



User Manual for HC-42 Bluetooth Serial Port Module

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Release Date: June 18, 2018 Version: V2.0

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| Software Version : HC-42V2.0 2018-06-18 |
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|--|
| Hardware Version : V1.0 2018-01-12 |
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1. About the Module HC-42

1.1 Features

The HC-42 Bluetooth serial communication module is a new generation of data transmission module based on Bluetooth Specification V5.0 BLE Bluetooth protocol.

Its radio operating frequency band is 2.4GHz ISM, and the modulation method is GFSK. Such module has a maximum transmit power of 4dBm and the receiving sensitivity of -96dBm.

The module has a dimension of 26.9mm×13mm×2.0mm and integrates stamp hole packaging process. It can be embedded into application system in an easy manner.



1.2 Basic Parameters

| Description | Value | Description | Value |
|-------------------------|---|-----------------------|----------------------|
| Model | HC-42 | Dimensions | 26.9X13mm |
| Operating band | 2.4G | Air data rate | 1Mbps/2Mbps |
| Operating voltage | 1.8~3.6V | Antenna interface | Built-in PCB antenna |
| Operating current | Refer to Table 1.3 | Shutdown current | 0.3μA |
| Communication interface | UART | Receive sensitivity | -96dBm@1Mbps |
| Communication level | 1.8~3.6V, consistent with operating voltage | Operating humidity | 10%~90% |
| Transmission power | -40~4dBm | Storage temperature | -40℃~+85℃ |
| Reference range | 40m/2Mbps (Bluetooth 5.0) | Operating temperature | -25℃~+75℃ |

1.3 Electrical features

| | Value | Remarks |
|--|---------------|---|
| Voltage | 1.8V~3.6V | If button cell is used, the voltage must be above 2.5V. |
| Reference current (Not include LED) | 1.23mA/1.22mA | Full broadcast/full connection |
| | 75μA/65μA | Power broadcast/low power connection (operating current varies with broadcast interval) |
| | 0.3μA | Shutdown |

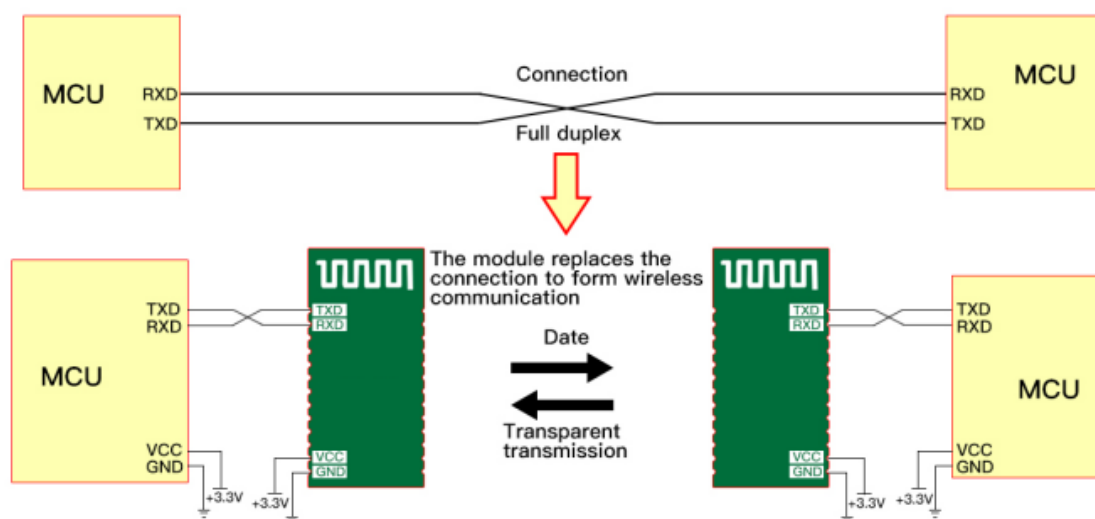
Note: The above-mentioned current data are obtained based on the temperature of 25℃, working voltage of 3.3V, and factory default configuration. There may be errors in actual use.

1.4 Products

| Model | Communication protocol | Operating frequency | Communication range | Air data rate | Dimensions | Embedding mode | Features |
|-------|------------------------|---------------------|---------------------|---------------|-------------|----------------|---------------------------|
| HC-08 | Bluetooth 4.0 | 2.4G | 40m | 1Mbps | 26.9*13*2mm | SMT | BLE low power consumption |
| HC-02 | Bluetooth 2.0 | 2.4G | 10m | 2Mbps | 26.9*13*2mm | SMT | Dual-mode Bluetooth |
| HC-05 | Bluetooth 2.0 | 2.4G | 10m | 2Mbps | 26.9*13*2mm | SMT | Various AT command |
| HC-06 | Bluetooth 2.0 | 2.4G | 10m | 2Mbps | 26.9*13*2mm | SMT | Simple AT command |

