

通讯协议

Communication Protocol

版本 V1.2

Version V1.0

1. 版本修订记录 The record of version revisi

序号 Serial No.	描述 Description	日期 Date	版本 Version	作者 Author
1.	初始版本 Initial Version	2019.06.11	V1.0	
2.	修改地址分配 Modify address assignment	2020.11.8	V1.1	
3	修正参考章节数 Modify the number of reference chapters	2020.12.22	V1.2	

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1.物理层 Physical Layer

4.1 UART

1. 物理接口 Physical Interface	UART	
2. 波特率 Baud Rate	9600 bps	
3. 通讯格式 Communication format	9600 , N , 8 , 1	
4. 有效电平 Effective voltage platform	Transmit	“0”: <0.5V
	TXD	“1”: OC (耐压 100V Voltage should lower than 100V)
	Receive	“0”: <0.5V
	RXD	“1”: >3V(耐压 100V Voltage should lower than 100V)

2.通讯格式 Communication 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. will judge whether the address of the slave is the same after all the slaves receive the message, . Only when the address of the slave is the same, data is allowed to return to the host.

2.2 地址分配 Address Assignment

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

2.3 UART 通讯格式 (UART communication format)

2.3.1 上位机发送 Upper computer transmit

帧头 Start Flag	上位机地址 Upper computer 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) 0xA5 (Fixed)	0x40(UPPER-Add)	参考第 3 节 See Section 3	8 字节 (固定) 8 byte (Fixed)		

2.3.2 从机响应主机命令 The slave responds to the host command

帧头 Start Flag	通信模块地址	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) 0xA5 (Fixed)	0x01(BMS-Add) 0x01(BMS-Add)	参考第 3 节 See Section 3	8 字节 (固定) 8 byte (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, and two data cannot be read at a time
2. 检验为之前所有数据之和(只取低字节) 。 Check to be the sum of all previous data (only low byte)

3.通讯内容信息 Communication content information

数据 Message	数据 ID Message ID	UPPER - BMS	说明 Remark
总压电流 SOC Total voltage current SOC	0x90	发送 SEND	Byte0~Byte7:Reserved
		返回 Return	Byte0~byte1: 累计总压 (0.1V) Cumulative total voltage(0.1V) Byte2~byte3: 采集总压 (0.1V) Collect total voltage(0.1V) Byte4~byte5: 电流 (30000 Offset, 0.1A) Current (30000 Offset, 0.1A) Byte6-Byte7: SOC (0.1%)
单体最高最低电 压 Single highest and lowest voltage	0x91	发送 SEND	Byte0~Byte7:Reserved
		返回 Return	Byte0~byte1: 最高单体电压值 (mV) Highest single voltage Value (mV) Byte2: 最高单体电压cell号 The cell No. of highest single voltage cell No. Byte3~byte4: 最低单体电压值 (mV) Lowest single voltage Value (mV) Byte5: 最低单体电压cell号 The cell No. of lowest single voltage
单体最高最低温 度 Single maximum and minimum temperature	0x92	发送 SEND	Byte0~Byte7:Reserved
		返回 Return	Byte0: 最高单体温度值 (40 Offset, ° C) Highest single temperature Value (40 Offset, ° C) Byte1: 最高单体温度cell号 The cell No. of highest single voltage Byte2: 最低单体温度值 (40 Offset, ° C) Lowest single temperature Value (40 Offset, ° C) Byte3: 最低单体温度cell号 The cell No. of lowest single voltage
充放电、MOS 状 态 Charge and 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 and discharge status (0 static, 1 charge, 2 discharge) Byte1: 充电MOS管状态 The status of charging MOS tube Byte2: 放电MOS管状态 The status of discharging MOS tube Byte3:BMS life (0~255循环) Byte4~Byte7:剩余容量 (mAh) The remaining capacity (mAh)
状态信息1 Status info1	0x94	发送 SEND	Byte0~Byte7:Reserved
		返回 Return	Byte0: 电池串数 Battery Strings Byte1: 温度个数 The number of temperature Byte2:充电器状态 (0断开, 1接入) Charger Status(0 off, 1 access) Byte3: 负载状态 (0断开, 1接入) Load Status(0 off, 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~Byte 7:Reserved
单体电压 1~48 Single cell voltage 1~48V	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 cell voltage occupies 2byte, sending by the actual cell number, the maximum is 96byte, divided into 16 frames to send Byte0: 帧序号, 从0开始, 0xFF为无效 Byte0: Frame serial number, starting from 0, 0xFF is invalid Byte1~byte6: 单体电压 (1mV) Single Cell voltage (1mV) Byte7:Reserved
单体温度 1~16 Single cell 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 cell temperature occupies 1byte, sending by the actual temperature number, the maximum is 21byte, divided into 3 frames to send Byte0: 帧序号, 从0开始 Frame serial number, starting from 0 Byte1~byte7: 单体温度 (40 Offset, ° C) Single cell temperature (40 Offset, ° C)
单体均衡状态 Single cell balance status	0x97	发送 SEND	Byte0~Byte7:Reserved
		返回 Return	0: 关闭 1: 开启 0: Off 1: On Bit0: 单体1均衡状态 Single cell 1 balance status ... Bit47: 单体48均衡状态 Single cell 48 balance status 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 Single cell voltage is too high level 1 alarm Bit 1: 单体电压过高二级告警 Single cell voltage is too high level 2 alarm Bit 2: 单体电压过低一级告警 Single cell voltage is too low level 1 alarm Bit 3: 单体电压过低二级告警 Single cell voltage is too low level 2 alarm

