Smart BMS Protocol (Version V3)

1. **Physical interface**

This protocol can be used for RS485/RS232/UART Physical interface

Baud rate: 9600BPS

1. **Structure of Data Packet or Frame**

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*A5-Read |
| 0\*5A-Write |
| Command code | Register address |
| Length | length of data frame, not include data itself |
| Data content | When the length of data frame is 0, content is none |
| check | data + length + command code checksum high position first, low in the back |
| Stop bit | 0\*77 |

1. **Description of commend code**

Command code:

Read 03 Read basic information and status

Read 04 Read voltage of single battery cell

Read 05 Read the hardware protection board version number

Sender send 0\*03 to read the basic information

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*A5 |
| Command code | 0\*03 |
| Length | 0 |
| Data content | -- |
| Party bit | checksum |
| Stop bit | 0\*77 |

BMS react 0\*03, and read the basic information

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*03 |
| Command code | Status, usually is 0, if failed, 0\*80 |
| Length | length of frame of data, not include data itself, when write, length is 0 |
| Data content | When length of data is 0, content is none |
| Party bit | checksum |
| Stop bit | 0\*77 |

Sender send:DD A5 03 00 FF FD 77

BMS react:DD 03 00 1B 17 00 00 00 02 D0 03 E8 00 00 20 78 00 00 00 00 00 00 10 48 03 0F 02 0B 76 0B 82 FB FF 77

**Explanation of Data content**

|  |  |  |
| --- | --- | --- |
| Content | BIT | Description |
| voltage | 2BYTE, 10mv, high byte first, below is the same |  |
| Current | 2BYTE Unit 10mv | The state of charge and discharge of the battery is judged by the current, charge is positive, discharge is negative. |
| The remaining capacity | 2BYTE Unit 10mv |  |
| Nominal capacity | 2BYTE Unit 10mv |  |
| Cycle life | 2BYTE |  |
| Production Date | 2BYTE | Use 2 bytes to transfer such as 0x2068, where the date is the lowest 5: 0x2028&0x1f = 8 is the date; month (0x2068>>5) & 0x0f=  0x03 means March; The year is 2000+ (0x2068>>9) = 2000 + 0x10 =2016; |
| balance status | 2BYTE | Each bit represents each serial balance, 0 is off, and 1 is on, indicate 1~16 series |
| balance status | 2BYTE | Each bit represents each serial balance, 0 is off, 1 is on, to indicate 17~32 series, highest up to 32 series ( added on the V0 version.) |
| Protection status | 2BYTE | Each bit represents a protection status, 0 is unprotected, and 1 is protected. See Note 1: |
| Protocol version | 1byte | 0x10 means 1.0 version |
| RSOC | 1byte | Indicates the percentage of remaining capacity |
| FET | 1byte | MOS status, bit0 indicates charging, bit1 indicates discharging, 0 indicates MOS is off, and 1 indicates on. |
| Number of series | 1byte | Number of battery series |
| Number of NTC | 1byte | Number of NTC |
| Several NTC content | 2\*N, unit 0.1K, high byte first | With absolute temperature transfer, 2731+ (actual temperature \*10),  0 degrees = 2731  25 degrees = 2731+25\*10 = 2981 |

Note 1: Description of protection status

Bit0 over voltage protection of single cell

Bit1 under voltage protection of single cell

Bit2 over voltage protection of whole battery set

Bit3 under voltage protection of whole battery set

Bit4 charging over temperature protection

Bit5 charging low temperature protection

Bit6 discharge over temperature protection

Bit7 discharge low temperature protection

Bit8 charging over current protection

Bit9 discharge over current protection

Bit10 short circuit protection

Bit11 detection IC error

bit12 software lock MOS

bit13~bit15 reserved

Sender send 0\*04 to read the voltage of single cell

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*A5 |
| Command code | 0\*04 |
| Length | 0 |
| Data content | -- |
| Party bit | checksum |
| Stop bit | 0\*77 |

BMS react 0\*03, and read the basic information

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*04 |
| Command code | Status, usually is 0, if failed, 0\*80 |
| Length | length of frame of data, not include data itself, when write, length is 0 |
| Data content | When length of data is 0, content is none |
| Party bit | checksum |
| Stop bit | 0\*77 |