2. Connection Description

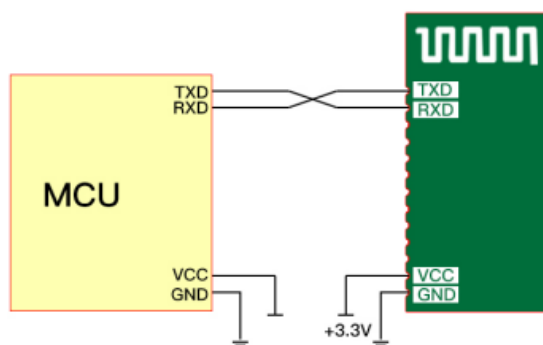
2.1 Operating Principle



Note:

As shown in the figure above, the HC-42 slaver module is used together with the HC-42 master module to replace the physical connection during full duplex communication. The equipment on the left sends UART data to the module. After receiving UART data, the RXD port of the module automatically sends the data to the air in the form of radio waves. The module on the right can automatically receive the data and restore the UART data originally sent by the left device from the TXD. The same is true from right to left.

2.2 Connection between the module and other equipment like MCU



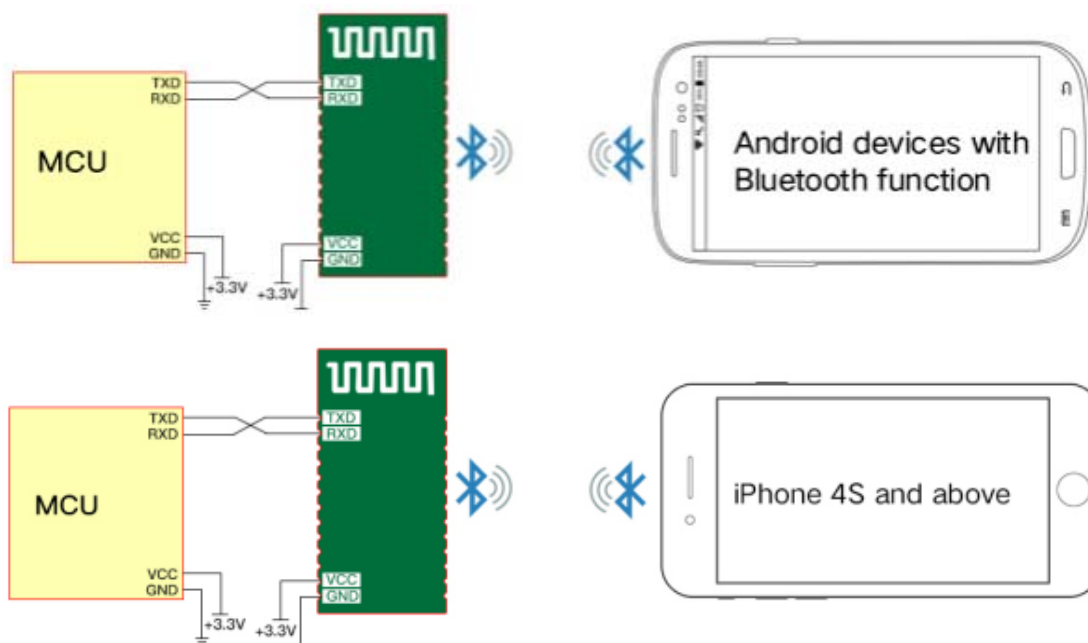
①: When the module is connected to the MCU with the power supply system of 3.3V, the serial ports can be cross - connected. (The RX of the module is connected to the TX of the MCU, and the TX of the module is connected to the RX of the MCU)

②: When the module is connected to an MCU with a power supply system of 5V, a 200Ω~1KΩ resistor can be connected in series to the RX pin end of the module and then to the TX pin of the MCU. The TX pin of the module is directly connected to the RX pin of the MCU, without connection to the resistor in series. (Note: Users are required to confirm that the MCU used recognizes the voltage of about 3.0V as high level, otherwise, a 3.3V/5V level conversion circuit is required.)

Note:

It must be noted that the module can be connected to 3.3V (3.0~3.6V) power supply only, instead of 5V. Direct connecting to 5V will result in damage to module. 5V power supply must be reduced to 3.3V through LDO before powering on the module.

2.3 Connection between module and mobile phone



HC-42 supports connection to and communication with handset devices using **Android 4.3 system and above**. Is **BLE Android serial port helper** required for communication test.