			<p>Bit 4: 总压过高一级告警 Total voltage is too high level 1 alarm</p> <p>Bit 5: 总压过高二级告警 Total voltage is too high level 2 alarm</p> <p>Bit 6: 总压过低一级告警 Total voltage is too low level 1 alarm</p> <p>Bit 7: 总压过低二级告警 Total voltage is too low level 2 alarm</p> <p>Byte 1</p> <p>Bit 0: 充电温度过高一级告警 Charging temperature is too high level 1 alarm</p> <p>Bit 1: 充电温度过高二级告警 Charging temperature is too high level 2 alarm</p> <p>Bit 2: 充电温度过低一级告警 Charging temperature is too low level 1 alarm</p> <p>Bit 3: 充电温度过低二级告警 Charging temperature is too low level 2 alarm</p> <p>Bit 4: 放电温度过高一级告警 Discharging temperature is too high level 1 alarm</p> <p>Bit 5: 放电温度过高二级告警 Discharging temperature is too high level 2 alarm</p> <p>Bit 6: 放电温度过低一级告警 Discharging temperature is too low level 1 alarm</p> <p>Bit 7: 放电温度过低二级告警 Discharging temperature is too low level 2 alarm</p> <p>Byte 2</p> <p>Bit 0: 充电过流一级告警 Charging over-current is too high level 1 alarm</p> <p>Bit 1: 充电过流二级告警 Charging over-current is too high level 2 alarm</p> <p>Bit 2: 放电过流一级告警 Discharging over-current is too high level 1 alarm</p> <p>Bit 3: 放电过流二级告警 Discharging over-current is too high level 2 alarm</p> <p>Bit 4: SOC过高一级告警 SOC is too high level 1 alarm</p> <p>Bit 5: SOC过高二级告警 SOC is too high level 2 alarm</p> <p>Bit 6: SOC过低一级告警 SOC is too low level 1 alarm</p> <p>Bit 7: SOC过低二级告警 SOC is too low level 2 alarm</p> <p>Byte 3</p> <p>Bit 0: 压差过大一级告警 The voltage difference is too big level 1 alarm</p> <p>Bit 1: 压差过大二级告警 The voltage difference is too big level 2 alarm</p> <p>Bit 2: 温差过大一级告警 The temperature difference is too big level 1 alarm</p> <p>Bit 3: 温差过大二级告警 The temperature difference is too big level 2 alarm</p> <p>Bit 4~Bit7: Reserved</p> <p>Byte 4</p> <p>Bit 0: 充电MOS过温警告 Charging MOS over-temperature alarm</p> <p>Bit 1: 放电MOS过温警告 Discharging MOS over-temperature alarm</p> <p>Bit 2: 充电MOS温度检测传感器故障 Charging MOS temperature detection sensor failure</p> <p>Bit 3: 放电MOS温度检测传感器故障 Discharging MOS temperature detection sensor failure</p> <p>Bit 4: 充电MOS粘连故障 Charging MOS involve failure</p> <p>Bit 5: 放电MOS粘连故障 Discharging MOS involve failure</p> <p>Bit 6: 充电MOS断路故障 Charging MOS Open circuit failure</p>
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		<div>Bit 7: 放电MOS断路故障 Discharging MOS Open circuit failure</div> <div>Byte 5</div> <div>Bit 0: AFE采集芯片故障 AFE collection chip failure</div> <div>Bit 1: 单体采集掉线 Single collection dropped</div> <div>Bit 2: 单体温度传感器故障 Single temperature sensor failure</div> <div>Bit 3: EEPROM存储故障 EEPROM storage failure</div> <div>Bit 4: RTC时钟故障 RTC clock failure</div> <div>Bit 5: 预充失败 Precharge failed</div> <div>Bit 6: 整车通信故障 Whole vehicle communication failure</div> <div>Bit 7: 内网通信模块故障 Intranet communication module failure</div> <div>Byte 5:</div> <div>Bit 0: 电流模块故障 Current module failure</div> <div>Bit 1: 内总压检测模块故障 Internal total voltage detection module failure</div> <div>Bit 2: 短路保护故障 Short circuit protection failure</div> <div>Bit 3: 低压禁止充电故障 Low voltage prohibit charging failure</div> <div>Bit 4~Bit7: Reserved</div> <div>Byte7: 故障码（如0x03，则显示“故障码3”，0不用显示） Fault code (such as 0x03, it will display "fault code 3", 0 does not displayed)</div>
	返回	<div>Byte 0:result(0 fault, 1 success)</div> <div>Byte 1-Byte 7:Reserved</div>