

User Manual

1. 模块 Module

蓝牙模块正面 Bluetooth Module, Front



蓝牙模块背面 Bluetooth Module, Back



2. 天线

使用 PCB 天线 Using PCB antenna



使用 PCB 天线时，模块上 R1 焊接，R2 不焊接。不需要额外器件。

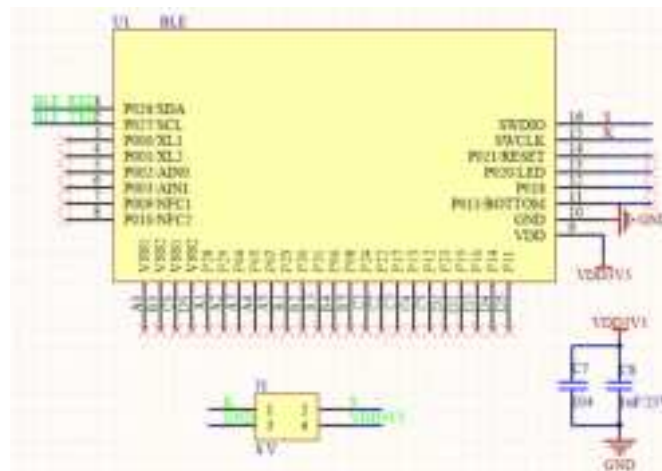
Weld R1 when using PCB antenna.

3. 接口说明 Ports Instructions



Port	Function	Direction	Notes
/	VCC	/	Typically 3.3V, Vmax=3.6V
/	GND	/	Grounded
P27	UART_RX	I	Module serial port receiver, input pull-up
P26	UART_TX	O	Module serial port transmitter, input pull-up
	DIO	I	Flash
	CLK	I	Flash

4. 最小系统原理图 System principle diagram, minimum



Notes:

1) 模块应使用 2.7V-3.3V 供电，不应该超出最大供电电压。

Power input range is 2.7V to 3.3V. The maximum supply voltage should not be exceeded.

2) 模块通过串口与外部设备进行通信。

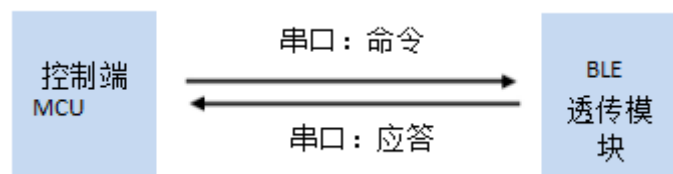
Module communicates with external through serial ports

串口配置：Serial port specifications:

- 波特率 Baud rate 115200
- 数据位 Data bits : 8bits
- 停止位 Stop bit : 1
- 奇偶校验 Parity check : No

3) 控制端 MCU 与模块通信如下图

Communication between MCU control end and BLE module





5. 接口说明 Interface

在命令模式下，MCU 发出命令，模块收到命令后，就会立即解析该命令，并给出相应的响应帧，从发出命令到收到相应需要一定的时间。命令的响应时间不会超过 20ms，典型值在 8-10ms 之间，在模块有其他更高级的任务处理的时候，响应时间会变长一些，但不会超过 20ms。

MCU 要将数据发送出去时，需要遵循一定的时序，低功耗蓝牙的通信速率是有限的，为了防止拥塞造成的大量丢包，MCU 向模块写入数据的速率不能太快。每包数据需要间隔 20ms。

In command mode, MCU will send commands, and after the module received a command, the module will immediately parse the command and give the corresponding response frame. It takes a certain time from issuing the command to receiving the corresponding frame. The response time of the command will not exceed 20ms, typical values are between 8-10ms, and the response time will be longer when the module has other more advanced tasks to process, but will not exceed 20ms.

When MCU needs to send data out, it needs to follow a certain time sequence. The communication rate of low power consumption Bluetooth is limited. In order to prevent packet loss caused by congestion, the MCU cannot write data to the module at an extremely fast rate. The interval for each data packet should be at least 20ms.