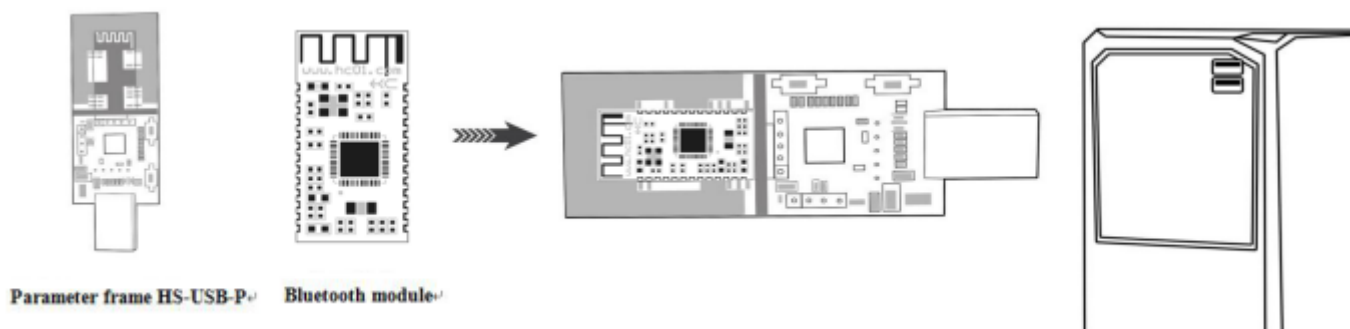
HC-42 supports connection to and communication with handset devices using **iPhone 4S system and above**. For communication test, it requires downloading and installing **Lightblue Bluetooth Helper** in APP Store for software connection (other serial port software supporting BLE Bluetooth can also be used).

Module UUID is set forth below:

Search UUID: FFF0 Service UUID: FFE0 Transparent data transmission UUID: FFE1

3. Rapid Testing

3.1 Connection between parameter frame and module



Put the HC-42 Bluetooth module into the HC-USB-P parameter frame, as shown in the figure. The module can be tested by plugging directly into the USB interface of the PC.

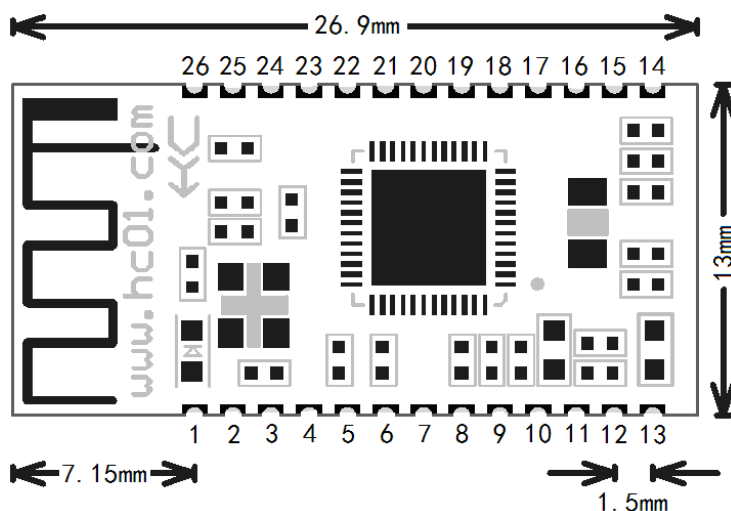
3.2 Communication test

Visit HC's official website (<http://www.hc01.com>) to download HID serial port helper.

- ① Connect the module with the computer by using the parameter rack, and select the corresponding module model.
- ② If you have no idea about the baud rate of the module, press the "module baud rate query" button to query the baud rate of the current module, with defaults as 9600.
- ③ Send AT (or click the test command button in the upper right corner of HID software) and return to OK, which means that the module works normally.
- ④ Refer to 5.3 for other AT commands.

4. Development and Application

4.1 Dimensions and Definition of PINS



| PINS | Definitions | I/O direction | Explanations |
|------|-----------------|---------------|--|
| 1 | TXD (P0.06) | O | UART output port, 1.8~3.6V level , consistent with operating voltage |
| 2 | RXD (P0.08) | I, pull up | UART input port, 1.8~3.6V level, consistent with operating voltage |
| 3 | P0.07 | | No setting, suspended |
| 4 | P0.05 | | No setting, suspended |
| 5 | P0.28 | O | Output low level after power on |
| 6 | SWDCLK | I | Simulation, programming clock pin, please suspended |
| 7 | SWDIO | I/O | Simulation, programming data pin, please suspended |
| 8 | P0.29 | | No setting, suspended |
| 9 | P0.30 | | No setting, suspended |
| 10 | P0.31 | | No setting, suspended |
| 11 | RESET | I, pull up | Module reset pin, requiring a low level of not less than 50ms to reset. |
| 12 | VCC | I | Power supply pin, requiring power supply of DC 3.3V, power supply current of not less than 50mA |
| 13 | GND | | Module common ground |
| 14 | LEDCON | I | Module on-board indicator LED2 control pin (Note①) |
| 15 | P0.12 | | No setting, suspended |
| 16 | LED1 (P0.13) | O | External indication LED output pin (Note②) |
| 17 | LINK (P0.14) | O | Connection indication (high level output in disconnected state, low level output after connection) |
| 18 | KEY+ (P0.15) | I, pull down | This pin is connected to high level, and the master is used to clear the recorded slaver address. |
| 19 | LPIN (P0.16) | I, pull up | Low power control pin, high level means "low Power consumption" and low level means "exit from low power consumption" (Note ③) |
| 20 | LPOUT (P0.17) | O | Module Low Power Indicator (Low Level Output in Standard State, High Level Output in Low Power State) |
| 21 | P0.18 | | No setting, suspended |
| 22 | P0.19 | | No setting, suspended |
| 23 | P0.20 | | No setting, suspended |
| 24 | P0.22 | | No setting, suspended |
| 25 | P0.23 | | No setting, suspended |
| 26 | P0.11 | | No setting, suspended |

