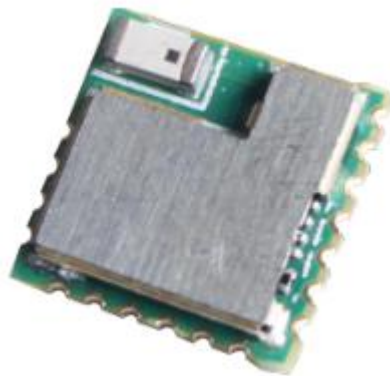




WH-BLE103 Hardware Manual

File version: V1.0.0.01





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1. Product overview

1.1. Dimension

Module dimension diagram as follow:

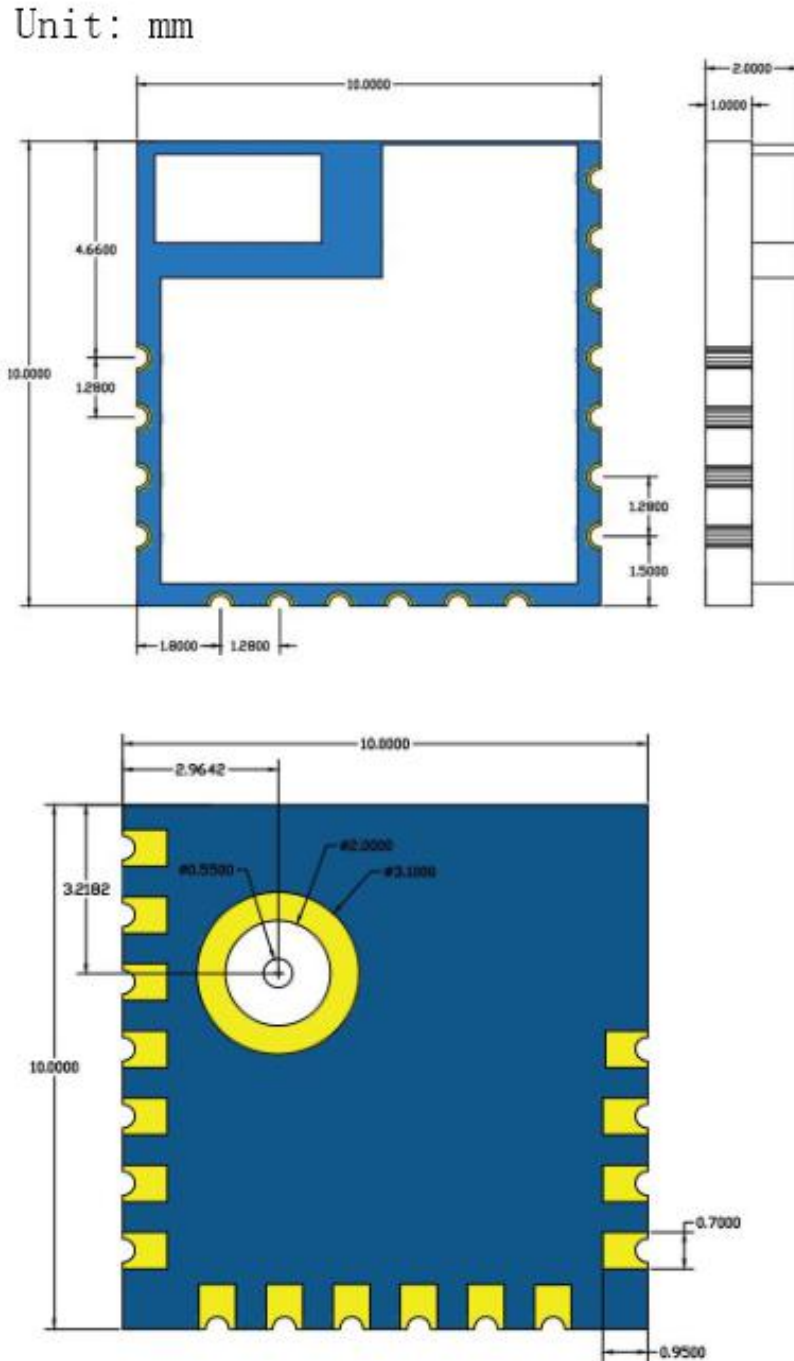


Figure 1 Dimension diagram

