

Monitoring platform and BMS communication protocol

Version Information

version	date	description	Author
	V20191124	First draft	
	V20200325	Update some description information, change 0xA10 to 0XD2, the dedicated charger switch refers to make	
	V20200325	Determine the baud rate of the transmitted data 115200	
	V20200329	Update the optimization instruction table and redefine the data identification code	
	V20200329	Add the instruction to read all data at once.	
	V20200427	Write the ID and write the date of manufacture for explanation	
	V20200429	Add 0xb7 address software version number	
	V20200429	Detailed description of 0x8b 0x8c address	
	V20200508	Optimize the unit of 0x84 address: 0.1A is changed to 0.01A	
	V20200512	0x81 address name to redefine the temperature in the battery box	
	V20200512	Redefine the name of 0xA0 0xA1	
	V20200512	Add the alarm bit of 0x8B address	
	V20200526	Add restart system identification 0xBB	
	V20200615	Add 0xB8 logo version change V2.0	
	V20200713	Add 0xBC logo to restore factory initialization version change V2.1	
		Add 309 fault information	
	V20200825	Add 0xBE 0xBF	
V2.4	20201204	Add 0xC0 to redefine the current field data	echo
V2.5	20201217	Add necessary fields to report instructions	echo

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1 Overview

This protocol defines the communication protocol between the monitoring platform and the battery terminal, and defines the message format, transmission mode, and communication mode.

2 Reference standards

Communication uses 2G GPRS in TCP transmission, 4G in GAT1, SOCKET interface mode, RS232TTL serial port, content custom communication format, **baud rate 115200**.

3 network topology

This protocol is a point-to-point or bus mode of BMS, GPS, Bluetooth terminal, PC upper computer and terminal.

4 Statute content

4.1 Communication rules

During the communication process, the device has active reporting frames and passive response frames, please refer to the communication data format for details. The interval of each packet is Timed broadcast, if sleeping, send activation information at the control end, activate BMS, and then communicate.

4.2 Frame format

The frame is the basic unit for transmitting information. Including start character, length, command word, transmission type, information field, end identifier, checksum. The specific format is shown. If there is no mandatory description in the data unit, the **low byte is on the right and the high byte is on the left. Sending is to send the high bit first and then the low bit.**

Table 1 Frame format

Serial number	Frame unit	length	Remarks
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	Frame length
3	BMS terminal number	4	4-byte ID
4	Command word	1	Refer to the command word description,
5	Frame source	1	0.BMS, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame 2. BMS active upload

7	Frame information unit	N	Information domain BMS set data identification code
8	Record number	4	The high 1 byte is meaningless random code (reserved for encryption), and the low 3 bytes are Record number
9	End flag	1	0X68
10	Checksum	4	Accumulative checksum (the high two bytes are used for CRC to be temporarily disabled and 0 is not enabled, the low two bytes Bytes are used for accumulative check)

4.2.1 Frame start character field

Two bytes. The first byte is 0x4e, and the second byte is 0x57.

4.2.2 Length field

L: Two bytes, all data bytes except the first two characters include the checksum and length field itself.

4.2.3 BMS terminal number ()

A total of four bytes: FF FF FF FF The highest 8-bit management spare number, the lower 24 bits are the terminal number , (The highest byte is to keep the default 00, the lower three bytes are the ID number of dimension one)

4.2.4 Command word description

One byte defines the transmission function of this frame.

Command code	Command item	Remarks
0 x01	Activation instructions ,	When the BMS is sleeping, the control terminal must send an activation command to communicate with the BMS. Do other operations after replying.
0 X02	Write instruction	Configure BMS parameter instructions,

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0X03	Read instruction	Read BMS identification code data,
0x05	Password instruction	When you want to modify the parameters, you can modify the parameters only after t
0x06	Read all data	Read all the data of the identification code table at one time

4.2.5 Frame source description

1 byte. Relative to the sender and receiver, 0. BMS, 1. Bluetooth, 2. GPS, 3. PC upper computer

4.2.6 Transmission type

1 byte: 0 represents the request frame, 1 represents the response frame. 2 represents the initiative to report.