Note①: The Module has an on-board indicator LED2 (near the first pin of the module). The 14-pin LEDCON of the Module is the control pin of the on-board indication LED2.

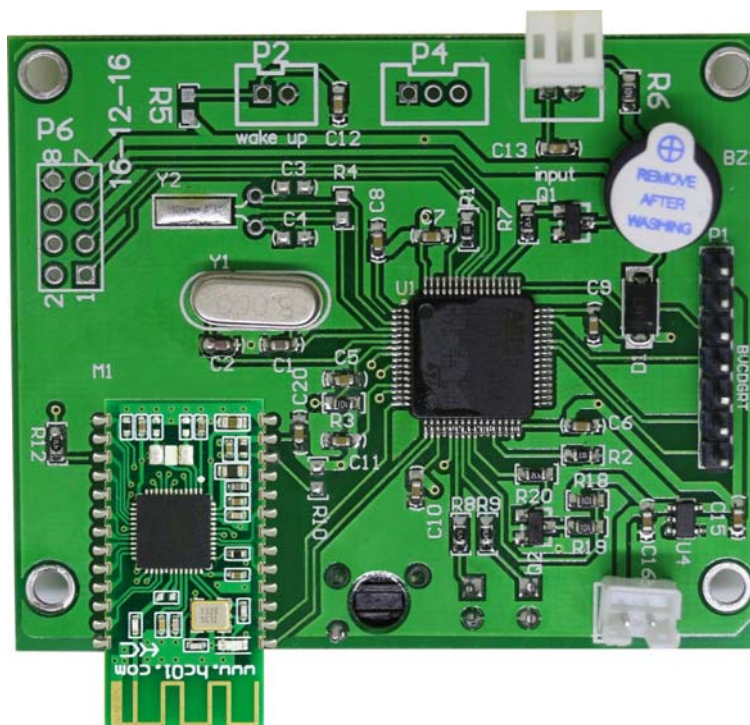
When the pin is grounded, the Bluetooth indication LED inside the module is turned off.
When the foot is suspended, the Bluetooth indication LED is turned on.

If low power consumption is turned on in an application, it is required that the 14-pin of the module shall be suspended to avoid unnecessary current consumption!

Note②: Module indicator lamp output pin, high level output, it can be connected to MCU IO. It is required to connect resistors in series when the Module is connected to LED.
Before connecting, the slaver module LED will light for 1 second every 2 seconds. After the connection, the LED is always on.

Note ③: Input foot, internal pull-up. When the foot is suspended, it is at a high level, and the module can enter a sleep state with low power consumption by using AT+SLEEP command. This pin is connected to low level and can wake up the module. Please refer to the command in the AT+SLEEP command for operations.