1.2. Encapsulation

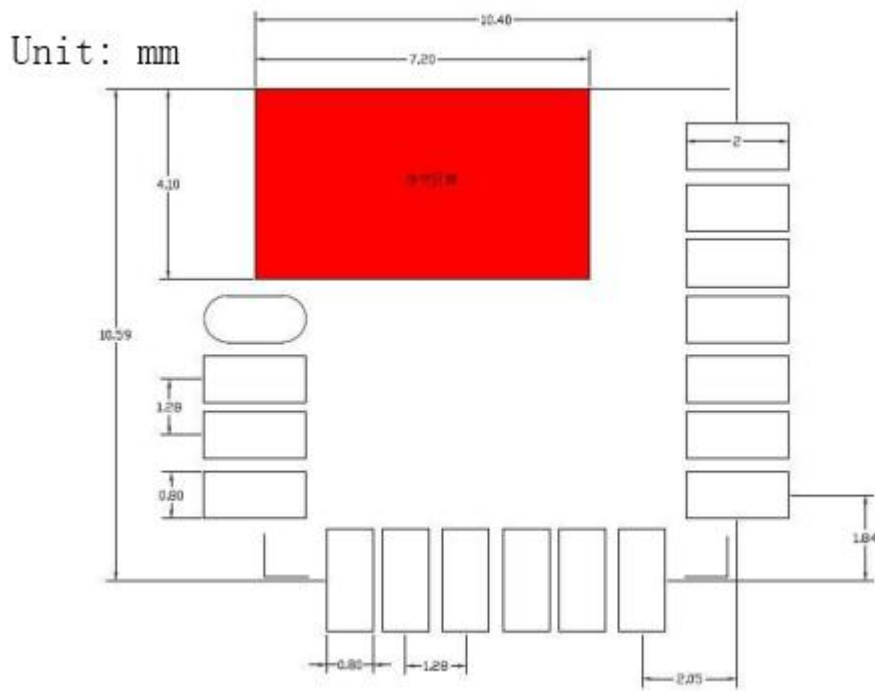
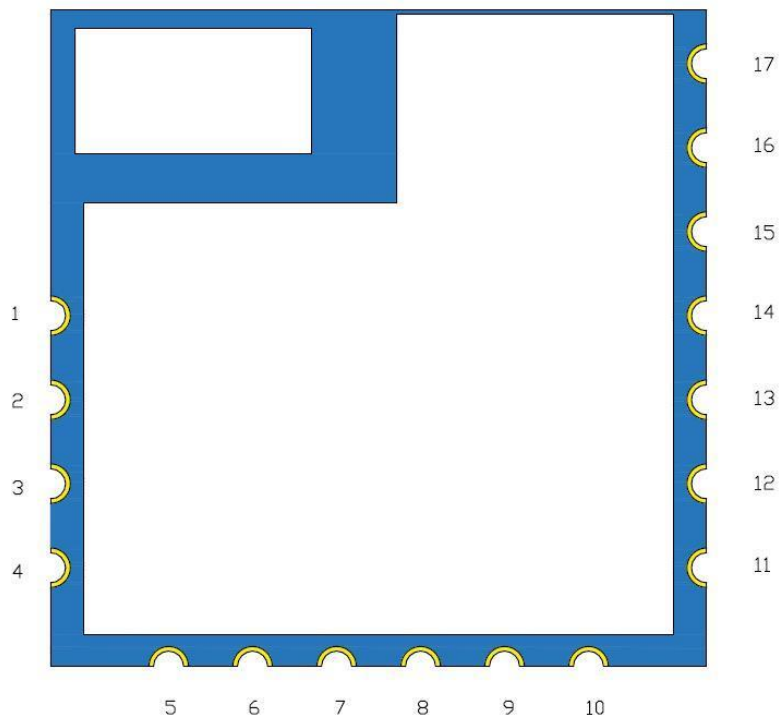


Figure 2 Encapsulation

1.3. Pin definition



PIN	Name	Signal type	Definition
1	nReload	I	Pull down to low level 3 seconds to 10 seconds can reset module to default settings.

