123SmartBMS gen3

UART data protocol

Firmware v3.3.11

General information

	Value
UART info	
Bitrate	9600 bps
Start bit	1
Stop bit	1
Parity bit	None
Data info	
Endianness	Big-endian
Transmit interval	1 s
Data bytes	58

Data bytes

Byte	Information	Step	Size	Example
1, 2, 3	Total voltage	0.005 volt/bit	24 bit	0x0105FF = 335.4 volt
4	Sign byte I1	Ascii: + , -, X	8 bit	0x2B = +, 0x2D = - , 0x58 = X
5, 6	Current sensor 1 (I1)	0.125 amp/bit	16 bit	0x0100 = 32 amp
7	Sign byte I2	Ascii: + , -, X	8 bit	0x2B = +, 0x2D = - , 0x58 = X
8, 9	Current sensor 2 (I2)	0.125 amp/bit	16 bit	0x0100 = 32 amp
10	Sign byte I-sum	Ascii: + , -, X	8 bit	0x2B = +, 0x2D = - , 0x58 = X
11, 12	Total current (I1 – I2)	0.125 amp/bit	16 bit	0x0100 = 32 amp
13, 14	V lowest	0.005 volt/bit	16 bit	0x0230 = 2.80 volt
15	Cell nr V lowest	cell nr/bit	8 bit	0x32 = Cell number 50
16, 17	V highest	0.005 volt/bit	16 bit	0x0230 = 2.80 volt
18	Cell nr V highest	cell nr/bit	8 bit	0x32 = Cell number 50
19, 20	T lowest	1 deg / bit + offset	16 bit	0x0114 = 0 deg Celcius, 0x0128 = 20 deg Celcius
21	Cell nr T lowest	cell nr/bit	8 bit	0x32 = Cell number 50
22, 23	T highest	1 deg / bit + offset	16 bit	0x0114 = 0 deg Celcius, 0x0128 = 20 deg Celcius
24	Cell nr T highest	cell nr/bit	8 bit	0x32 = Cell number 50
25	Information of specific cell nr	cell nr/bit	8 bit	0x32 = Cell number 50
26	Nr of cells	cell nr/bit	8 bit	0xFF = Cell number 255

123electric
The Netherlands
E-mail: info@123electric.eu
www.123electric.eu

27, 28	Cell voltage of specific cell	0.005 volt/bit	16 bit	0x0230 = 2.80 volt
29, 30	Cell Temp of specific cell	1 deg / bit + offset	16 bit	0x0114 = 0 deg Celcius, 0x0128 = 20 deg Celcius
31	Status byte 1		8 bit	See table “Status byte 1”
32, 33, 34	TodayEnergy collected	Wh/bit	24 bit	0x000064 = 100 Wh
35, 36, 37	Energy stored	Wh/bit	24 bit	0x00F221 = 61.985 kWh
38, 39, 40	Today Energy consumed	Wh/bit	24 bit	0x000064 = 100 Wh
41	SoC %	1%/bit	8 bit	0x32 = 50%
42, 43, 44	Total collected	kWh/bit	24 bit	0x640000 = 6.553.600 kWh
45, 46, 47	Total consumed	kWh/bit	24 bit	0x640000 = 6.553.600 kWh
48	Key		8 bit	Offset 25, 0x19 = key 0
49	Value		8 bit	See table below
50, 51	Battery capacity	0.1 kWh/bit	16 bit	0x00A0 = 16.0 kWh
52, 53	V-MIN Setting	0.005 volt/bit	16 bit	0x0244 = 2.90 V
54, 55	V-MAX Setting	0.005 volt/bit	16 bit	0x02E4 = 3.70 V
56, 57	V-Balance Setting	0.005 volt/bit	16 bit	0x02BC = 3.50 V
58	Checksum		8 bit	Lowest 8 bits of sum of all received data bytes (57 bytes, except checksum)

Status byte 1

Bit	Info
7 (MSB)	SoC not calibrated
6	Exceed T max
5	Exceed T min
4	Exceed V max
3	Exceed V min
2	Comm error
1	Allow to discharge
0 (LSB)	Allow to charge

Status byte 2

Bit	Info
7 (MSB)	Unused
6	Unused
5	Relay “Load” closed/active
4	Relay “Charge” closed/active
3	Exceed Tmin discharge
2	Exceed Tmin charge
1	Early warning
0 (LSB)	Unused

Key/value pairs (byte 48 and 49)

Key	Value	Step	Remarks
0	State-of-health (SoH)	1%/bit	
1	Charge efficiency	1%/bit	
2	Vlow MSB	5mV/bit	
3	Vlow LSB		
4	Vnom MSB	5mV/bit	
5	Vnom LSB		
6	Fw version major | minor		High nibble for major, low nibble for minor
7	Fw version patch		
8	Battery charge cycles MSB	1C/bit	
9	Battery charge cycles LSB		
10	Battery charged energy MSB	1kWh/bit	
11	Battery charged energy		
12	Battery charged energy LSB		
13	Battery discharged energy MSB	1kWh/bit	
14	Battery discharged energy		
15	Battery discharged energy LSB		
16	Status byte 2		See table “Status byte 2”
17	Vfull MSB	5mV/bit	
18	Vfull LSB		

Electrical circuit

The End Board has an 2 pin “EXT OUT” connector with UART data output. This UART signal is inverted and galvanically connected to the End Board power, which is the last cell. If you are building your own circuit, it is highly recommended to isolate the signal, for example with an optocoupler. You can use most general purpose optocouplers, for example the FOD814 or FOD817.

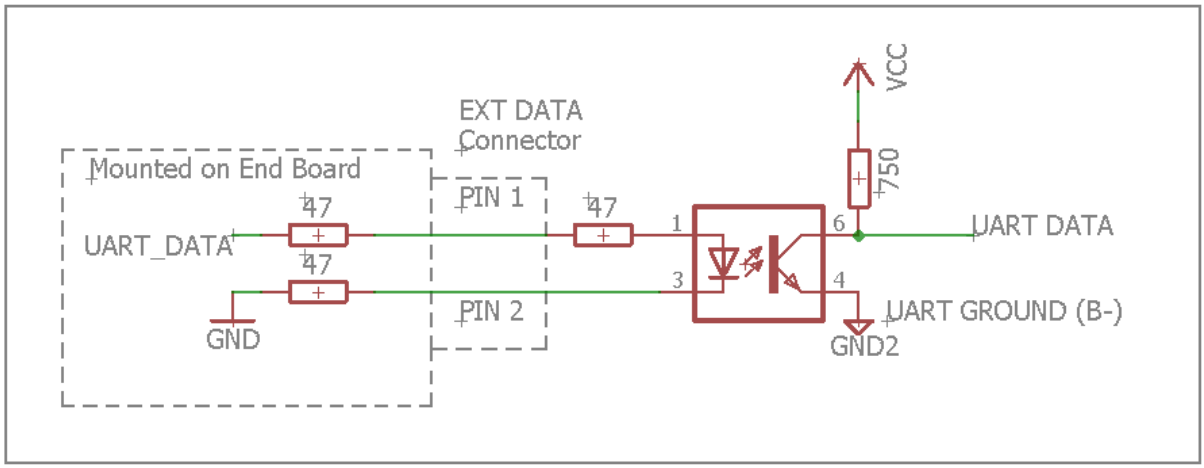

Figure 1 - Example optocoupler isolation circuit

Note: the 123\SmartBMS to USB cable does not need any additional isolation. The cable already contains an electrical isolation circuit.