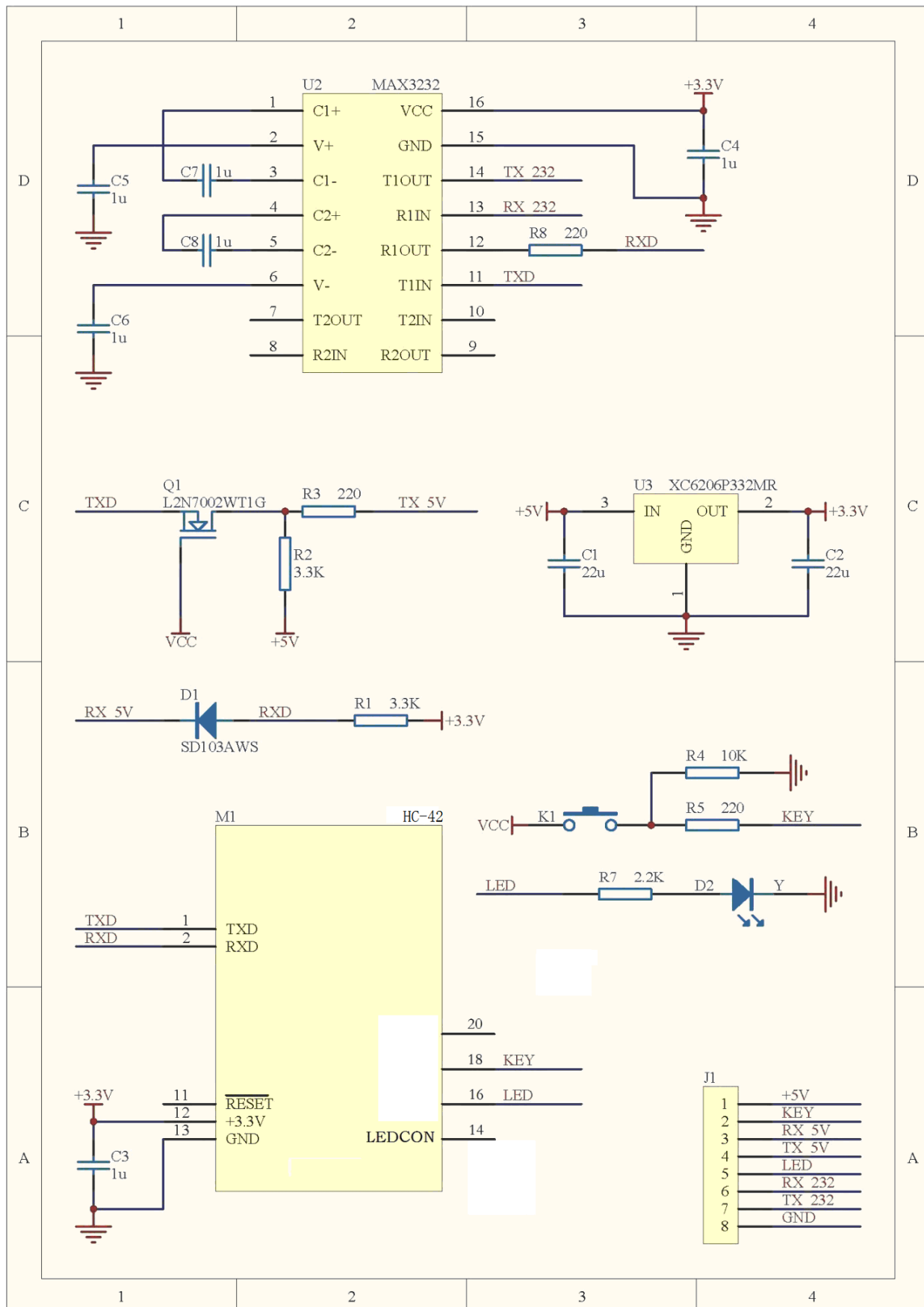
4.2 Embedding mode



No copper can be applied and no wires can be routed under the antenna part of the module, otherwise the signal will be affected adversely. It is recommended that the bottom plate of the antenna may be hollowed out and the antenna be as close to the board as possible.

Stamp hole packaging mode is used, and the pin is defined as in Section 4.1.

4.3 Reference connection circuit



5. AT Command

5.1 Module parameters setting-AT command

1. AT command are used to set the parameters of the module. The module can operate the AT command in the disconnected state and enter the serial port transparent transmission mode after connection.
2. It takes about 300ms for the module to start, so it is better to operate AT command 350ms after the module is powered on or reset. Unless otherwise specified, the parameter setting of AT command will take effect immediately. At the same time, the modification of parameters and functions will not be lost in case of power failure.
3. After the AT command is successfully modified, it will return to OK(except for command of viewing information such as AT+RX and AT+VERSION). If it is unsuccessful, it will not return any information.

5.2 command set

| SN | AT command (lower case x means parameters) | Functions | Default status | Remarks |
|----|--|--|--------------------------------------|---------|
| 1 | AT | Check if the serial port can work normally | | |
| 2 | AT+VERSION | Check the module version and website address | | |
| 3 | AT+NAME=xxxx | Check and Modify Bluetooth names | HC-42 | |
| 4 | AT+RFPM=xx | View and change RF power | 4dBm | |
| 5 | AT+UART=xxxx | Check and Modify UART baud rate | 9600 | |
| 6 | AT+AINT=xx | Viewing and Changing Broadcast Interval | 200mS | |
| 7 | AT+PM=x | Check and Modify Module Power Consumption Mode | 0 | |
| 8 | AT+SLEEP | Module into sleep mode | | |
| 9 | AT+PD | Module in shutdown mode | | |
| 10 | AT+LEDnM=x | Check and Modify the Operation Mode of LED Indicator | | |
| 11 | AT+DEFAULT | Restore factory default parameters | | |
| 12 | AT+ROLE | Check and Modify master-slave mode | S/P | |
| 13 | AT+RESET | Reset module | | |
| 14 | AT+IBEN | iBeacon switch | 0 (OFF) | |
| 15 | AT+IBUUID | Check and modify iBeacon UUID | FDA50693-A4E2-4FB1-AFCF-C6EB07647825 | |
| 16 | AT+IBRSSI | Check and modify iBeacon RSSI | 0xC3 | |
| 17 | AT+IBMAJ | Check and modify iBeacon Major value | 0x27C6 | |
| 18 | AT+IBMIN | Check and modify iBeacon Minor value | 0x8B06 | |
| 19 | | | | |
| 20 | | | | |

Note:

No carriage return or line feed is required after AT command; unless otherwise specified, all AT command in this Module will not be sent with line feed.

