WH-BLE102 Hardware Manual

File version: V1.0.1.02

Content

1. Product overview

1.1. Dimension

Module dimension diagram as follow:

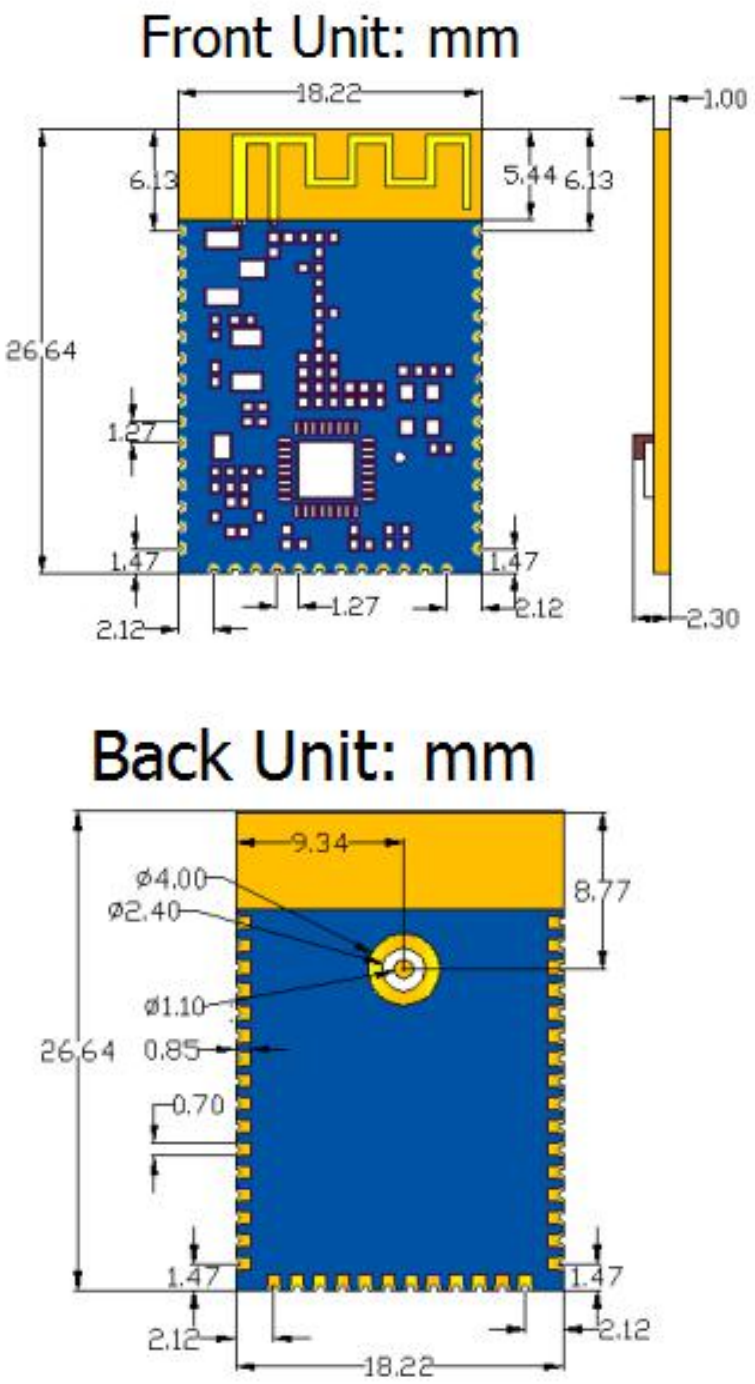


Figure 1 Dimension diagram

1.2. Encapsulation

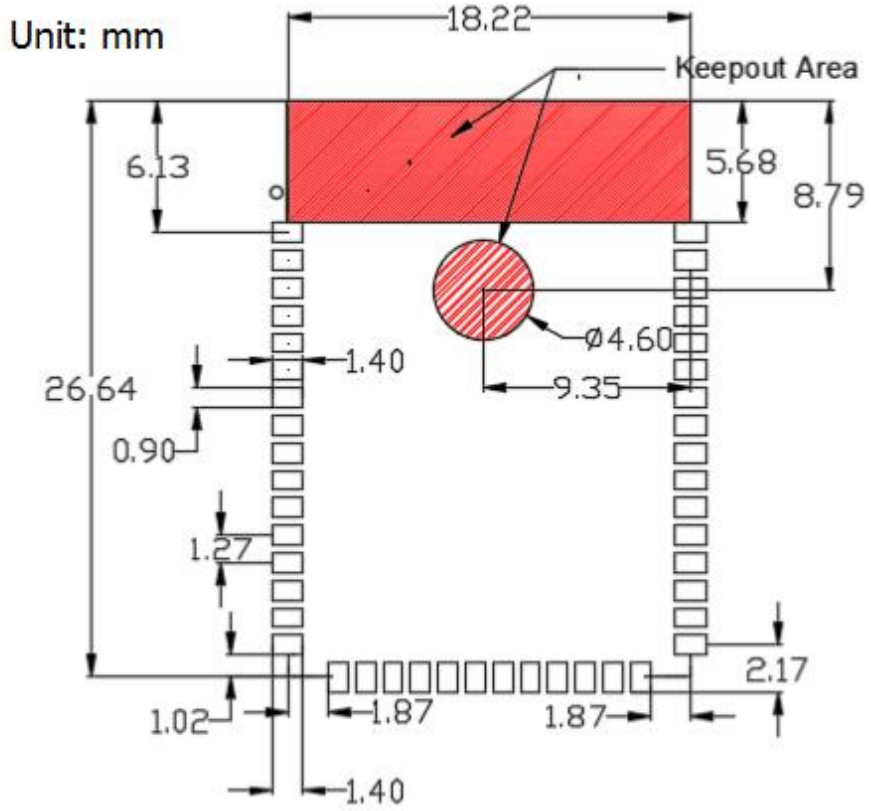
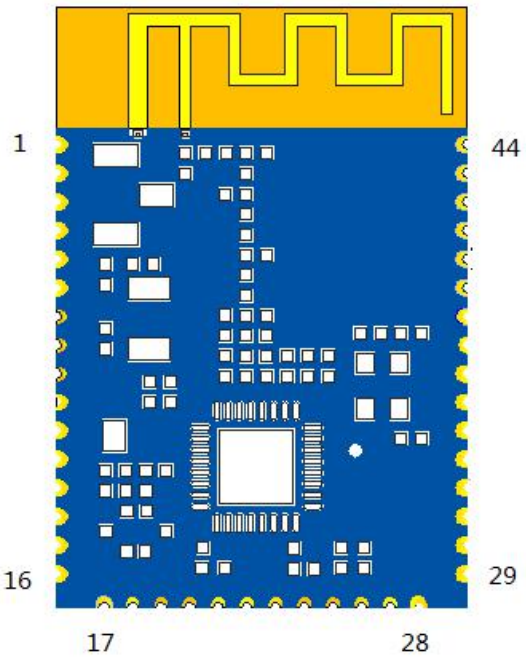


Figure 2 Encapsulation

1.3. Pin definition



PIN	Name	Signal Type	Definition
1	GND	P	Power Ground
2	RFIO	IO	RF input/output
3	NC	NC	Not available
4	nReset	I	Restart module, take effect in low level
5	NC	NC	Not available
6	NC	NC	Not available
7	NC	NC	Not available
8	NC	NC	Not available
9*	I2C_SDA	IO	Reserved I2C_SDA function, can be GPIO
10*	I2C_SCL	IO	Reserved I2C_SCL function, can be GPIO
11	GND	P	Power Ground
12	GND	P	Power Ground
13	VCC	P	VCC pin, range from 1.7V to 3.6V
14	VCC	P	VCC pin, range from 1.7V to 3.6V
15	NC	NC	Not available
16	NC	NC	Not available
17	GND	P	Power Ground
18	NC	NC	Not available
19	UART_TX	O	UART TX pin
20	UART_RX	I	UART RX pin
21	nReload	I	Pull down 3seconds to 10 seconds to restore default settings
22*	ADC	I	Module ADC collecting pin
