

The file		The page	Page 1 of 5
The version	VI. 02	Effective date	20190428

version	instructions	note
V101	Original version, standard frame format	
V102	Increases the cumulative discharge timing	

BMS-CAN communication protocol

1 overview

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

2 Definition of Terms

BMS: Battery Management System.

Can: Controller Area Network;

3 Physical interface

This agreement adopts CAN2.0A standard, and the frame format adopts standard frame. Communication baud rate is 250kbps.

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

4 Data convention

In the data transmission of this protocol, low-byte first-send mode (small-end) is adopted for multi-byte data, except for special instructions. For the battery's total current value, a positive value indicates discharge and a negative value indicates charge.

The data format of this Agreement is defined as follows:

CANJD		Data fields
FUNC	SA	DATA
3	8	0 ~ 64

Func is the function code that represents the frame data type.

SA is the source address, here represents the address of the BMS, fixed as 0xF4.

Data refers to DATA domain information, and the frame length of this protocol is fixed at 8 bytes.

The file		The page	Page 2 of 5
The version	VI. 02	Effective date	20190428

5 Parameter group number

The parameter group number is assigned as follows:

The	The name of the	describe	FUNC	ID	The sender	Message cycle
1	BATT ST	Battery status	0x02	0x02F4	BMS	20ms
2	CELL VOLT	Batteries voltage	0x04	0x04F4	BMS	100ms
3	CELL TEMP	The cell temperature	0x05	0x05F4	BMS	100ms
4	ALMJNFO	The alarm information	0x07	0x07F4	BMS	100ms

Messages of battery status, cell voltage and cell temperature are sent periodically after power on, and alarm message in an event triggered manner

6 Message Definition

6.1 Battery Status (BATT ST) ID: 0x02F4

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

The	parameter	Start bit	A length of	The scope of	The	The offset	unit	note
1	BattVolt	0	16	0 ~ 1000	0.1	0	V	Total voltage of battery
2	BattCurr	16	16	- 400 ~ 1000	0.1	- 400.	A	Total battery current
3	SOC	32	8	0-100.	1	0	%	The residual capacity
4	DischgTime	48	16	0 ~ 65535	1	0	h	Discharge time

For example :02F4 13 01 D7 11 33 XX 64 00

Represents: voltage 27.5V, current 56.7A (precision: 0.1A), SOC51%, discharge time 100h.

6.2 Cell voltage (CELL_VOLT)ID: 0x04F4

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

The	parameter	Start bit	A length of	The scope of	The	The offset	unit	note
1	MaxCellVolt	0	16	0 ~ 5000	1	0	mV	Maximum cell voltage
2	MaxCvNO	16	8	1-250.	1	1		Highest cell n o .
3	MinCellVolt	24	16	0 ~ 5000	1	0	mV	Minimum cell voltage
4	MinCvNO	40	8	1-250.	1	1		Lowest cell n o .

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

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

The file		The page	Page 3 of 5
The version	VI. 02	Effective date	20190428

6.3 Cell temperature (CELL_TEMP)ID: 0x05F4

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

The	parameter	Start bit	A length of	The scope of	The	The offset	unit	note
1	MaxCellTemp	0	8	- 50 ~ 200	1	- 50	° c.	Maximum cell temp
2	MaxCtNO	8	8	1-250.	1	1		Maximum temp no.
3	MinCellTemp	16	8	-50 ~ 200	1	- 50	° c.	Minimum cell temp
4	MinCtNO	24	8	1-250	1	1		Lowes temp no.
5	AvrgCellTemp	32	8	- 50 ~ 200	1	- 50	° c.	Average cell

For example: 05F4 48 06 2F 01 3F XX XX XX

Represents: the highest cell temperature is 22 ° C, corresponding cell number is 6;The minimum cell temperature is -3 ° C, corresponding cell number is 1.Average cell temperature is 13 ° C.

