BMS-RS485　Communication Protocol

1. Summary

This protocol is the Active Balanced Protection Board RS485/RS232/UART interface universal protocol with a baud rate of 9600bps.

2. Frame structure

During the communication process, the protective board is always slave, and the remote device is the host.All communications can only be initiated by the host and answered from the slave.For distinguishing purposes, it is agreed that the frame sent by the host is the configuration frame and the frame sent by the protection panel is the answer frame.
The configuration frame consists of start bits, state bits, command codes, data length, data content, check bits, and stop bits.The frame structure is as follows:

Start bits	Status bits	Command Code	Data Length	Data Content	Calibration	Stop Bits

1) Start bit: 1 byte, indicating the start of a frame of data, fixed to 0xDD;

2) State bit: 1 byte, state 0xA5 means read, state 0x5A means write.

3) Command code: 1 byte, in the process of communication, command code is used to distinguish the data content carried by the configuration frame. Each command code corresponds to the data carried as follows:

Status bits	Command Code	Data Content
0xA5	0x03	Read basic information and status
	0x04	Read battery cell voltage
	0x05	Read the hardware version number of the protection board
	0x06	Read Protective Panel User Private Data
0x5A	0Xe1	MOS Control Instructions

4) Data length: 1 byte, which indicates the valid length of the frame to carry data.

5) Data content: N bytes, the content carried by the frame data, when the data length is 0, there is no such part.

6) Check - Check: 2 bytes, the check field is "command code + length bytes + data segment content". Check method is to add the results of the above fields and then add 1 inversely, the high position is first, the low position is after.

7) Stop bit: 1 byte, indicating the end of a frame of data, fixed to Ox77;

Answer frame contains start bit, status bit, command code, data length, data content, check, stop bit.The frame structure is as follows:

Start bits	Command Code	Status bits	Data Length	Data Content	Calibration	Stop Bits

1) Start bit: 1 byte, meaning - the start of a frame of data, fixed to OxDD;

2) Command code: 1 byte, is the command code of the configuration frame that the frame responds to.

3) Status bit: 1 byte, Ox00 is correct, 0x80 is error.

4) Data length: 1 byte, which indicates the valid length of the frame to carry data.

5) Data content: N bytes, the content carried by the frame data, when the data length is 0, there is no such part.

6) Check - Check: 2 bytes, the check field is "command code + length bytes + data segment content". Check method is to add the results of the above fields and then add 1 inversely, the high position is first, the low position is after.

7) Stop bit: 1 byte, indicating the end of a frame of data, fixed to 0x77;

3. Communication example

1) Read basic information and status

Host Send: DD A5 03 00 FF FD 77

BMS response: DD 03 00 1B 17 00 00 00 02 D0

0 00 00 10 48 03 0F 02 0B 760 B 82 FB FF 77

Red is the checked byte, the sum of all the bytes;The latter two are the results of the check, and the reverse + 1 is added to the results of all the previous check data.

The content structure of the answer frame data is as follows:

Data Content	Length	Explanation
Total Voltage	2Byte	Unit: 10mV; High byte before low byte
Total Current	2Byte	Unit: 10mA; Judging the state of battery charging and discharging by current, charging is positive and discharging is negative
Remaining capacity	2Byte	Unit: 10mAh;
Nominal capacity	2Byte	Unit: 10mAh;
Number of cycles	2Byte	Unit: times
Production date	2Byte	A two-byte transfer, such as 0x2068, with a minimum date of 5: 0x2028&0x1F=8 for the date;Month (Ox2068 >>5) &0x0f=0x03 means March;The year is 2000+ (Ox2068>>9) = 2000+0x10=2016;
Equilibrium state	2Byte	Each bit equalizes each string, 0 closes, 1 opens 1 to 16 strings
Equilibrium state__High	2Byte	Each bit equalizes each string, 0 is off, 1 is on, 17-32 strings, up to 32 strings are supported
Protection Status	2Byte	Each bit represents a state of protection, 0 is unprotected, 1 occurs protection as detailed in Note 1:
Retain	1Byte	
Remaining power	1Byte	Indicates the percentage of remaining capacity
FET control status	1Byte	MOS indicates status, bit0 indicates charging, Bit1 indicates discharge, 0 indicates MOS off, 1 indicates on
Battery strings	1Byte	Number of battery strings
Number of NTC	1Byte	Number of NTCs
N NTC content	2Byte	Absolute temperature transmission is adopted for unit 0.1k, 2731 + (actual temperature * 10), 0 degree = 2731, 25 degree = 2731 + 25 * 10 = 2981;

NOTE:

BIT0 unit overvoltage protection
BIT1 under voltage protection
BIT2 over voltage protection
BIT3 under voltage protection
BIT4 charging over temperature protection
BIT5 charging low temperature protection
Bit 6 discharge over temperature protection
BIT7 Discharge Low Temperature Protection
BIT8 Charging Overcurrent Protection
BIT9 Discharge Overcurrent Protection
BIT10 Short Circuit Protection
BIT11 Front End Detect IC Error
BIT12 Software Lock MOS
BIT13~BIT15 Reservation

2) Read battery monomer voltage

Host Send: DD A5 04 00 FF FC 77

BMS Response: DD 04 00 1E 0F 66 0F 63 0F 63 0F 64 0F 3E 0F 63 0F 37 0F 5B 0F 65 0F 3B 0F 63 0F 63 0F 3C 0F 66 0F 3D F9 F9 77

The content structure of the answer frame data is as follows:

Data Content	Length	Explanation
First Series of Monomer Voltages	2Byte	Unit: mV; High byte before low byte
2nd Series Monomer Voltage	2Byte	Unit: mV; High byte before low byte
3rd Series Monomer Voltage	2Byte	Unit: mV; High byte before low byte
N-Series Monomer Voltage	2Byte	Unit: mV; High byte before low byte

3) Read the hardware and software version number of the protection board

Host Send: DD A5 05 00 FF FB 77

BMS Response: DD 05 00 0A 30 31 32 33 34 35 36 37 38 39 FD E9 77

The content structure of the answer frame data is as follows:

Data Length N	Explanation
BYTE N	Reply with ASCII code (e.g. hardware version H-XXXx)

4) Read the private data of the shield user

Host Send: DD A5 06 00 FF FA 77

BMS Response: DD 06 00 0A 30 31 32 33 34 35 36 37 38 39 FD E9 77

Data Length N	Explanation
BYTE N	Reply with ASCII code (e.g. 23562455)

5) Control MOS Directive

The host sends control MOS instructions:

Host Send: DD 5A E1 02 00 XX CH CL 77

BMS Response: DD E1 00 00 CH CL77

The comparison table of X and MOS actions is as follows:

Value of XX	
0x00	Release the software shutdown MOS tube action
0x01	Software closes charging MOS, release software closes discharging MOS
0x02	Software closes discharging MOS, release software closes charging MOS
0x03	MOS software turns off charging and discharging MOS at the same time

Example: DD 5A E1 02 00 02 FF 1B 77 sent by the host indicates that the software turns off the discharge MOS;