As long as the 5 -Bluetooth, 2-GPS, 3-PC host computer is initiated first, and the 4-BMS is initiated first, the reply is always 1.

4.2.7 Record number

The high 1 byte is the random code, and the low 3 bytes are the record code

4.2.8 End code field

One byte 0x68

4.2.9 Check code field

The high two-byte CRC16 is temporarily not used, and the checksum is the cumulative sum of all data from the start character to the end mark.

4.3 Communication data format

Example: GPS reading (all, single) data reference

Serial number	Frame unit	Length byte	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	Frame length
3	BMS terminal number	4	4-byte ID
4	Command word	1	Reference command writing instructions
5	Frame source	1	0. Data box, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame 2. Actively upload the data box
7	Data identification code		Read single data reference (5.1 table); read all data and fill in 0x00
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes are the record serial number
9	End flag	1	0x68
10	Checksum	4	

BMS response

Serial number	Frame unit	length	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
<hr/>			
2	LENGTH	2	
3	Terminal number	4	
4	Command word	1	
5	Frame source	1	0. Data box, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame 2. Actively upload the data box
7	Identification code + data	1+N	Identification code + data
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes are the record serial number
9	End flag	1	0X68
10	Checksum	4	

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Example: GPS write data reference

Serial number	Frame unit	Length	byte
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	Frame length
3	BMS terminal number	4	4-byte ID
4	Command word	1	Reference command writing instructions
5	Frame source	1	0. Data box, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame 2. Actively upload the data box
7	Identification code + data	1+N	Identification code + data
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes are the record serial number
9	End flag	1	0x68
10	Checksum	4	

BMS response

Serial number	Frame unit	length	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	
3	Terminal number	4	
<hr/>			
4	Command word	1	
5	Frame source	1	0.BMS, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame 2. BMS active upload

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7	Identification code	1	Write a single data reference (5.1 table);
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes are the record serial number
9	End flag	1	0X68
10	Checksum	4	

Mark code note: (When reading all data, the background data identification code fills in 0x00)

5.1 BMS setting data identification code

use instruction	Data mark Code	name	byte	Types of	
R 0x79		Single battery voltage	3*n HEX		The first byte is the battery number, the latter is the voltage value MV, when reading all the data At the same time, 0x79 is followed by one byte length data as shown above, and then a group of three bytes represents the electricity Cell voltage.
R 0x80		Read power tube temperature	2	HEX	0--140 (-40 to 100°C) The part exceeding 100 is negative temperature, such as 101 is negative 1 degree (100 Benchmark)
R 0x81		Read the temperature in the battery box	2	HEX	0--140 (-40 to 100°C) The part exceeding 100 is negative temperature, the same as above (100 reference)
R 0x82		Read battery temperature	2	HEX	0--140 (-40 to 100°C) The part exceeding 100 is negative temperature, the same as above (100 reference)
R 0X83		Total battery voltage	2	HEX	0.01V 3500*0.01=35.00v minimum unit 10MV 10000 (10000-11000)*0.01=-10.00a (discharge) (10000-9500)*0.01=5.00a (charging) Accuracy 10MA unit: 0.01A
R 0X84		Current data	2	Hex	Note: C0:0x01 redefine 0x84 current data, the unit is 10MA, the highest bit is 0 Means discharging, 1 means charging If discharging 20A, the data transmitted will be 2000 (0x07D0) If charging 20A, the transmission data is 34768 (0x87D0)
R 0X85		Battery remaining capacity	1	HEX	SOC, 0-100%.
R 0X86		Number of battery temperature sensors	1	Hex	Two battery temperature sensors,
R 0X87		Number of battery cycles	2	Hex	
R 0X89		Total battery cycle capacity	4	HEX	Anshi
R 0x8a		Total number of battery strings	2	HEX	