23	LED	O	LED pin
24*	UART_CTS	IO	Reserved module Flow Control pin, can be GPIO Chip selection pin of upgrading firmware by serial port
25*	UART_RTS	IO	Reserved module Flow Control pin, can be GPIO
26	SWDIO	IO	SWD data, Reserved SPI MOSI pin
27	SWCLK	IO	SWD clock, Reserved SPI MISO pin
28	GND	P	Power Ground
29	GND	P	Power Ground
30	NC	NC	Not available
31	NC	NC	Not available
32*	PWM2	O	PWM2 pin
33	NC	NC	Not available
34*	SPI_CLK	IO	Reserved SPI clock pin TX pin of upgrading firmware by serial port
35	NC	NC	Not available
36	NC	NC	Not available
37	NC	NC	Not available
38*	Wake	I	Module waking up pin and take effect in low level over 1 second

			Reserved SPI chip selection pin RX pin of upgrading firmware by serial port
39	NC	NC	Not available
40	NC	NC	Not available
41*	PDM_CLK	IO	Reserved PDM clock pin
42*	PDM_DATA	IO	Reserved PDM data pin
43	NC	NC	Not available
44	GND	P	Power Ground

Figure 3 Pin definition

Note: Pin with label * have reserved I2C, SPI, PDM, ADC function. If user needs these function, user can contact our company technical support engineer for customization.

