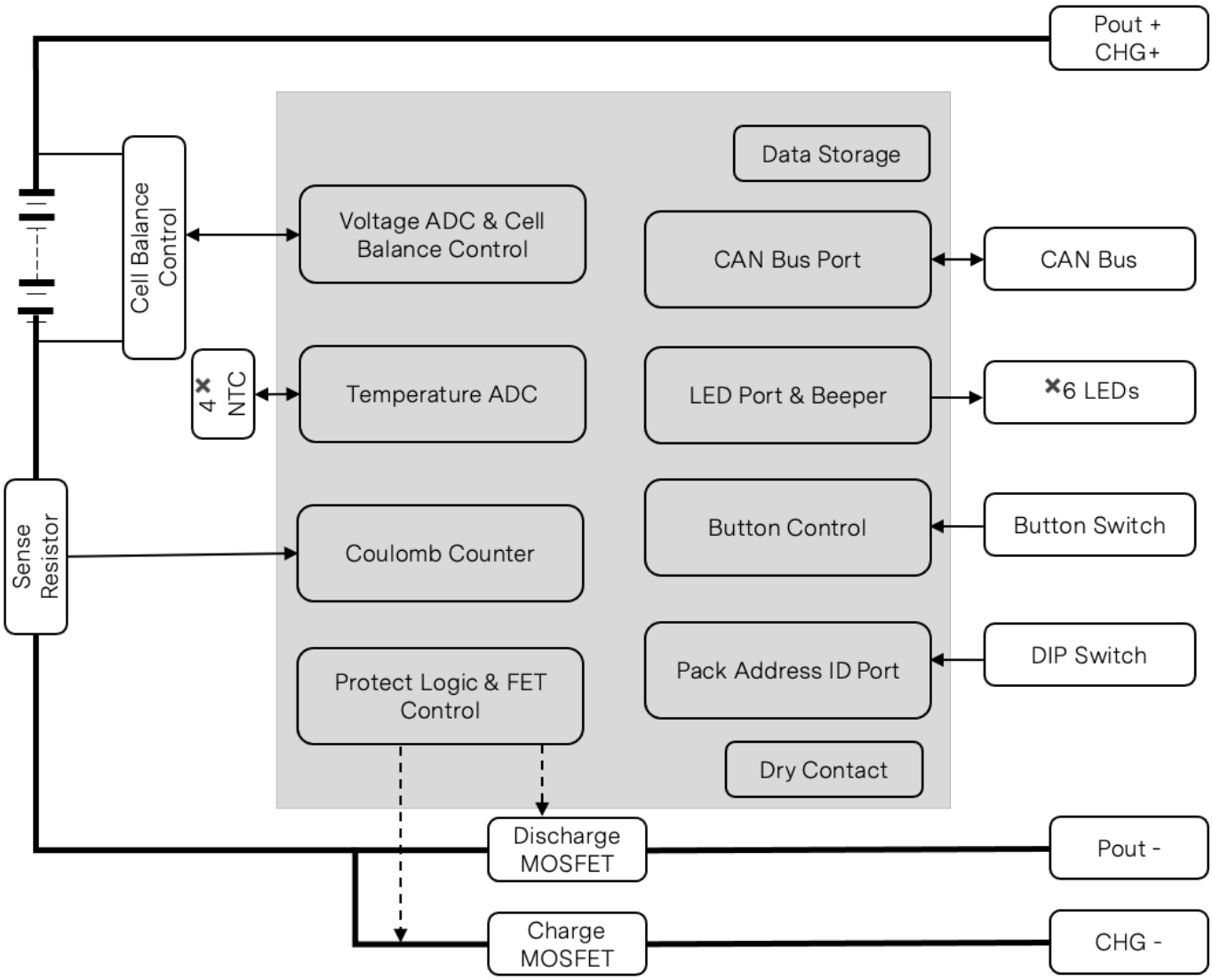

Fig. 1 Hardware Block Diagram

2. Functional Description

2.1 BMS Measurement

- ✧ Individual cell voltages measurement
- ✧ SOC and SOH calculation
- ✧ Each string current measurement
- ✧ Cell voltage variance
- ✧ Temperature measurement

2.2 BMS Cell Balance

Passive cell balance method is used，it helps to smooth out the high and low voltage between series, when the cell balancing function is enabled, whenever the cell voltage reaches the “Cell balancing start voltage”, and also the voltage difference between the highest and lowest cell reaches the “Cell Balance Delta Voltage”, the cell balancing will be started during charging.

2.3 BMS Protection

- ✧ Cell Under Voltage Protection

Protection will be triggered when any cell's voltage below the preset value for a preset time period, the discharge FET will then be shut off and the BMS will be into Power Off Mode; The protection will be released if all cell's voltage are returned to the preset value or if charge current is detected.

- ✧ Cell Over Voltage Protection

  Protection will be triggered when any cell's voltage reaches the preset value for a preset time period, the charge FET will then be shut off; The protection will be released if all cell's voltage is returned to the preset value or if discharge current is detected.

- ✧ Over/Under Temperature Protection (Charing and Discharging)

  Protection will be triggered when the pack temperature reaches the preset value for a preset time period during charging / discharging, the charge / discharge FET will then be shut off; The protection will be released if the pack temperature is returned to the preset value (range).