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R 0X8b	Battery warning message	2	hex	<p>Bit 0: Low capacity alarm 1 alarm 0 normal. Only warning</p> <p>1 bit: MOS tube over-temperature alarm 1 alarm 0 normal, alarm</p> <p>2 digits: charging over-voltage alarm 1 alarm 0 normal, alarm</p> <p>3 bits: Discharge undervoltage alarm 1 alarm 0 normal, alarm</p> <p>4 bits: battery over temperature alarm 1 alarm 0 normal, alarm</p> <p>5 bits: charging overcurrent alarm 1 alarm 0 normal, alarm</p> <p>6 bits: Discharge overcurrent alarm 1 alarm 0 normal, alarm</p> <p>7-bit: Cell pressure difference alarm 1 alarm 0 normal, alarm</p> <p>8 bits: over-temperature alarm in the battery box 1 alarm 0 normal, alarm</p> <p>9 bits: Battery low temperature alarm 1 alarm 0 normal, alarm</p> <p>10 bits: monomer overvoltage alarm 1 alarm 0 normal, alarm</p> <p>11 bit: monomer undervoltage alarm 1 alarm 0 normal, alarm</p> <p>12 bits: 309_A protection 1 alarm 0 normal, alarm</p> <p>13 bits: 309_B protection 1 alarm 0 normal, alarm</p> <p>14 bits: reserved</p> <p>15 bits: reserved</p> <p>example:</p> <p>0x0001: indicates the low capacity alarm value</p> <p>0x0001 ----> Low capacity alarm</p> <p>0x0002 ----> Power board over temperature alarm This is for upload prompt</p> <p>0 bit charging MOS tube state 1 on 0 off And power board over temperature alarm</p> <p>0x0003 ----> Low capacity alarm This is for upload prompts.</p> <p>1 bit discharge MOS tube state 1 on 0 off This is for upload prompts.</p> <p>2-position balance switch state 1 on, 0 off, this is for uploading prompts</p> <p>3 battery dropped 1 is normal. 0 is offline, this is the upload prompt,</p> <p>Bits 4-15: reserved</p> <p>example:</p>
R 0X8c	Battery status information	2		

00 01: Indicates that the charging MOS tube is turned on

RW 0x8e	Total voltage overvoltage protection value		HEX 1000-15000 (10 MV) Minimum unit 10MV
RW 0x8f	Total voltage undervoltage protection value		HEX 1000-15000 (10 MV) Minimum unit 10MV
RW 0x90	Single overvoltage protection voltage		Hex 1000~4500 MV,
RW 0x91	Cell overvoltage recovery voltage	2	HEX 1000-4500MV
RW 0x92	Single overvoltage protection delay	2	HEX 1-60 seconds
RW 0x93	Single undervoltage protection voltage		Hex 1000~4500 MV
RW 0x94	Monomer undervoltage recovery voltage		HEX 1000-4500MV
RW 0x95	Single undervoltage protection delay	2	HEX 1-60S seconds
RW 0x96	Cell pressure difference protection value		Hex 0-1000MV
RW 0x97	Discharge overcurrent protection value		Hex 1-1000A
RW 0x98	Discharge overcurrent delay	2	Hex 1-60S seconds
RW 0x99	Charging overcurrent protection value		Hex 1-1000A
RW 0x9a	Charge overcurrent delay	2	HEX 1-60S
RW 0x9b	Balanced starting voltage	2	Hex 2000-4500MV
RW 0x9c	Balanced opening pressure difference		hex 10-1000 MV,
RW 0x9d	Active balance switch	1	Hex 0 off or 1 on
RW 0x9e	Power tube temperature protection value		Hex 0~-100°C
RW 0x9f	Power tube temperature recovery value		Hex 0-100°C
RW 0xa0	Temperature protection value in the battery box	2	Hex 40~-100°C,
RW 0xa1	Temperature recovery value in the battery box	2	Hex 40~-100°C
RW 0xa2	Battery temperature difference protection value		hex 5-20°C,
RW 0xa3	Battery charging high temperature protection value		HEX 0-100°C
RW 0xa4	Battery discharge high temperature protection value		HEX 0-100°C
RW 0xa5	Charging low temperature protection value		Hex -45°C /+25°C (no reference-signed data)
RW 0xa6	Charging low temperature protection recovery value		Hex -45 °C /+25 °C (no reference-signed data)
RW 0xa7	Discharge low temperature protection value		Hex -45°C /+25°C (no reference-signed data)
RW 0xa8	Discharge low temperature protection recovery value		Hex -45 °C /+25 °C (no reference-signed data)
RW 0xa9	Battery string setting	1	Hex 3-32
RW 0xaa	Battery capacity setting	4	Hex AH (Amp Hour)
RW 0xab	Charging MOS tube switch	1	Hex 0 off 1 open
RW 0xac	Discharge MOS tube switch	1	Hex 0 off 1 open
RW 0xad	Current calibration	2	Hex 100MA-20000MA
RW 0xae	Protection board address	1	Hex is reserved for use when cascading,
RW 0xaf	Battery Type	1	HEX 0: lithium iron phosphate, 1: ternary, 2: lithium titanate
RW 0xb0	Sleep waiting time	2	Hex second data, temporarily for reference,
RW 0xb1	Low volume alarm value	1	Hex 0~-80%
RW 0xb2	Modify parameter password	10	hex is temporarily used as a reference, fix a password,