5.3 Introduction of AT command

5.3.1 Test command

| Command | Response | Explanations |
|---------|----------|--------------|
| AT | OK | Test |

5.3.2 Viewing software versions command

| Command | Response | Explanation |
|------------|---|--|
| AT+VERSION | OK+VERSION=HC-42 V2.0.180601 www.hc01.com | Obtain software version and official website address |

5.3.3 Inquiring and modifying Bluetooth name command

| Command | Response | Explanations | Details |
|--------------|---------------|--------------------------|--|
| AT+NAME | OK+NAME=HC-42 | Inquiring Bluetooth name | Default Bluetooth name: HC-42 |
| AT+NAME=xxxx | OK+NAME=xxxx | Setting Bluetooth name | 1. Only 12 characters or less are allowed. 2. This command does not filter any characters. If Chinese characters are required, trans-coding can be conducted according to their own device format. (For example, Android's character format is UTF-8. If you want to search for Chinese names with Android, you must enter them according to UTF-8 encoding.) |

Examples:

Send : AT+NAME=www.hc01.com Return: OK+NAME=www.hc01.com

(Set Bluetooth name as www.hc01.com)

Send : AT+NAME Return : OK+NAME=www.hc01.com

(Inquire the Bluetooth name as www.hc01.com)

5.3.4 Inquiring and modifying RF power command

| command | Response | Explanations | Details |
|------------|------------|--------------------------------|--|
| AT+RFPM | OK+RFPM=4 | Inquire RF power of the module | Default RF power: 4dBm |
| AT+RFPM=xx | OK+RFPM=xx | Set RF power of the module | RF power value with parameters of XX, supports the following power value (unit: dBm): 4, 3, 0, -4, -8, -12, -16, -20, -40 |

Examples:

Send: AT+RFPM=-4 Return: OK+RFPM=-4 (Set RF power as -4dBm)
Send: AT+RFPM Return : OK+RFPM=-4 (Inquire RF power as -4dBm)

5.3.5 Inquiring and modify UART baud rate command

| command | Response | Explanation | Details |
|--------------|--------------|---------------------------|--|
| AT+UART | OK+UART=9600 | Inquire UART baud rate | Default serial-port baud rate: 9600 |
| AT+UART=xxxx | OK+UART=xxxx | Set serial-port baud rate | Parameters xxxx represents baud rate, and supports the setting of the following baud rate:1200,2400,4800,9600,19200,38400, 57600,115200,230400 |

Examples:

Send : AT+ UART =19200 Return: OK+UART=19200 (Set serial-port baud rate as 19200)
Send: AT+ UART Return: OK+UART=19200 (Inquire the serial-port baud rate as: 19200)

5.3.6 Inquiring and setting broadcast interval command

| command | Response | Explanation | Details |
|------------|-------------|--|--|
| AT+AINT | OK+AINT=200 | Inquire broadcast interval | Default broadcast interval: 200mS |
| AT+AINT=xx | OK+AINT=xx | Set broadcast interval (affecting power consumption in disconnected state) | The parameter xx represents the broadcast interval, with unit being ms, the input range is 20ms-10000ms, being an integer multiple of 10. Default value: 200 |

Examples:

Send : AT+AINT=1000 Return : OK+AINT=1000 (Set broadcast interval as 1000mS)
Send : AT+AINT Return: OK+AINT=1000 (Inquire broadcast interval as 1000 ms)

5.3.7 Inquiring and setting module power consumption mode command

| command | Response | Explanation | Details |
|---------|----------|--------------------------------|---|
| AT+PM | OK+PM=0 | Inquire power consumption mode | Default power consumption mode: 0 |
| AT+PM=x | OK+PM=x | Set power consumption mode | Parameter xx represents the power consumption mode and supports the following power consumption modes: 0: Power up and run at full speed 1: Power on and turn on low power consumption (equivalent to AT+SLEEP input on power on) Note: After setting up, the module will not work until it is powered on again! |

Examples:

Send: AT+PM=1 Return: OK+PM=1 (Modify into power consumption mode 1)

Send: AT+PM Return: OK+PM=1 (Inquire as power consumption mode 1)

Reminder:

In the low power consumption mode, the average operating current of the module is related to the broadcast interval. If the broadcast interval is increased, the operating current will decrease. The table below indicates the average operating current reference values for low power consumption of the module at different broadcast intervals:

| | | | | | | |
|---------------------------------------|------------|------------|-------------|-------------|-------------|--------------|
| Broadcast interval (mS) | 200 | 500 | 1000 | 2000 | 5000 | 10000 |
| Average operating current (µA) | 70 | 29 | 16 | 11 | 6 | 4.5 |

Note:

The parameters said above are measured under the condition that the operating voltage of the module is 3.3V. The measurement error of ±20% caused by the difference of conditions is normal and for reference only. The internal power supply of the module is DC/DC. With the decrease of the working voltage of the module, the operating current of the module will increase correspondingly.