1) 串口数据帧结构 Serial data frame structure

透传模块的命令有一定的格式，包含“字头”、“命令 ID”、“命令信息长度”、“命令信息”五个区域。Commands from transparent transmission module have certain format. The

command should contain five parts, which are prefix (2 parts), command ID, command length and command data.

2) 串口命令 Serial port command

发送 Send command

字头Prefix I	01	1 byte
字头Prefix II	FC	1 byte
命令 ID Command ID	CMD	1 byte
信息长度 Command length	LEN	1 byte
信息内容 Command data	DATA	N byte (N<255)

应答 Answer command

字头Prefix I	04	1 byte
字头Prefix II	FC	1 byte
命令 ID Command ID	CMD	1 byte
信息长度 Command length	LEN	1 byte
信息内容 Command data	DATA	N byte (N<255)

3) 串口命令 Serial port command

0x07	查询MAC地址 Querying MAC Addresses
0x12	设置广播 Set broadcast
0x25	连接到指定设备 Connect to the specified device
0x2A	已连接Connected
0x41	发送数据 Send data

0x42	收到数据 Receive data
0x43	断开连接 Disconnect
0x48	睡眠 Sleep

4) 常用指令说明 Frequently used commands

命令字	命令描述	示例
07	MAC 地址查询	<p>格式：01 FC 07 00</p> <p>返回：命令正确 04 FC 07 06 xx...(共 6 个字节，低字节序)</p>
12	广播数据设置	<p>格式：01 FC 12 xx (广播数据长度) xx... (广播数据)</p> <p>广播数据长度取值范围是 1-29，必须与后面广播数据字节数相符</p> <p>上电默认：空</p>
41	发送数据 (透传)	<p>格式：01 FC 41 xx (数据长度) xx... (用户数据)</p> <p>数据长度取值范围是 1-80，用户数据字节数必须和数据长度相符</p> <p>返回：能正常发送 04 FC 01 00</p>
42	接收数据 (透传)	<p>MCU 向模块发送该命令无效，当模块收到数据，并且模块处于命令模式时，模块主动向 MCU 发送该命令的响应，响应的格式如下：</p> <p>04 FC 42 xx(数据长度) xx... (用户数据)</p> <p>数据长度的范围是 1-20，后面紧跟用户数据</p>

Command	Description	Example
07	Querying MAC Addresses	<p>Format: 01 FC 07 00</p> <p>Return: Correct command should be 04 FC 07 06 xx... (Total 6 bytes, low byte order)</p> <p>Incorrect command should be 04 FC 02 00</p>
12	Set broadcast	<p>Format: 01 FC 12 xx (broadcast data length) xx... (Broadcast data)</p> <p>The broadcast data length ranges from 1 to 29 bytes and must be consistent with the number of broadcast data bytes</p> <p>Power-on Default: None</p> <p>Correct command should be 04 FC 01 00</p> <p>Incorrect command should be 04 FC 02 00</p>
41	Send data (Not encrypted)	<p>Format: 01 FC 41 xx (Data length) xx... (User data)</p> <p>The data length ranges from 1 to 80. The number of data bytes must be consistent with the data length</p> <p>Correct command should be 04 FC 01 00</p> <p>Incorrect command should be 04 FC 02 00</p>
42	Receive data (Not encrypted)	<p>It is invalid for MCU to send the command to the module.</p> <p>When the module receives data and is in command mode, the module actively sends the response of the command to the MCU in the following format:</p> <p>04 FC 42 xx(Data length) xx... (User data)</p> <p>Data length ranges from 1 to 20, followed by user data</p>

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
"Contains Transmitter Module FCC ID: 2AT86BT832X Or Contains FCC ID: 2AT86BT832X"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference.
 - (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with Single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C : 15.247 and 15.209 requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 requirement, then the host can be sold legally.