6.4 Fault information (ALM_INFO) ID: 0x07F4

The alarm message is sent by event trigger. When there is an alarm, BMS sends the message periodically. If there is no alarm message, it will not be sent. When multiple alarms occur at the same time, the alarm number will be displayed circularly on the instrument interface, up to 4 alarm numbers can be displayed circularly. The alarm number is shown in the order of alarm occurrence as priority. The specific format is as follows:

Alarm no.	parameter	Start bit	A length of	The scope	The	The offset	unit	note
1	Monomer overvoltage	0	2	0 ~ 3	1	0		The alarm level
2	Cell undervoltage	2	2	0 ~ 3	1	0		
3	Total voltage overvoltage	4	2	0 ~ 3	1	0		
4	Total voltage undervoltage	6	2	0 ~ 3	1	0		
5	Cell voltage difference	8	2	0 ~ 3	1	0		
6	Discharge overcurrent	10	2	0 ~ 3	1	0		
7	Chaeging overcurrent	12	2	0 ~ 3	1	0		
8	Temp too high	14	2	0 ~ 3	1	0		
9	Temp too low	16	2	0 ~ 3	1	0		
10	Excessive temp difference	18	2	0 ~ 3	1	0		
11	SOC too low	20	2	0 ~ 3	1	0		
12	Insulation too low	22	2	0 ~ 3	1	0		
13	High voltage interlock fault	24	2	0 ~ 3	1	0		
14	External communice fail	26	2	0 ~ 3	1	0		
15	Internal communicate fail	28	2	0 ~ 3	1	0		

Alarm level: 0 for no alarm, 1 for serious alarm, 2 for important alarm, 3 for general alarm

07F4 43 00 20 00 XX XX XX XX

Represents: monomer overpressure, level 3 alarm;Total voltage undervoltage, level 1 alarm;Too low SOC, level 2 alarm.

The file		The page	Page 4 of 5
The version	VI. 02	Effective date	20190428

7 Test cases

7.1 Normal state

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

CANJD	data	Data meaning	The instrument shows
0x02F4	13 01 D7 11 33 XX 64 00	Voltage 27.5V, current 56.7A, SOC51%, discharge time 100h	The main interface displays voltage of 27.5, SOC display of 51%, battery capacity of 2 cells, and current not displayed

7.2 Low battery

When a low battery alarm occurs (SOC >= 20%), the main page does not display voltage, but displays the current alarm number. If it is a single unit alarm, the hour meter displays the corresponding unit number for the single unit alarm

CANJD	data	Data meaning	The instrument shows
0x02F4	E1 00 8A 10 10 XX XX XX	Voltage 22.5V, current 23.4 A, SOC 16%	The main page displays alarm number 11, while the "AL" symbol flashes, SOC displays 16%, battery cells are 1, and current is not displayed
0x07F4	00 00 30 00 XX XX XX XX	SOC 3 level alarm	

7.3 Excessive and low monomer voltage

CANJD	data	Data meaning	The instrument shows
0x04F4	8C 0A 05 92 09 08 XX XX	Maximum unit voltage 2700mV, corresponding to unit number 5; minimum unit voltage 2450mV corresponding to unit number 8	The main page displays alarm numbers 1 and 2 in a loop, while the "AL" symbol flashes. Unit numbers 5 and 8 corresponding to the alarm displayed at the hour meter
0x07F4	0F 00 00 00 XX XX XX XX	Cell overvoltage level 3 alarm Cell undervoltage level 3 alarm	

7.4 Cell temperature is too high and too low

CANJD	data	Data meaning	The instrument shows
0x05F4	48 06 2F 01 3F XX XX XX	Maximum cell temp is 22 °C, corresponding to unit number 6 Minimum cell temp is -3 °C, corresponding to unit number 1. The average cell temp is 13 °C	The main page displays alarm numbers 8 and 9 in a loop, while the "AL" symbol flashes. Unit numbers 6 and 1 corresponding to the alarm displayed at the hour meter
0x07F4	00 CO 03 00 XX XX XX X X	cell High temp, level 3 alarm cell Low temp, level 3 alarm	

The file		The page	Page 5 of 5
The version	VI.02	Effective date	20190428