Communication protocol-QM-UPS1601

一、 **Physical interface**

This protocol supports QUCC BMS RS485/RS232/UART interface general protocol, consistent with the host computer protocol, baud rate of 9600BPS or other customized rates.

二、 **Frame structure**

Host send：

Start bit	Address	Status	Command code	Length	Date content	Calibration	Stop bit
0xDD	Device address	0xA5-read 0x5A-write	Command code	Indicates the length of the data, not including itself	Data content, when the length is 0, is skipped here	The checksum of the status code + data segment content + length byte + command code byte is then negated and added by 1, with the high bit first and the low bit last	0x77

BMS Reply：

Start bit	Address	Command code	Status	Length	Date content	Calibration	Stop bit
0xDD	Device address	Command code	0	Indicates the length of the data, not including itself	Data content, when the length is 0, is skipped here	The checksum of the status code + data segment content + length byte + command code byte is then negated and added by 1, with the high bit first and the low bit last	0x77

三、 **Command interpretation**

Command code： Read 03 to read basic information and status

Read 04 to read the battery cell voltage

The host sends instructions 0x03 read basic information

0xDD	0xA5		0x03	0	-- (If not, empty)	checksum	0x77

The BMS responds with instructions 0x03 read basic information

0xDD	00	0x03	Status, 0 table correct	Indicates the length of the data, excluding itself, and the response is written with a length of 0	Data content, when the length is 0, is skipped here	checksum	0x77
			If there is an error, the 0x80 is returned	0		checksum	0x77

Host send：DD 00 A5 03 00 FF 58 77

BMS response：DD 00 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

The data and validation behind this example are incorrect, and are only used to parse the protocol

*Red is the check byte, the sum of all bytes; The next two are the check results, which negate the +1 result for the sum of all the previous checks.

In the above results: 03 represents the command code, 00 represents the status code, and 1B represents the data field length.

The contents of the data fields are explained below

Data content	Byte size	description
Total voltage	2BYTE,Unit 10mV, high byte first, the same below	
Current	2BYTE，Unit 10mA	Signed type 16 decimal number, the battery charge and discharge state is judged by the current, the charge is positive, and the discharge is negative.
Capacity remaining	2BYTE，Unit 10mAh	

Full capacity	2BYTE，Unit 10mAh	
Number of cycles	2BYTE	
Date of manufacture	2BYTE	Use 2 bytes to transfer such as 0x2068, where the date is the lowest 5: 0x2028&0x1f = 8 means the date; Month (0x2068>>5) &0x0f = 0x03 means March; The year is 2000+ (0x2068>>9) = 2000 + 0x10 = 2016;
Balanced state	2BYTE	Each bit means that each string is balanced, 0 is off, 1 is open means 1~16 strings
Balanced state_high	2BYTE	Each bit means that each string is balanced, 0 is off, 1 is open means 17~32 strings, up to 32 strings are supported V0 version is added
Protection status	2BYTE	Each bit represents a protection state, 0 is unprotected, and 1 occurs protection See Note 1 for details:
Software version	1byte	0x10 indicates version 1.0
RSOC	1byte	Represents the percentage of capacity remaining
FET Control status	1byte	MOS indicates status, bit0 means charge, bit1 means discharge, 0 means MOS off, and 1 means on
Number of battery strings	1byte	Number of battery strings
Alarm status	2 byte	Each bit represents an alarm status, 0 is not occurring, and 1 alarm has occurred See Note 2 for details:
Ambient temperature	2 byte，Unit 0.1K, high in front	Using absolute temperature transmission, 2731+ (actual temperature * 10), 0 degrees = 2731 25 degrees = 2731 + 25 * 10 = 2981
FET temperature	2 byte，Unit 0.1K, high in front	Using absolute temperature transmission, 2731+ (actual temperature * 10), 0 degrees = 2731 25 degrees = 2731 + 25 * 10 = 2981
NTC Number of N	1byte	Number of NTC
N 个 NTC content	2*N，Unit 0.1K, high in front	Using absolute temperature transmission, 2731+ (actual temperature * 10), 0 degrees = 2731 25 degrees = 2731 + 25 * 10 = 2981

