通讯协议

Communications agreements

版本 V1.0

V1.0 version

1. 版本修订记录 Revision records

序号 Serial number	描述 Description	日期 Date	版本 Version	作者 Author
1.	初始版本 Initial version	2019.06.11	V1.0	

1.物理层 physical layer

1.1 UART

1. 物理接口 physical interface	UART	
2. 波特率 baud rate	9600 bps	
3. 通讯格式 Communications Format	9600 , N , 8 , 1	
4. 有效电平 effective level	发送 TXD TXD sent	"0": <0.5V
		"1": OC (耐压 100V Voltage should lower than 100V)
	接收 RXD RXD received	"0": <0.5V
		"1": >3V(耐压 100V Voltage should lower than 100V)

2.通讯格式 Communications Format

2.1 基本时序 Basic timing

所有消息均由主机发送，所有从机收到消息后判断从机地址是否吻合，只有在从机地址吻合情况下才允许向主机返回数据。

All messages are sent by the host, all slave after receiving the message to determine whether the slave address match, only in the case of slave address match is allowed to return data to the host.

.2 地址分配 Address allocation

模块 Module	地址 Address
BMS 主控 BMS Master	0x01
蓝牙手机 APP Bluetooth APP	0x20
GPRS	0x40
上位机 Upper	0x80

2.3 UART 通讯格式 UART Communication formats

2.3.1 上位机发送 upper computer

帧头 Frame Head Start Flag	上位机地址 Upper secondary address 通信模块地址 Communication module address	数据 ID Data ID	数据长度 Data Length	数据内容 数据内容 Data	校验和 Checksum (1 byte)
0xA5（固定）Fixed	0x80(UPPER-Add)	参考第 6 节 See Section 6	8 字节（固定）8 bytes (fixed)		

2.3.2 从机响应主机命令 slave response host command

帧头 Start Flag	通信模块地址 Communication module address	数据 ID Data ID	数据长度 Data Length	数据内容 Data	校验和 Checksum (1 byte)
0xA5(固定)Fixed	0x01(BMS-Add)	参考第 6 节 See Section 6	8 字节（固定） 8 bytes (fixed)		

Note:

1. 对于每一个数据,都有固定的数据长度,一次不能读取两个数据。**For each data, there is a fixed data length, two data can not be read at a time.**
2. 检验为之前所有数据之和(只取低字节) 。**Check as the sum of all previous data (take only low bytes).**

3 通讯内容信息 Communications content information

数据 Message	数据 ID Message ID	UPPER - BMS	说明 Remark
总压电流 SOC SOC of Total Voltage Current	0x90	发送 Send	Byte0~Byte7:Reserved
		返回 Return	Byte0~byte1：累计总压（0.1V）pressure (0.1 V) Byte2~byte3：采集总压（0.1V）acquisition (0.1 V) Byte4~byte5：电流（30000 Offset，0.1A）current (Offset,0.1A 30000) Byte6-Byte7：SOC（0.1%）
单体最高最低电压 Maximum Minimum Voltage of Monomer	0x91	发送 Send	Byte0~Byte7:Reserved
		返回 Return	Byte0~byte1：最高单体电压值（mV）maximum monomer voltage (mV) Byte2：最高单体电压cell号Maximum Unit Voltage cell No. Byte3~byte4：最低单体电压值（mV）minimum monomer voltage (mV) Byte5：最低单体电压cell号Minimum Unit Voltage cell No.

单体最高最低温度 Maximum minimum temperature of monomer	0x92	发送 Send	Byte0~Byte7:Reserved
		返回Return	Byte0：最高单体温度值（40 Offset，°C） maximum monomer temperature (40 Offset,°C) Byte1：最高单体温度cell号 Maximum monomer temperature cell No. Byte2：最低单体温度值（40 Offset，°C）minimum monomer temperature (40 Offset,°C) Byte3：最低单体温度cell号Minimum Monomer Temperature cell No.
充放电、MOS 状态 Charge/discharge, MOS status	0x93	发送Send	Byte0~Byte7:Reserved
		返回Return	Byte0：充放电状态（0静止，1充电，2放电）charge/discharge status (0 stationary ,1 charged ,2 discharged) Byte1：充电MOS管状态charging MOS tube status Byte2：放电MOS管状态discharge MOS tube state Byte3:BMS life（0~255循环）BMS life(0~255 cycles) Byte4~Byte7:剩余容量（mAH） residual capacity (mAH)
状态信息1 Status Information 1	0x94	发送 Send	Byte0~Byte7:Reserved
		返回Return	Byte0：电池串数 battery string Byte1：温度个数 temperature Byte2:充电器状态（0断开，1接入）charger status (0 disconnected ,1 connected) Byte3：负载状态（0断开，1接入）load status (0 disconnected ,1 access) Byte4： Bit 0: DI1 state Bit 1: DI2 state Bit 2: DI3 state Bit 3: DI4 state Bit 4: DO1 state Bit 5: DO2 state Bit 6: DO3 state Bit 7: DO4 state Byte 5~Byte6 :充放电循环次数charge/discharge cycles Byte7:Reserved
单体电压 1~48 Cell voltage 1~48	0x95	发送 Send	Byte0~Byte7:Reserved
		返回Return	每个单体电压占2byte，根据实际单体个数发送，最大96byte，分16帧发送Each unit voltage of 2 byte, according to the actual number of units sent, a maximum of 96 byte, divided into 16 frames sent Byte0：帧序号，从0开始，0xFF为无效frame number, starting from 0,0 xFF invalid Byte1~byte6：单体电压（1mV） monomer voltage (1 mV) Byte7:Reserved

