BMS Communication Protocol

1. Physical Layer

The communication type is UART，RS485 and RS232, and the Baud rate is 9600bps.

2. Frame format

2.1 Transmit frame:

NO.	1	2	3	4	5	6	7
Bytes	1	1	1	1	N	2	1
Name	SOI	R/W	Command	Length	Info.	CHSM	EOI

The transmit frame consist of seven parts, Start of Information(SOI), End of Information(EOI) and five frame contents.

Description as follows:

2.1.1 SOI=0xDD

2.1.2 R/W(Read or Write); R=0xA5, W=0x5A

2.1.3 Command=0x03, 0x04, 0x05

0x03: read the battery basic information

0x04: read the voltage of every cell

0x05: read the battery version

2.1.4 Length: data length

2.1.5 Info.(Information), data information. When the data length is 0, the info=0xFF.

2.1.6 CHSM=Not(Checksum(Command + Length + info.))+1

2.1.7 EOI=0x77

2.2 Received frame:

NO.	1	2	3	4	5	6	7
Byte	1	1	1	1	N	2	1
Name	SOI	Command	Flag	Length	Info.	CHSM	EOI

The transmit frame consist of seven parts, Start of Information(SOI), End of Information(EOI) and five frame contents.

Description as follows:

2.2.1 SOI=0xDD

2.2.2 Command=0x03, 0x04, 0x05 or 0xA5(some version)

2.2.3 Flag=0x00 or 0x80, When the received frame is right, the Flag=0x00, or Flag=0x80.

2.2.4 Length: data length

2.2.5 Info.(Information), data information.

0x03: the battery basic information

0x04: the voltage of every cell

0x05: the battery version

2.2.6 CHSM=Not(Checksum(Flag+ Length + info.))+1

2.2.7 EOI=0x77

3. Received frame command and content

3.1 Command=0x03, Received the battery basic information.

The received information(info.) description are as follows.

NO.	Content	Byte width	Desription
1	Pack Voltage	2 Bytes	Unit: 10mV, The high byte is front, and the low byte is back
2	Current	2 Bytes	Unit: 10mA, The charge current is positive, and the discharge current is negative
3	Remain Capacity	2 Bytes	Unit: 10mAh
4	Nominal Capacity	2 Bytes	Unit: 10mAh
5	Cycle Life	2 Bytes	Unit: Cycle
6	Production Date	2 Bytes	For example received data is 0x2068. The date is low five bits.

			2068&0x1F=8，the date is 8；The month is middle 4 bits. (0x2068>>5)&0x0F=0x03，The month is 3；The year is 2000+(0x2068>>9)=2016；The production date is 2016/03/08.
7	Balance status (Low Bytes)	2 Bytes	The balance status of cell1~cell16 is the bit0~bit15. Each bit is balance status of one cell. If the bit is 0, there is no balance, or the cell is on balance status.
8	Balance status (High Bytes)	2 Bytes	The balance status of cell17~cell32 is the bit0~bit15. Each bit is balance status of one cell. If the bit is 0, there is no balance, or the cell is on balance status.
9	Protection status	2 Bytes	Each bit is one type of protection. If the bit is 0, the protection happens, or does not. The details see the *
10	Firmware version	1 Byte	For example, the 0x10 is the version 1.0
11	RSOC	1 Byte	RSOC=(Remain Capacity / Nominal Capacity)*100%
12	MOSFET Status	1 Byte	Charge and discharge MOSFET status. The bit0 is the charge MOSFET status. And the bit1 is the discharge MOSFET status. If the is 0, the MOSFET is OFF, or is ON.
13	NO. of cell	1 Byte	the number of cells (N)
14	NO. of NTC	1 Byte	the number of NTC temperature sensor
15	NTC content	2*N Byte	Unit：0.1K，The temperature is absolute temperature. 0°C=2731，25°C=2731+25*10=2981

*Description of protection status:

bit0：Over Voltage Protection for cell；bit1：Under Voltage Protection for cell；

bit2：Over Voltage Protection for Pack；bit3：Under Voltage Protection for Pack;

bit4：Over Temperature Protection for charger； bit5：Low Temperature Protection for charge;

bit6：Over Temperature Protection for discharge; bit7: Low Temperature Protection for discharge;

bit8：Over Current Protection for charge； bit9：Over Current Protection for discharge;

bit10：Shirt Circuit Protection； bit11：AFE IC Fail；

bit12：MOSFET Locked by software；bit13~15：reserved

For example：

Send：DD A5 03 00 FF FD 77

Receive：DD 03(or A5) 00 1B 09 BD 00 00 01 BA 07 D0 00 01 25 4C 00 00 00 00 00 00 19 16 03 07 02 0B 90 0B A0 FB 9A 77

3.2 Command=0x04, Received the cell voltage.

The received information(info.) description are as follows.

No.	Data Content	Byte width	Description
1	Cell 1	2 Bytes	Unit：mV，High byte is front.
2	Cell 2	2 Bytes	Unit：mV，High byte is front.

3	Cell 3	2 Bytes	Unit：mV，High byte is front.
	…		
n	Cell n	2 Bytes	Unit：mV，High byte is front.

For example：

Send：DD A5 04 00 FF FC 77

Receive：DD 04(or A5) 00 0E 0D EA 0D E9 0D EA 0D E8 0D EB 0D EC 0D ED F9 2E 77

3.2 Command=0x05, Received the battery version.

The received information(info.) description are as follows.

No.	Data Content	Byte width	Description
1	First character	1 Byte	The ASCII code for the first byte (For example, Version:IYP-24V25AH-A3). Received data is "0x49"
2	Second Character	1 Byte	The ASCII code for the second byte (For example, Version:IYP-24V25AH-A3). Received data is "0x59"
3	Third Character	1 Byte	The ASCII code for third byte (For example, Version:IYP-24V25AH-A3). Received data is "0x50"
	…		
n	The Nth Character	1 Bytes	The ASCII code for the Nth byte

For example：

Send：DD A5 05 00 FF FB 77

Receive：DD 05(or A5) 00 14 49 59 2D 32 34 56 32 30 41 48 2D 37 53 32 35 41 31 FB 28 77