2	Wake	I	Pull down to low level over 1 second to wake up module
3	GPIO1	IO	General IO1. Control pin of serial port downloading.
4	ADC	I	AD acquisition pin.
5	GPIO2	IO	General IO2.
6	VBAT	P	Power supply pin. Voltage range: 1.7V~3.6V.
7	SWCLK	IO	SWD clock pin. Downloading interface.
8	SWDIO	IO	SWD data pin. Downloading interface.
9	UART_TX	O	UART_TX pin.
10	UART_RX	I	UART_RX pin.
11	LINK	O	Indication pin of connection status.
12	nReset	I	Restart module and take effect in low level.
13	GND	P	Power ground.
14	VBAT	P	Power supply pin. Voltage range: 1.7V~3.6V.
15	GND	P	Power ground.
16	RF	IO	RF pin. External antenna.
17	GPIO3	IO	General IO3.

Figure 3 Pin definition

Module minimum system can be constituted by VBAT, GND, UART_TX, UART_RX. User can also add nReload, Wake, LINK, nReset according to own needs. When user adopts external bonding pad pin antenna WH-BLE103b, user needs to connect RF pin to external antenna.

ADC, GPIO1, GPIO2, GPIO3 are reserved function and user can contact to technical support engineer for customized development.

Serial port downloading: Besides using SWD interface to download firmware, user can also use serial port downloading. Pins are UART_TX, UART_RX and GPIO1. GPIO1 is control pin of serial port downloading. Pull up GPIO1 pin before powering module or restarting module and then pull down GPIO1 pin after starting module, it can make module enter firmware upgrade mode and user can download firmware by serial port at the moment.

2. Hardware design

2.1. Typical connection

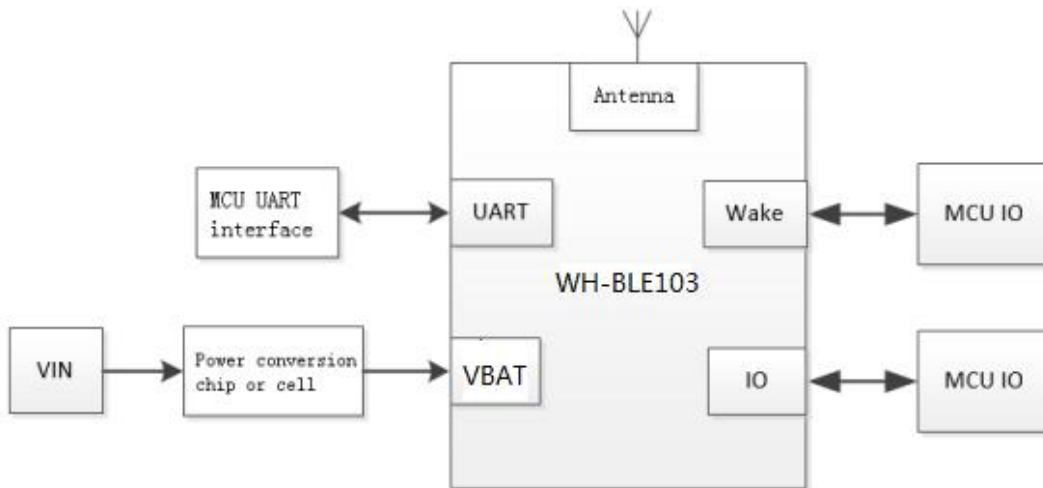


Figure 4 Typical connection

2.2. Power interface

Working voltage range from 1.7V to 3.6V, 3.3V is recommended. Peak current is 30mA. Pin has reserved high frequency filter capacitance and $10\mu\text{F}+0.1\mu\text{F}+1\text{nF}+100\text{pF}$ is recommended. If the application environment is bad, module will often suffer ESD interference or EMC requirement is high, series connection with magnetic bead or parallel connection with TVS is recommended to increase module stability.

When user designs the peripheral circuit for BLE103, these should be ensured: 1. Provide adequate power supply. 2. Voltage range from 1.7V to 3.6V. 3. Peak power supply voltage is less than 200mV. 4. Place large capacitance after DC/DC or LDO to prevent external power supply voltage dropping during pulse current period.