RW 0xb3	Dedicated charger switch	1	Hex 0 off or 1 on	Example 60300001 (60-nominal voltage level: defined by the voltage level, for example, 60 is 60V Series 48 is 48V series; 3-material system: according to the system definition of battery materials such as iron Lithium code is 1 manganic acid code 2 ternary code 3; 00001-production serial number: according to manufacturing The Nth group of the model produced by the manufacturer that month is numbered N (for example: a certain type The first group of the number, then N is 00001)) characters
RW 0xb4	Device ID code	8	character	Example 2004-production year: take the last two digits according to the actual production year; list the production in 2020 Battery, year code 20; Production month: 01-12 months; character
RW 0xb5	Date of manufacture	4	character	

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RW 0xb6	System working hours	4	HEX	HEX is cleared when leaving factory, unit minute
R 0xb7	Software version number	15	character	NW_1_0_0_200428
RW 0xb8	Whether to start current calibration	1	HEX	HEX 1: Start calibration 0: Close calibration
RW 0xb9	Actual battery capacity	4	HEX	HEX AH (Amp Hour)
RW 0xBA	Manufacturer ID naming	twenty four	character	Column: "BT3072020120000200521001" *Product name: BT for battery *Material system: iron-lithium code 1; manganese acid code 2; ternary code 3 *Voltage level: 48 for 48V series; 60 for 60V series; 72 for 72V series *Capacity grade: 20 for 20AH specification *Cycle life: 400 cycles use 04 mark, 1200 cycles use 12 mark *Manufacturer code: Low-speed vehicle battery manufacturer's English code, if the manufacturer's English code is insufficient Four bits, complemented by the character 0 *Production year: take the last two digits according to the actual production year; list the year of the battery produced in 2019 Part code "19" *Production month: 1 --- December *Production date: 01-31 *Production serial number: According to the Nth group of the model produced on the day of the manufacturer's production date, The number is N (for example: the first group of a certain model, then 001)
W 0xBB	Restart the system	1	HEX	HEX 1: Restart the system
W 0xBC	reset	1	Hex	HEX 1: Restore (only restore the factory reference parameters)
W 0xBD	Remote upgrade logo	1	HEX	Start of Hex 1 (wait for logo response when issuing documents)
W 0xBE	Battery low voltage turns off GPS	2	Hex	Hex unit: mv (turn off the power to GPS when low voltage is detected)
W 0xBF	Battery low voltage recovery GPS	2	Hex	Hex unit: mv (turn on the power to the GPS when the recovery voltage value is detected)
R 0xC0	Protocol version number	1	Hex	Default value: 0x00 0x01: Redefine 0x84 current data, the unit is 10MA, and the highest bit is 0 for discharging. 1 means charging If discharging 20A, the data transmitted will be 2000 (0x07D0) If charging 20A, the transmission data is 34768 (0x87D0)

【Note】

1. In all fields of 0x79 ~ 0xb9, R or RW should be reported. For the old version that has not been reported, please upgrade as much as possible; if it is inconvenient to upgrade, please contact Department of our technical support, phone: 13755639263/13480924112
2. 0xBA Named by manufacturer ID. This field is mainly used for switch cabinets. If the switch cabinet is required, this field must be added.