- ✧ Over Charge Current Protection

  Protection will be triggered when charge current reaches the preset value for a preset time period, the charge FET will then be shut off; The protection will be released after preset time period , or if discharge current is detected.

- ✧ Discharge Current Protection

  Protection will be triggered when discharge current reaches the preset value for a preset time period, the discharge FET will then be shut off; The protection will be released after preset time period, or if charge current is detected.

- ✧ Short Circuit Protetion

  Protection will be triggered when current reaches the preset short circuit protection value for a preset time period, the charge and discharge FET will then be shut off; The protection will be released after preset time period.

- ✧ Data Storage

  500 battery status storage

- ✧ Communication
  - ✓ Support CAN/RS485/RS232 port and upper-machine to monitor voltage, current, temperature, and the related parameters can be set.
  - ✓ RJ45 port definition (Appendix A)
  - ✓ CAN protocol (Appendix B)

- ✧ DIP Switch to Setup Pack Address ID

  Refer to battery pack User's Manual

- ✧ LED Display and Button

  4 LEDs display module is used to display the remaining capacity. And 1 LED is for running status indication, 1 LED is for alarm status indication.

Appendix A. RJ45 Port Definition

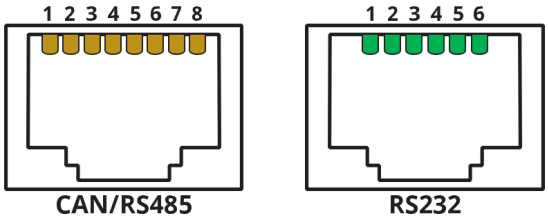

Fig. 2 RJ45 Port Interface

	Description
CAN	Pin 1: CAN-H Pin 5: CAN-L Pin 2, 3, 4, 6, 7: NC Pin 8: GND
RS485	Pin 1, 4, 5: NC Pin 2, 7: RS485-A Pin 3, 6: RS485-B Pin 8: GND
RS232	Pin 1, 2, 6: NC Pin 3: BMS transmit; Computer receiver Pin 4: BMS receiver; Computer transmit Pin 5: GND

Appendix B. CAN BUS Communication Protocol

- ✧ Communication Rate BAUD: 500 Kbps
- ✧ Use standard frame
- ✧ Data transmission cycle: 1s

CAN ID: 0x359

Byte 0	Protection	Table 1	Byte 0
Byte 1	Protection	Table 2	Byte 1
Byte 2	Alarm	Table 3	Byte 2
Byte 3	Alarm	Table 4	Byte 3
Byte 4	Module numbers	8 bits unsigned char	Byte 4
Byte 5	“U”	0x50	Byte 5
Byte 6	“Z”	0x4E	Byte 6
Byte 7	-		

Table 1

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit 0
Discharge over current			Cell under temperature	Cell over temperature	Cell or module under voltage	Cell or module over voltage	

Table 2

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit 0
				System error			Charge over current

Table 3

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit 0
Discharge high current			Cell low temperature	Cell high temperature	Cell or module low voltage	Cell or module high voltage	

Table 4

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit 0
				Internal communication fail			Charge high current

CAN ID: 0x351

Byte 0	Battery charge voltage	Unit: 0.1V	16 bits unsigned int
Byte 1			
Byte 2	Charge current limit	Unit: 0.1A	16 bits signed int, 2`s complement
Byte 3			
Byte 4	Discharge current limit	Unit: 0.1A	16 bits signed int, 2`s complement
Byte 5			
Byte 6			
Byte 7			

CAN ID: 0x355

Byte 0	SOC of single module or average value of system	Unit: 1%	16bit unsigned int
Byte 1			
Byte 2	SOH of single module or average value of system	Unit: 1%	16bit unsigned int
Byte 3			
Byte 4			
Byte 5			
Byte 6			
Byte 7			

CAN ID: 0x356

Byte 0 Byte 1	Voltage of single module or average module voltage of system	Unit: 0.01V	16 bits signed int, 2`s complement
Byte 2 Byte 3	Module or system total current	Unit: 0.1A	16 bits signed int, 2`s complement
Byte 4	Average cell temperature	Unit: 0.1℃	16 bits signed int, 2`s complement
Byte 5			
Byte 6			
Byte 7			

CAN ID: 0x35C

Byte 0	Request flag	Table 5	
Byte 1			

Table 5

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit 0
Charge enable	Discharge enable	Request force charge I*	Request force charge II*	Request full charge**			

*For PowerLite: Please use bit 5, the SOC range is: 10-15%. Bit 4 is NULL.

Bit 5 is designed for inverter allows battery to shut down, and able to wake battery up to charge it.
Bit 4 is designed for inverter doesn`t want battery to shut down, able to charge battery before shut down to avoid low energy. We suggest inverter to use this bit.
In this case, inverter itself should set a threshold of SOC: after force charge, only when battery SOC is higher than this threshold then inverter will allow discharge, to avoid force charge and discharge status change frequently.

**Request full charge:
Reason: when battery is not full charged for long time, the accumulative error of SOC calculation will be too high and may not able to be charged or discharged as expected capacity.
Logic: if SOC never higher than 97% in 30 days, will set this flag to 1. And when the SOC is ⩾ 97%, the flag will be 0.
How to: we suggest inverter to charge the battery by grid when this flag is 1.

CAN ID: 0x35E

Byte 0-3	Manufacturer Name:UZENERGY		
Byte 4-7			