2.3. UART interface

If module adopts 3.3V power supply and communicates to MCU with 3.3V, user just needs to connect TXD of module to RXD of MCU and RXD of module to TXD of MCU. When communicates to MCU with unmatched level (such as 5V), switching circuit is necessary. Switching circuit diagram as follow:

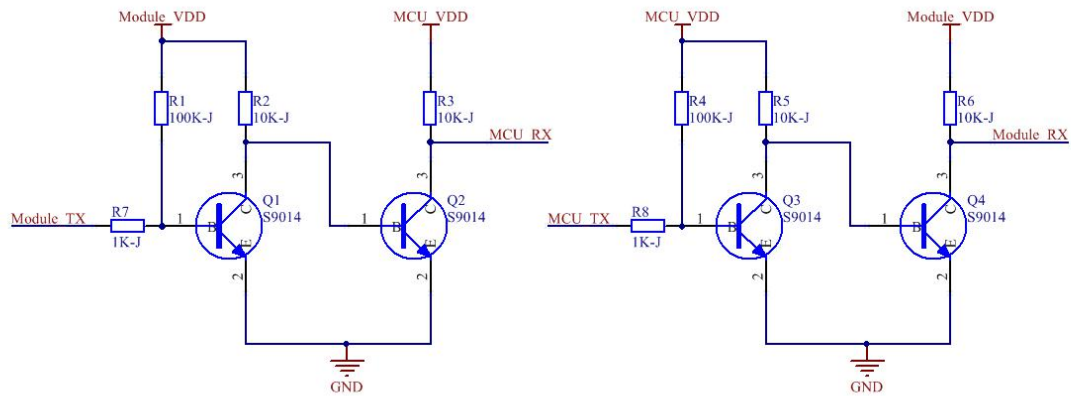


Figure 5 Switching circuit

This level switching circuit can support baud rate to 230400. If user adopts 460800 or above baud rate, user needs to use high speed optocoupler or specialized level switch chip to establish level switching circuit.

2.4. nReset and nReload

nReset: Restart the module and take effect in inputting low level. nReset pin connects to internal 100K Ohm pull-up resistor and also connects to 100nF earth capacitance. Press over 100us and release to restart the module.

nReload: nReload pin can connect to external button or configuration pin. Press 3-10 seconds to reset to default settings. nReload pin connects to internal 10K Ohm pull-up resistor.

Circuit diagram as follows:

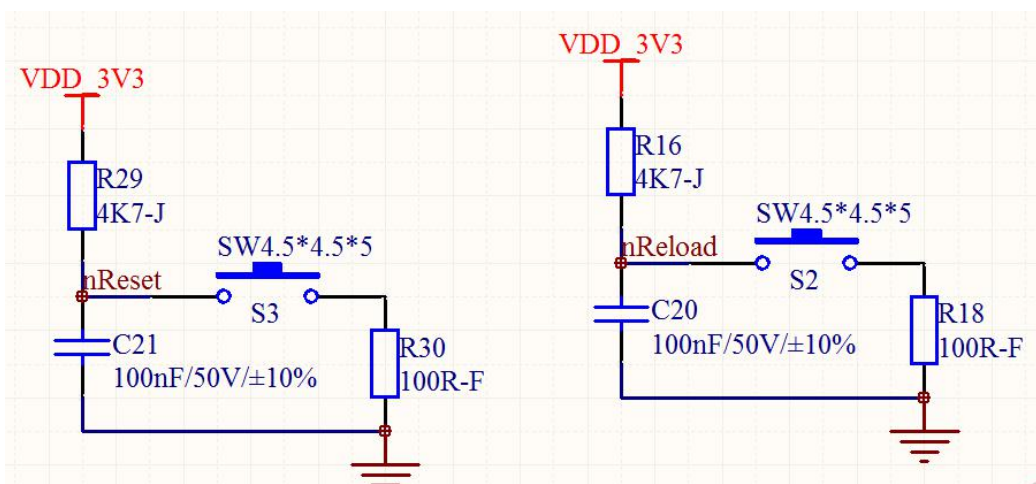


Figure 6 nReset and nReload circuit

Note: Because module has internal pull-up resistor and earth capacitance. R29 and C21 in nReset circuit can choose not to weld which are same as R16 in nReload circuit.