Sender send: DD A5 04 00 FF FC 77

BMS react: DD 04 00 1E 0F 66 0F 63 0F 63 0F 64 0F 3E 0F 63 0F 37 0F 5B 0F 65 0F 3B 0F 63 0F 63 0F 3C 0F 66 0F 3D F9 F9 77

**Explanation of Data content**

|  |  |
| --- | --- |
| Length of data frame | Length of data frame: number of series \*2 |
| Voltage of first series | 2Byte, unit mv, high byte first |
| Voltage of second series | 2Byte, unit mv, high byte first |
| Voltage of third series | 2Byte, unit mv, high byte first |
| Voltage of N series | 2Byte, unit mv, high byte first |

The sender send 0\*05 and supports up to 31 characters at most. The model number is written by the device model number of the sender computer.

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*A5 |
| Command code | 0\*05 |
| Length | 0 |
| Data content | -- |
| Party bit | checksum |
| Stop bit | 0\*77 |

BMS react 0\*03 , read the basic information

|  |  |
| --- | --- |
| Start bit | 0\*DD |
| Status | 0\*04 |
| Command code | Status, usually is 0, if failed, 0\*80 |
| Length | length of frame of data, not include data itself, when write, length is 0 |
| Data content | When length of data is 0, content is none |
| Check | checksum |
| Stop bit | 0\*77 |

**Explanation of Data content**

|  |  |
| --- | --- |
| Length of data | length of name of device |
| BYTE0 | The ASCII code of the first character (for example, the hardware version is LH-XXXX, then the length is 7,byte0 = ‘L’) |
| BYTE(N-1) |  |

Sender send :DD A5 05 00 FF FB 77

BMS react: DD 05 00 0A 30 31 32 33 34 35 36 37 38 39 FD E9 7

-- indicated the hardware version number 0123456789

1. **Data Description**

Sender send 0\*04 to read voltage of single cell, BMS return

DD-- Start bit

04 --control code, read voltage of single cell

00-- command code, 0 is correct, not 0 is error

1. - length of data, 34 data, indicating that the battery pack has 17 series, a series of 2 data

0EC8 -- Section 1 single cell voltage 3784

0EC8 -- Section 2 single cell voltage 3744

0ECB -- Section 3 single cell voltage

0ECF -- Section 4 single cell voltage

0ECA -- Section 5 single cell voltage

0EC7 -- Section 6 single cell voltage

0ECA -- Section 7 single cell voltage

0ECD -- Section 8 single cell voltage

0EC9 -- Section 9 single cell voltage

0ECA -- Section 10 single cell voltage

0ECB -- Section 11 single cell voltage

0ECB -- Section 12 single cell voltage

0EC8 -- Section 13 single cell voltage

0ECC -- Section 14 single cell voltage

0EC8 -- Section 15 single cell voltage

0EC9 -- Section 16 single cell voltage

0EC9 -- Section 17 single cell voltage

F187 -- check code

77 -- end code

The sender sends 0x03 command to read basic information, BMS react data description:

DD -- start bit

03 -- Name code

00 -- status code

1F -- length of data frame

19DF -- Total voltage = 6623 = 66.23V Unit: 10mV

F824 -- total current = 63524, the highest bit is 1, it is discharge, current = 65536-63524 = 2012, the unit is 10mA, so the final current is -20.12A

0DA5 -- Remaining capacity = 3493, unit 10mAH, the final remaining capacity value is 34930mAH

0FA0 -- nominal capacity = 4000, because the unit is 10mAH, all final capacity is 40000mAH

0002 -- the number of cycles. 2 times

2491 -- date of manufacture

0000 -- low balance

0000 -- high balance

0000 -- protection status

12 -- Software version

57 -- Percentage of remaining capacity 87

03 --MOS Status

11 --Number of battery series 17

04 --Number of temperature probes

0B98 -- first temperature 2968 -2731 = 247, unit is 0.1 ° C = 24.7 ° C

0BA9 -- the second temperature

0B96 -- the third temperature

0B97 -- the 4th temperature

F89A -- check code

77 -- end code

1. **Revision history**

|  |  |
| --- | --- |
| Version | description |
| V0 version | first draft |
| V2 version | compatible with 30-series protection board, increasing balance height 16 bits |
| V3 version | Add the instruction to read the hardware version number, corresponding device type |
| V version | Add BMS return data description |