2. Hardware design

2.1. Typical connection

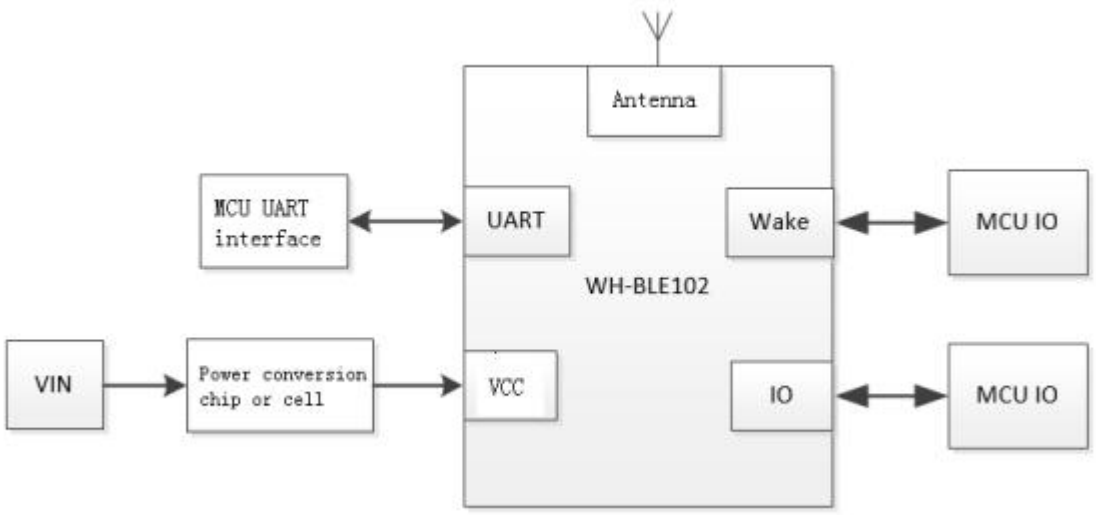


Figure 4 Typical connection

2.2. Power interface

Working voltage VCC range from 1.7V to 3.6V, 3.3V is recommended. Peak current is 15mA. Pin has reserved high frequency filter capacitance and 10uF+0.1μF+1nf+100pf is recommended. If the application environment is bad, module will often suffer ESD interfered or EMC requirement is high, series connection with magnetic bead or parallel connection with TVS is recommended to increase module stability.

When user design the peripheral circuit for BLE102, 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 300mV. 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 communicate 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 communicate to MCU with unmatched level(such as 5V), switching circuit is necessary. Switching circuit diagram as follow:

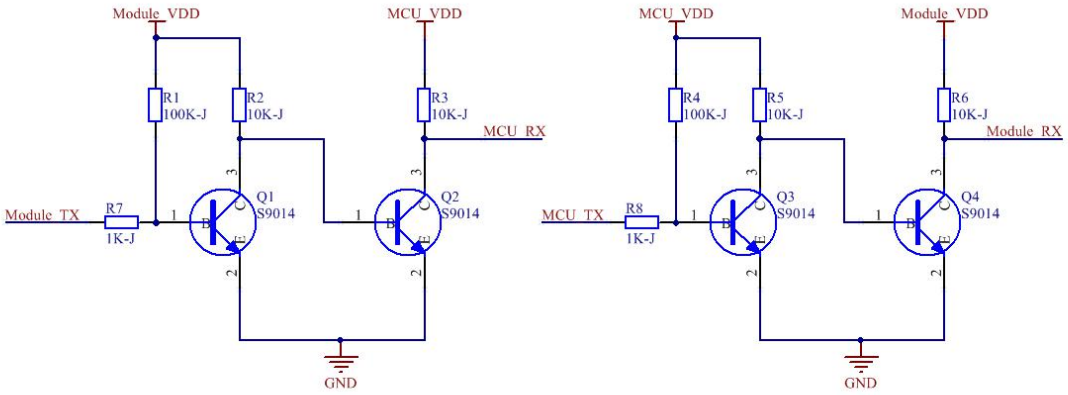


Figure 5 Switching circuit

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 to 3.3V 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 restore default settings. nReload pin connects to internal 10K Ohm pull-up resistor.

