



The right battery

Canbus Specifications

Rev.: 3 - September 2018

Description

This BMS features a logging system and a CANBus communications interface, running at 250kbit/S.

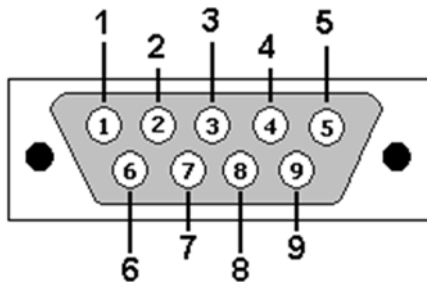
Both realtime data and the log can be retrieved over CANBus

The BMS firmware can be flashed through CANBus.

The system will log up to 118 events looping, so the 119'th event will overwrite the first.

The following tables shows event types and data logged at these events.

Pinout when looking on the battery



Pin 2: CAN-L

Pin 7: CAN-H

Pin 4: Common GND / Analog 0-5V -

Pin 8: Analog 0-5V +

The analog signal shows the current SoC in percent, where 0v is 0% and 5v is 100%

The analog signal cannot supply power above 20ma.

Realtime data

The following data is available over CANBus, and can be retrieved by sending a frame with the ID's seen below. The ID's can be changed by flashing the appropriate firmware. This is relevant if multiple batteries are coupled in parallel and communication with all packs is desired.

#	Frame ID	Data Length	Data Description	Offset	Unit	Min value	Max value
1	0x201	1 frame - 8 bytes	Pack Voltage	byte 0 - 1	0.1V	0	65535
			Charge-Current	byte 2 - 3	0.1A	0	65535
			Discharge-Current	byte 4 - 5	0.1A	0	65535
			SOC	byte 6	1%	0	100
			Remaining Time to Full-Charge	byte 7	0.1h	0	255
2	0x202	1 frame - 8 bytes	Remaining Capacity	byte 0 - 1	1mAh	0	65535
			SOH	byte 2		0	100
			N/A	byte 3 - 7			
3	0x203	1 frame - 8 bytes	BMS Current Status 0x0001 discharge (bit 0) 0x0002 charge (bit 1) 0x0004 OV (bit 2) 0x0008 UV (bit 3) 0x0010 COC(bit 4) 0x0020 DOC (bit 5) 0x0040 DOT (bit 6) 0x0080 DUT (bit 7) 0x0200 SC (bit 9) 0x0400 COT(bit 10) 0x0800 CUT (bit 11)	Byte 0-1			
			BMS Temperature 1 is 1 °C 0 is 0 °C 255 is -1 °C	Byte 2	1°C	-40°C	120°C
			N/A	Byte 3-7			

#	Frame ID	Data Length	Data Description	Offset	Unit	Min value	Max value
4	0x204	1 frame - 8 bytes	Cell1 Voltage	byte 0 - 1	1mv	0	4500
			Cell2 Voltage	byte 2 - 3	1mv	0	4500
			Cell3 Voltage	byte 4 - 5	1mv	0	4500
			Cell4 Voltage	byte 6 - 7	1mv	0	4500
5	0x205	1 frame - 8 bytes	Cell5 Voltage	byte 0 - 1	1mv	0	4500
			Cell6 Voltage	byte 2 - 3	1mv	0	4500
			Cell7 Voltage	byte 4 - 5	1mv	0	4500
			N/A	byte 6 - 7			
F	0x20F	Multiple frames - 8 byte each	Retrieve Log See further down for specifications				

Logged events

#	Event Type
1	Bms shutdown
2	Power on
3	Bms firmware update
4	Full-charge capacity update
5	Cycle-count update
6	Turn off DSG-Mosfet
7	Turn off CHG-Mosfet
8	Turn on DSG-Mosfet
9	Turn on CHG-Mosfet

#	Event Type
10	Charge start
11	Charge stop
12	OV
13	UV
14	OV recovery
15	UV recovery
16	Charge over current
17	Discharge over current
18	Short-circuit

#	Event Type
19	Short-circuit recovery
20	Charge over current recovery
21	Discharge over current recovery
22	Charge OT
23	Discharge OT
24	Charge OT recovery
25	Discharge OT recovery

Some of these “events” are actually proxy events that are shown as states (state1 - 3) together with an event byte, which can be considered as the “main” event.