Note1：Description of the protection status

bit0 Single over voltage protection

bit1 Single under voltage protection

bit2 Whole over voltage protection

bit3 Whole voltage protection

bit4 Charging over temperature protection

bit5 Charging low temperature protection

bit6 Discharge over temperature protection

bit7 Discharge low temperature protection

bit8   Charge over current protection

bit9   Discharge over current protection

bit10   Short-circuit protection

bit11   Front end detection IC error

bit12   Software locked MOS

bit13   High ambient temperature

bit14   Low ambient temperature

bit15   FET high temperature

Note2：Description of the protection status

bit0   Single low voltage alarm

bit1   Single high voltage alarm

bit2   Whole low voltage alarm

bit3   Whole high voltage alarm

bit4   Charging over current alarm

bit5   Discharge over current alarm

bit6   Charging high temperature alarm

bit7   Charging low temperature alarm

bit8   Discharge high temperature alarm

bit9   Low temperature discharge alarm

bit10   Ambient high temperature alarm

bit11   Ambient low temperature alarm

bit12   PCB high temperature alarm

bit13   Large differential pressure alarm

bit14   Low capacity alarms

bit15   empty

The host sends a command to read unit voltage 0x04

0xDD	00	0xA5	0x04	0	--(empty if not)	checksum	0x77

BMS respond to commands 0x04 read basic information

0xDD	00	0x04	Status, 0 table correct	Represents the length of the data, not including itself, and the response is written at the length of the response 0	Data content, when the length is 0, is skipped here	checksum	0x77
			An error returns a 0x80	0		checksum	0x77

Host send：DD 00 A5 04 00 FF 57 77

BMS response：DD 00 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 F5 77

Red is the check byte, the sum of all bytes. The next two are the check results, which negate the +1 result for the sum of all the previous checks.

The data and validation behind this example are incorrect, and are only used to parse the protocol.

Red is the check byte, the sum of all bytes. The next two are the check results, which negate the +1 result for the sum of all the previous checks.

In the above results: 04 represents the command code, 00 represents the status code, and 1E represents the data field length.

Interpretation of data content

Data length	The data length is the number of battery strings N multiplied by 2
The first string of monomer voltages	2Byte, unit mV, high first
The second string of monomer voltages	2Byte, unit mV, high first
The third string of monomer voltages	2Byte, unit mV, high first
° ° ° °	° ° ° °
The Nth string monomer voltage	2Byte, unit mV, high first

五、 **Protocol data examples:**

The host sends a command to read the monomer voltage 0x04, and the BMS returns the data description:

DD --Frame header, starting byte

00- address

04 --Command code, read the monomer voltage

00 --Status code, non-0 is an error, 0 is correct

22 --The short length of the data is 34 data, which means that the battery pack has 17 strings, a string of 2 data

0EC8 --Section 1 monomer voltage 3784

0EC8 --Section 2 monomer voltage 3784

0ECB --Section 3 monomer voltage

0ECF --Section 4 Cell voltage

0ECA --Section 5 monomer voltage

0EC7 --Section 6 Cell voltage

0ECA --Section 7 Monomer voltage

0ECD --Section 8 Monomer voltage

0EC9 --Section 9 Monomer voltage

0ECA --Section 10 monomer voltage

0ECB --Section 11 monomer voltage

0ECB --Section 12 monomer voltage

0EC8 --Section 13 Motive Voltage

0ECC --Section 14 monomer voltage

0EC8 --Section 15 monomer voltage

0EC9 --Section 16 Monomer Voltage

0EC9 --Section 17 Monomer Voltage

F187 --Check digit, subject to the actual value

77 --End code

The host sends instructions 0x03 read basic information, and the BMS returns the data description:

DD --Start

00-address

03 --Name code

00 --Status code

25 --Data length

19DF -- Total voltage = 6623 = 66.23V，The units are 10mV

F824 --Total current = 63524, the highest bit is 1, which is the discharge，Current value = 65536-63524 = 2012 in 10mA, so the final current is -20.12A

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

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

0002 --Number of cycles. 2 times

2491 --Date of manufacture

0000 --Balanced - Low

0000 --Balanced - High

0000 --Protection status

12 --Software version

57 --Remaining capacity percentage 87

03 --MOS state

11 --Number of battery strings 17

0000 -Alarm status

0B98   --Ambient temperature   2968 -2731 =247，The units are 0.1℃ = 24.7℃

0B98   --PCB temperature 2968 -2731 =247，The units are 0.1℃ = 24.7℃

04 --Number of temperature probes

0B98   --First temperature   2968 -2731 =247，The units are 0.1℃ = 24.7℃

0BA9   --2nd temperature

0B96   --3rd temperature

0B97   --4th temperature

F89A   --Check Code

77 --End Code