Circuit diagram as follows:

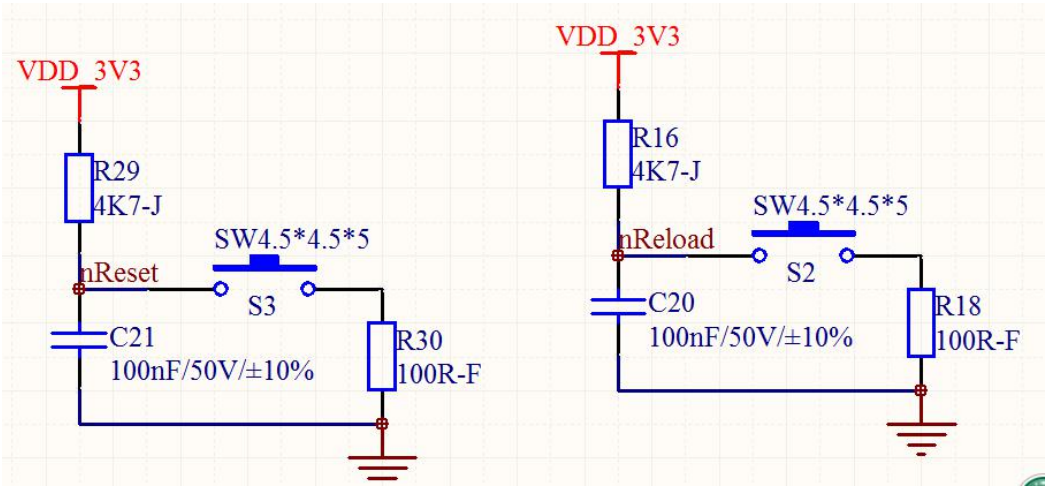


Figure 6 nReset and nReload circuit

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 38 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 can adopt 3 method: internally installed antenna, external IPEX socket antenna and external bonding pad pin antenna. We provide internally installed antenna WH-BLE102a and external IPEX socket antenna WH-BLE102b.

2.6.1. WH-BLE102a

User need follow these rules when adopt WH-BLE102a solution:
1.On PCB board, user can't place component on antenna part as follow red line area:

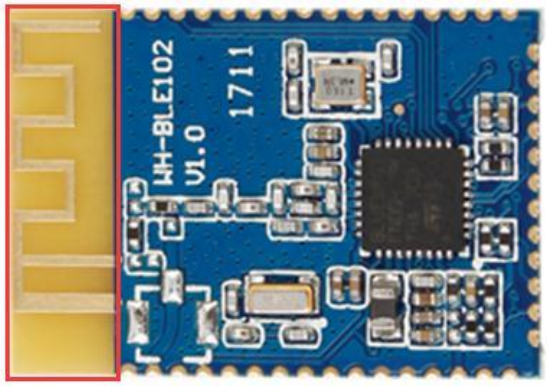


Figure 7 WH-BLE102a antenna part

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 BLE102 on test board, please place BLE102 on the area as follow Figure to reduce influence to antenna and wireless signal.

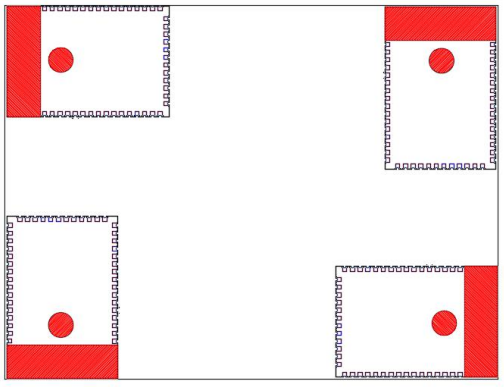


Figure 8 WH-BLE102a area

2.6.2. WH-BLE102b

When user adopts this method, please pay special attention to module RF pin. That's to say should keep RF pin(pin 2 of module) in not available status and connect antenna directly to IPEX socket.

2.6.3. External bonding pad pin antenna

User need 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:

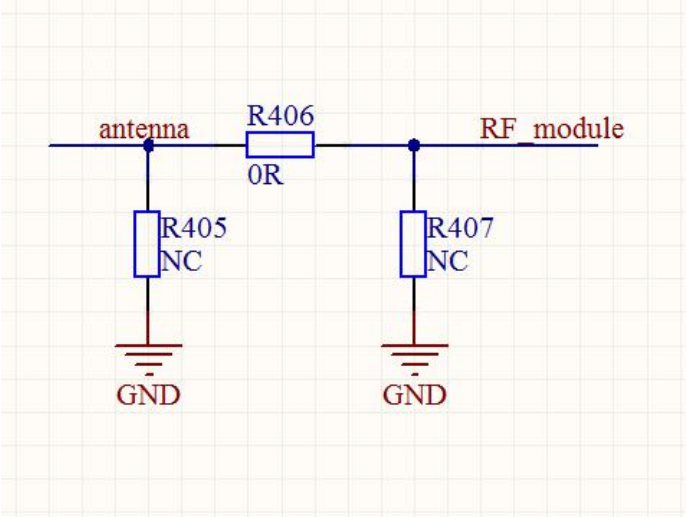


Figure 9 WH-BLE102 reserved match circuit

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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5. Update History

2018-03-01 V1.0.1.01 established.
2018-07-05 V1.0.1.02 updated.