Example:

When a charge OT “event” occurs, a “Turn off CHG-Mosfet event” will be triggered by the BMS and the Charge OT will be shown as a change in the state3 byte (0x80), in a response where the event byte set to 0x09(C-FET Off).

On page 5 there is a description of the datalog, which events are shown in the event byte and which are shown as states.

Log data specifications

When the log is requested the BMS will send a multiframe response with each frame organized like below.

Frame #	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
1	SOI (0xEA)	CID (0xD1)	ADR (0x01)	Data Length (eg 0x25)	0xFF	0x08	Record # (0x01 - 0x72)	Data 0
2	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8
3	Data 9	Data 10	Data 11	Data 12	Data 13	Data 14	Data 15	Data 16
4	Data 17	Data 18	Data 19	Data 20	Data 21	Data 22	Data 23	Data 24
5	Data 25	Data 26	Data 27	Data 28	Data 29	Data 30	Data 31	Checksum
6	EOI(0xF5)	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Data length in bytes is counted like this: all data bytes + byte 3-6 in frame 1 + checksum from frame 5.

For the current firmware this results in: 0x25 or (37)₁₀

Checksum: Frame1-Byte3^Frame1-Byte4^...^Frame5-Byte6 (Bitwise XOR)

The following frame will be sent as the last frame, to show the complete log has been sent:

Frame #	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
END	SOI (0xEA)	CID (0xD1)	ADR (0x01)	Data Length (0x04)	0xFF	0xFE	Checksum	0xF5

The checksum for this frame is calculated like this:

Byte3^Byte 4^Byte5 (Bitwise XOR)

Datalog description

Data Byte	Description	Unit/notes
0	Year	Bit 7-4: tens Bit 3-0: ones
1	Month	Bit 4: tens Bit 3-0: ones
2	Day	Bit 5-4: tens Bit 3-0: ones
3	Hour	Bit 6-4: tens Bit 3-0: ones
4	Minute	Bit 6-4: tens Bit 3-0: ones
5	Second	Bit 6-4: tens Bit 3-0: ones
6	Pack V High Byte	10mV
7	Pack V Low Byte	-
8	Min Cell V High Byte	1mV
9	Min Cell V Low Byte	-
10	Max Cell V High Byte	1mV
11	Max Cell V Low Byte	-
12	Current High Byte	10mA
13	Current Low Byte	-
14	Temperature	Celsius - offset by 40
15	N/A	
16	SOC	Percent
17	Rem. Cap Byte 1 (highest)	10mAh
18	Rem. Cap byte 2	-
19	Rem. Cap byte 3	-
20	Rem. Cap byte 4 (lowest)	-
21	Cyclecount High Byte	
22	Cyclecount Low Byte	
23	State 1	See below
24	State 2	See below
25	State 3	See below
26	Charge/Discharge Flag	0x20: standby 0x40: discharge 0x80: charge
27	Event	See below
28	SOH	Percent
29	N/A	
30	N/A	
31	N/A	

State 1	Description
0x02	UV Recovery
0x08	OV Recovery
0x20	UV
0x80	OV

State 2	Description
0x04	SC Recovery
0x08	DOC Recovery
0x10	COC Recovery
0x20	SC
0x40	DOC
0x80	COC

State 3	Description
0x10	DOT Recovery
0x20	COT Recovery
0x40	DOT
0x80	COT

Event	Description
0x03	UV Shutdown
0x04	Power Up
0x06	Full charge cap update
0x07	Cycle count update
0x08	D-FET OFF
0x09	C-FET OFF
0x0A	D-FET ON
0x0B	C-FET ON
0x0C	Firmware written
0x23	Charging Start
0x24	Charging Stop
0x27	Discharge Begin
0x28	Discharge Stop

Legend

UV: Under voltage

OV: Over voltage

DOC: Discharge Overcurrent

COC: Charge Over Current

SC: Short circuit

DOT: Discharge Over Temp

COT: Charge Over Temp