

version	Description	Remarks
V101	Initial version, standard frame format	
V102	Increase discharge accumulation timing	

BMS-CAN communication protocol

Overview

This protocol specifies the communication protocol between BMS and other nodes in the car CAN network.

Definition of terms

BMS: Battery Management System, battery management system;

CAN: Controller Area Network, controller area network;

Physical interface

This protocol adopts CAN 2.0A standard, and the frame format adopts standard frame. The communication baud rate is 250kbps.

The communication between the BMS and the instrument is a point-to-point one-way communication, that is, the BMS sends data to the instrument, and the instrument only receives and parses the data for display.

Data convention

For multi-byte data in the data transmission of this protocol, unless otherwise specified, the low byte is sent first (little end). For the total current value of the battery, a positive value means discharging, and a negative value means charging.

The data format of this agreement is defined as follows:

CAN_ID										Data field		
											...	
FUNC			SA							DATA		
3			8							0~64		

FUNC is the function code, indicating the data type of the frame.

SA is the source address, here it means the address of the BMS, which is fixed at 0xF4. DATA is data domain information, and the frame length of this protocol is fixed at 8 bytes.

Parameter group number

The parameter group numbers are assigned as follows:

Serial number.	Name	Description	FUNC	ID	Sender	Message cycle
1	BATT_ST	Battery status information	0x02	0x02F4	BMS	20ms
2	CELL_VOLT	Cell voltage	0x04	0x04F4	BMS	100ms
3	CELL_TEMP	Cell temperature	0x05	0x05F4	BMS	100ms
4	ALM_INFO	Warning message	0x07	0x07F4	BMS	100ms

The battery status information, battery cell voltage, and battery temperature messages are sent periodically after power-on, and the alarm information messages are sent in an event-triggered manner.

Message definition

1.1 Battery status (BATT_ST) ID : 0x02F4

This message defines the power battery status information. The specific format is as follows:

Serial number	parameter	Start bit	Bit length	range	Resolution	Offset	unit	Remarks
1	BattVolt	0	16	0~1000	0.1	0	V	Total battery voltage
2	BattCurr	16	16	-400~1000	0.1	-400	A	Total battery current
3	SOC	32	8	0~100	1	0	%	The remaining capacity
4	DischgTime	48	16	0~65535	1	0	h	Discharge time

Example: 02F4 13 01 D7 11 33 XX 64 00

Means: voltage 27.5V, current 56.7A (accuracy: 0.1A), SOC 51%, discharge time 100h.

1.2 Cell voltage (CELL_VOLT) ID : 0x04F4

This message defines cell voltage information. The specific format is as follows:

Serial number	parameter	Start bit	Bit length	range	Resolution	Offset	unit	Remarks
1	MaxCellVolt	0	16	0~5000	1	0	mV	Maximum cell voltage
2	MaxCvNO	16	8	1~250	1	1		Highest cell position
3	MinCellVolt	24	16	0~5000	1	0	mV	Lowest cell voltage
4	MinCvNO	40	8	1~250	1	1		Lowest cell position

Example: 04F4 8C 0A 05 92 09 08 XX XX

Means: The highest cell voltage is 2700mV, and the corresponding cell number is 5; the lowest cell voltage is 2450mV, and the corresponding cell number is 8.

1.3 Cell temperature (CELL_TEMP) ID : 0x05F4

This message defines cell temperature information. The specific format is as follows:

Serial number	parameter	Start bit	Bit length	range	Resolution	Offset	unit	Remarks
1	MaxCellTemp	0	8	-50~200	1	-50	°C	Maximum cell temperature
2	MaxCtNO	8	8	1~250	1	1		Highest temperature position
3	MinCellTemp	16	8	-50~200	1	-50	°C	Minimum cell temperature
4	MinCtNO	24	8	1~250	1	1		Lowest temperature position
5	AvrgCellTemp	32	8	-50~200	1	-50	°C	Average cell temperature

Example: 05F4 48 06 2F 01 3F XX XX XX

Means: The highest cell temperature is 22°C, corresponding to cell number 6; the lowest cell temperature is -3°C, corresponding cell number is 1. The average cell temperature is 13°C.

1.4 Fault information (ALM_INFO) ID : 0x07F4

The alarm information is sent in an event-triggered manner. When there is an alarm, the BMS sends the message periodically, and does not send if there is no alarm information. When multiple alarms occur at the same time, the instrument interface will display the alarm numbers in cycles, and up to 4 alarm numbers can be displayed in cycles. The alarm number display takes the priority of the alarm occurrence sequence. The specific format is as follows:

Alarm level:

0 is no alarm,

level 1 is serious alarm,

level 2 is major alarm, and

level 3 is general alarm.

Example: 07F4 43 00 20 00 XX XX XX XX

Means:

monomer overvoltage - level 3 alarm;

total voltage undervoltage - level 1 alarm;

SOC too low - level 2 alarm.

Test cases

Normal state

Normal state only displays SOC, voltage value, hour meter and other information. In the normal state, only battery status messages, battery cell voltage messages, and cell temperature messages are sent, and no alarm information messages are sent.

Low battery

When a low battery alarm occurs ($SOC \geq 20\%$), the main interface does not display the voltage, but the current alarm number. If it is a single alarm, the hour meter displays the corresponding single alarm number.

The cell voltage is too high or too low

CAN_ID	Data	Data meaning	The meter shows
0x04F4	8C 0A 05 92 09 08 XX XX	The highest cell voltage is 2700mV, corresponding to cell number 5; the lowest cell voltage is 2450mV, corresponding to cell number Body size is 8	The main interface displays alarm numbers 1 and 2 cyclically, and the "AL" symbol flashes. The hour meter displays the unit numbers 5 and 8 corresponding to the alarm
0x07F4	0F 00 00 00 XX XX XX XX	Single overvoltage level 3 alarm Single cell undervoltage level 3 alarm	

1.5 The cell temperature is too high or too low

CAN_ID	Data	Data meaning	The meter shows
0x05F4	48 06 2F 01 3F XX XX XX	The highest cell temperature is 22°C, corresponding to the cell number 6; the lowest cell temperature is -3°C, corresponding to the cell number is 1. Average cell temperature 13°C	The main interface displays alarm numbers 8 and 9 cyclically, and the "AL" symbol flashes. The hour meter displays the unit number corresponding to the alarm 6 and 1
0x07F4	00 C0 03 00 XX XX XX XX	Unit overtemperature level 3 alarm Single low temperature level 3 alarm	

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