2.5. Wake up pin

Pin 2 of module is wake up pin and will take effect in low level over 1 second. User doesn't need to connect to external pull-up resistor.

2.6. RF interface

RF interface adopts two methods: internally installed antenna and external bonding pad pin antenna. We provide internally installed antenna WH-BLE103a and external bonding pad pin antenna WH-BLE103b.

2.6.1. WH-BLE103a

User needs to follow these rules when adopts WH-BLE103a solution:

1. On PCB board, user can't place component on antenna part as follow red line area:

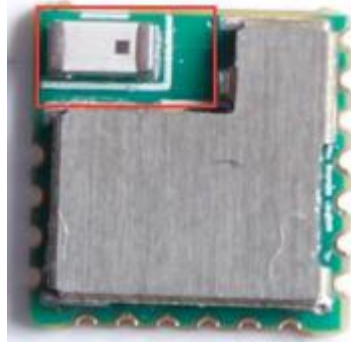


Figure 7 WH-BLE103a antenna part

2. Keep antenna away from metal, maintain a distance at least 10 mm from surrounding high components.

3. Antenna must be placed on edge of board.

4. Antenna can't be covered by metal shell and keep at least 10mm away from plastics shell.

5. When user places BLE103 on test board, please place BLE103 on the area as follow Figure to reduce influence to antenna and wireless signal.

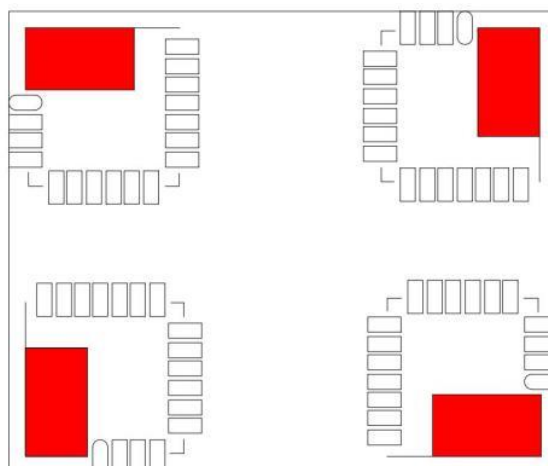


Figure 8 WH-BLE103a area

2.6.2. WH-BLE103b

User needs reserved π type match circuit on PCB board. RF line need guarantee 50ohm impedance matching and try to be short to reduce attenuation of signal. User can refer to below reserved match circuit:

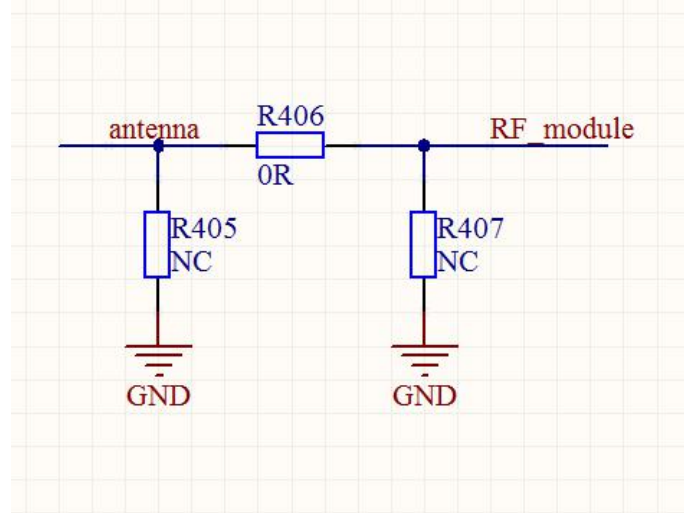


Figure 9 WH-BLE103b reserved match circuit

Note:

1. Module is recommended to be placed on edge of PCB board to shorten the distance to antenna and this can help to reduce attenuation of signal. RF line need guarantee 50ohm impedance matching to avoid lowering signal quality.
2. Keep RF line away from power supply, clock signal and other signal source which maybe cause interference.
3. When user places antenna, it is necessary to ensure antenna in exposed status and it would better be vertically upward. User can't place antenna in metal shell which can greatly reduce transmission distance.



3. Contact

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4. Disclaimer

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5. Update History

2018-07-05 V1.0.0.01 established.