单体温度 1~16 Monomer temperature 1~16	0x96	发送 Send	Byte0~Byte7:Reserved
		返回Return	每个温度占1byte，根据实际使用温度个数发送，最大21byte，分3帧发送Each temperature is 1 byte, sent according to the actual number of temperature used, a maximum of 21 byte, divided into 3 frames Byte0：帧序号，从0开始 frame number, starting at 0 Byte1~byte7：单体温度（40 Offset，°C）monomer temperature (40 Offset，°C)
单体均衡状态 Monomer equilibrium state	0x97	发送 Send	Byte0~Byte7:Reserved
		返回Return	0：关闭OFF　　1：开启ON Bit0：单体1均衡状态 monomer 1 equilibrium state ... Bit47：单体48均衡状态monomer 48 equilibrium state Bit48~Bit63：reserved
电池故障状态 Battery failure status	0x98	发送 Send	Byte0~Byte7:Reserved
		返回Return	0 -> No error 1 -> Error Byte 0 Bit 0: 单体电压过高一级告警one stage warning of unit over voltage Bit 1: 单体电压过高二级告警one stage warning of unit over voltage Bit 2: 单体电压过低一级告警 one stage warning of unit over voltage Bit 3: 单体电压过低二级告警two stage warning of unit over voltage Bit 4: 总压过高一级告警Total voltage is too high One alarm Bit 5: 总压过高二级告警Total voltage is too high Level two alarm Bit 6: 总压过低一级告警Total voltage is too low One alarm Bit 7: 总压过低二级告警Total voltage is too low Level two alarm Byte 1 Bit 0: 充电温度过高一级告警Charging temperature too high. One alarm Bit 1: 充电温度过高二级告警 Charging temperature too high. Level two alarm Bit 2: 充电温度过低一级告警 Charging temperature too low. One alarm Bit 3: 充电温度过低二级告警Charging temperature's too low. Level two alarm Bit 4: 放电温度过高一级告警Discharge temperature is too high. One alarm Bit 5: 放电温度过高二级告警Discharge temperature is too high. Level two alarm Bit 6: 放电温度过低一级告警Discharge temperature is too low. One alarm

Bit 7: 放电温度过低二级告警Discharge temperature is too low. Level two alarm

Byte 2
Bit 0: 充电过流一级告警 Charge over current. Level one alarm
Bit 1: 充电过流二级告警Charge over current, level two alarm
Bit 2: 放电过流一级告警 Discharge over current. Level one alarm
Bit 3: 放电过流二级告警Discharge over current, level two alarm
Bit 4: SOC过高一级告警SOC is too high an alarm
Bit 5: SOC过高二级告警SOC is too high. Alarm Two
Bit 6: SOC过低一级告警 SOC is too low. level one alarm
Bit 7: SOC过低二级告警SOC is too low. level two alarm

Byte 3
Bit 0: 压差过大一级告警 Excessive differential pressure level one alarm
Bit 1: 压差过大二级告警 Excessive differential pressure level two alarm
Bit 2: 温差过大一级告警Excessive temperature difference level one alarm
Bit 3: 温差过大二级告警 Excessive temperature difference level two alarm

Byte 4
Bit 0: 充电MOS过温警告charging　MOS overtemperature warning
Bit 1: 放电MOS过温警告 discharge MOS overtemperature warning
Bit 2: 充电MOS温度检测传感器故障charging MOS temperature detection sensor failure
Bit 3: 放电MOS温度检测传感器故障discharge MOS temperature detection sensor failure
Bit 4: 充电MOS粘连故障charging MOS adhesion failure
Bit 5: 放电MOS粘连故障discharge MOS adhesion failure
Bit 6: 充电MOS断路故障charging MOS breaker failure
Bit 7: 放电MOS断路故障discharge MOS breaker failure

Byte 5
Bit 0: AFE采集芯片故障AFE acquisition chip malfunction
Bit 1: 单体采集掉线 monomer collect drop off
Bit 2: 单体温度传感器故障Single Temperature Sensor Fault
Bit 3: EEPROM存储故障EEPROM storage failures
Bit 4: RTC时钟故障RTC clock malfunction
Bit 5: 预充失败 Precharge Failure

			Bit 6: 整车通信故障vehicle communications malfunction Bit 7: 内网通信模块故障intranet communication module malfunction Byte 6: Bit 0: 电流模块故障Current Module Failure Bit 1: 内总压检测模块故障main pressure detection module Bit 2: 短路保护故障Short circuit protection failure Bit 3: 低压禁止充电故障Low Voltage No Charging Bit 4~Bit7: Reserved Byte7: 故障码（如0x03，则显示"故障码3"，0不用显示）fault code (if 0 x 03, show "fault code 3",0 do not show)