5.3.8 Module enters sleep mode command

| command | Response | Explanation | Details |
|----------|----------|--|---|
| AT+SLEEP | OK+SLEEP | Module enters sleep mode (low power operation) | After the module returns to OK+SLEEP, it enters low power consumption state, the broadcast or connection state will be maintained, and serial communication will be turned off. The transmitting and receiving of data will cause the module exit from sleep state, and the module restart will also cause the module to exit from sleep mode. If the module is required to enter sleep as soon as it is powered on, please send the command AT+PM=1. |

Examples:

Send: AT+SLEEP Return: OK+SLEEP

In order to control low power consumption in a quick and human-oriented manner, this module introduces IO to control power consumption. When LPIN (PIN19, input pin) is at high level, it can enter low power consumption operation through AT+SLEEP command, and when LPIN is at low level, it will unconditionally exit from low power consumption operation.

Low power consumption is determined by the command AT+SLEEP and pin LPIN, and its logic relation is as follows:

| | | | | |
|---|-------------------------|------------------------|------------------------|------------------------|
| LPIN (default pull up, high level) | High level | High level | Low level | Low level |
| AT+SLEEP command | Enter AT+SLEEP | Exit from AT+SLEEP | Enter AT+SLEEP | Exit from AT+SLEEP |
| Module power consumption state | Lower power consumption | High power consumption | High power consumption | High power consumption |

Or in other words: Only when AT+SLEEP and LPIN are both set to low power consumption, the module can be in low power consumption.

Reminder: The interval between entering and exiting from low power consumption is recommended to be greater than 100ms.

5.3.9 Module shutdown command

| command | Response | Explanation | Details |
|---------|----------|--------------------------------|---|
| AT+PD | OK+PD | Module entering shutdown state | At this time, the operating current of the module is about 0.3μA In this state, the module can only be awakened by pulling down LPIN or RESET, and the module is automatically reset in the wake-up process. |

Suggestion: If the module is used under certain power-saving situations, it is suggested that the module can be shut down by AT+PD command without controlling the working power supply of the module, so as to avoid the slow response caused by voltage residue in the mode of cutting off the power supply.

5.3.10 Bluetooth indicating LED operating mode

| command | Response | Explanation | Details |
|------------|------------|--------------------------------|---|
| AT+LEDnM | OK+LEDnM=2 | Inquire operating mode of LEDn | LEDn can be LED1 (external indicator LED) and LED2 (onboard indicator LED) |
| AT+LEDnM=x | OK+LEDnM=x | Set operating mode of LEDn | Parameter n represents the mode and supports the following modes: 1: OFF 2:Following low power consumption (turn off automatically at low power consumption, and turn on at other times) 3: ON |

Examples:

Send: AT+LED1M Return: OK+LED1M=2 (the operating mode of LED1 is mode 2)

Send: AT+LED2M=1 Return: OK+LED2M=1 (set the operating mode of LED2 is mode 1)

5.3.11 Module parameter restore defaults command

| command | Response | Explanation | Details |
|------------|------------|---|---|
| AT+DEFAULT | OK+DEFAULT | Module parameter recovers default value | Default value of module parameters: Bluetooth name: HC-42 RF power: 4dBm Serial baud rate: 9600bps Broadcast interval: 200mS Power consumption mode: 0 (power-on, full speed operation) Onboard LED 2:1 External indicator led1: 2 |

5.3.12 Master-slave setting

| command | Response | Explanation | Details |
|-----------|-----------|------------------------------------|---|
| AT+ROLE | OK+ROLE=x | Inquire the current role of module | S: Slave (default) P: Peripheral (default) M: Master C: Central S 跟 P 是一样，M 跟 C 也是一样 S is the same as P, M also same as C. |
| AT+ROLE=x | OK+ROLE=x | Set the current role of module | S and P are slaves, M and C are masters. |

Examples:

Send: AT+ROLE Return: OK+ROLE=S/P (Inquire the current module as slave)

Send: AT+ROLE=M Return: OK+ROLE=M/C (Set the module as master)

5.3.13 Module reset

| command | Response | Explanation | Details |
|----------|----------|--------------|---------|
| AT+RESET | OK+RESET | Module reset | |

Examples:

Send: AT+RESE Return: OK+RESET

5.3.14 iBeacon switch

| command | Response | Explanation | Details |
|-----------|-----------|---------------------------|-----------------------------|
| AT+IBEN | OK+IBEN=x | Inquire status of iBeacon | 0 : OFF (default) 1 : ON |
| AT+IBEN=x | OK+IBEN=x | Set status of iBeacon | |

Examples:

Send: AT+IBEN Return: OK+IBEN=0 (iBeacon disenabled)

Send: AT+IBEN=1 Return: OK+IBEN=1(Enable iBeacon)

5.3.15 iBeacon UUID

| command | Response | Explanation | Details |
|--|--|----------------------|--|
| AT+IBUUID | OK+IBUUID=***** _****_****_****_***** **** | Inquire iBeacon UUID | In order to use WeChat's iBeacon function, related registration must be made on WeChat's public platform. |
| AT+IBUUID=*****_** **_****_****_***** | OK+IBUUID=***** _****_****_****_***** **** | Set iBeacon UUID | It must be set in strict accordance with the format requirements. Only hexadecimal characters in the range of 0~F and "-" are allowed. The default UUID is as follows: FDA50693-A4E2-4FB1-AFCF-C6EB07647825 |

Examples:

Send: AT+IBUUID **Return:** OK+IBUUID=FDA50693-A4E2-4FB1-AFCF-C6EB07647825

Send: AT+IBUUID=FDA50693-A4E2-4FB1-AFCF-C6EB07647825
Return: OK+IBUUID=FDA50693-A4E2-4FB1-AFCF-C6EB07647825

5.3.16 Setting of iBeacon RSSI

| command | Response | Explanation | Details |
|-------------|--------------|----------------------------|--------------------------|
| AT+IBRSSI | OK+IBRSSI=xx | Inquire Measured RSS value | Default 0xC3 |
| AT+IBRSSI=x | OK+IBRSSI=x | Measured RSS value | Used for iBeacon ranging |

*For detailed measurement methods, please refer to relevant data on your own costs.

Examples:

Send: AT+IBRSSI **Return:** OK+IBRSSI=C3

Send: AT+IBRSSI=C8 **Return:** OK+IBRSSI=C8

5.3.17 iBeacon Major value

| command | Response | Explanation | Details |
|---------------|---------------|---------------------|--|
| AT+IBMAJ | OK+IBMAJ=xxxx | Inquire Major value | Default 0x27C6 |
| AT+IBMAJ=xxxx | OK+IBMAJ=xxxx | Set Major value | Obtain it at WeChat Public Platform after registration |

Examples:

Send: AT+IBMAJ **Return:** OK+IBMAJ=27C6 (inquire Major value)

Send: AT+IBMAJ=1234 **Return:** AT+IBMAJ=1234 (set Major value)

5.3.18 iBeacon Minor value

| command | Response | Explanation | Details |
|---------------|---------------|---------------------|--|
| AT+IBMIN | OK+IBMIN=xxxx | Inquire minor value | Default 0x8B06 |
| AT+IBMIN=xxxx | OK+IBMIN=xxxx | Set Minor value | Obtain it at WeChat Public Platform after registration |

Examples:

Send: AT+IBMIN **Return:** OK+IBMIN=8B06 (Inquire Minor value)

Send: AT+IBMIN=1234 **Return:** OK+IBMIN=1234 (Set Minor value)

6. About HC

Guangzhou HC Information Technology Co., Ltd was established in September 2008 and is a pioneer in the field of wireless data transmission. For more than ten years, HC has always adhered to independent research and development and provided wireless data transmission solutions for the majority of technology companies. HC series modules are exported to various countries across the world, and the cumulative sales have reached tens of millions of pieces. With the advantages of stable performance, easy embedding and low packet loss rate, it has been well received by technical experts from all over the world. Among them, the HC-05 and HC-06 Bluetooth serial port modules are the classic works called wireless data transmission products, which have been far ahead in sales for more than ten years, witnessing a market share of more than 40 %. The self-made stamp packaging method has now been widely used by the industry.

In recent years, through continuous innovation, HC has successively developed wireless serial port modules of various working systems, forming four series of serial port products mainly including Bluetooth 2.0, Bluetooth 4.0 BLE, Wireless 433MHz and WIFI, as well as supporting products.

We will not forget our initiative mind, so as to achieve our ultimate goal. HC always sticks to the philosophy of " gathering information and carrying dreams" and do its best to contribute to the wireless data transmission field and society.

[Official Website]: www.hc01.com

[Telephone]: 020-8408-3341

Official Wechat: hc4008881803

[Sales customer service]: QQ: 1870976902 QQ: 2716533457

[Technical customer service]: QQ: 445253184 QQ:1614485461 QQ:1004658237

[Address]: Room 608, No.19, Jiangong Road, Tianhe Science Park, Tianhe District, Guangzhou City, Guangdong Province

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