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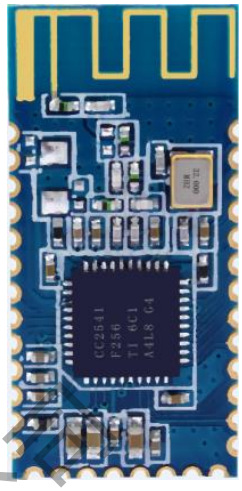
# 1. Overview



DX-BT05 4.0 Bluetooth module is built by Shenzhen DX-SMART Technology Co., Ltd. for intelligent wireless data transmission. It adopts CC2541 chip of American TI Company, configures 256Kb space, and follows V4.0 BLE Bluetooth specification. Support AT command, users can change the serial port baud rate, device name, pairing password and other parameters as needed, flexible use.

This module supports UART interface and supports Bluetooth serial port transparent transmission. It has the advantages of low cost, small size, low power consumption, high sensitivity of sending and receiving, etc. It can realize its powerful functions with only a few peripheral components simple operation, high cost performance and technology leading edge.

# 2. Module default parameters：

| | |
|---|---|
| **Bluetooth Protocol** | Bluetooth Specification V4.0 BLE |
| **Working Frequency** | 2.4GHz ISM band |
| **Communication Interface** | UART |
| **Power Supply** | 3.3V |
| **Communication distance** | 30-40M (Open and unobstructed environment) |
| **Physical Dimension** | 18.5(L)mm x 13.5(W)mm x 2(H) mm |
| **Bluetooth Authentication** | FCC CE ROHS REACH |
| **Bluetooth Name** | BT05 |
| **Serial Port Parameters** | 9600、8 data bits、1 stop bit、No check、No flow control |
| **Service UUID** | FFE0 |
| **Notify\Write UUID** | FFE1 |
| **Write UUID** | FFE1 |
| **Storage temperature** | MIN:-55℃ - MAX:+125℃ |
| **Work temperature** | MIN:-20℃ - MAX:+70℃ |
| **Customized requirements** | If you have other special function requirements, you can contact us to customize the module. |

## 3. Application area:

DX-BT05 module supports BT4 .2 BLE protocol, which can be directly connected to iOS devices that have BLE Bluetooth function, and supports background program resident operation.

Successful application of BT05 module:

※ Bluetooth wireless data transmission;

※ Mobile phones, computer peripherals;

※ Handheld POS device;

※ Medical equipment wireless data transmission;

※ Smart Home Control;

※ Automotive Inspection OBD Equipment;

※ Bluetooth printer;

※ Bluetooth remote control toy;

※ Anti-lost device, LED light control;

## 4. Power consumption parameters:

| Mode | Status | Current | Unit |
|---|---|---|---|
| Low power mode | Discoverable | 400-700 | uA |
| | Connected | 8.5 | mA |
| Normal working mode | Discoverable | 8.5 | mA |
| | Connected | 8.5 | mA |

## 5. Radio frequency characteristics:

| Rating | Value | Unit |
|---|---|---|
| **BLE Transmit power** | **0** | **dBm** |
| **BLE Sensitivity** | **-93** | **dBm** |

## 6. Transparent transmission parameters

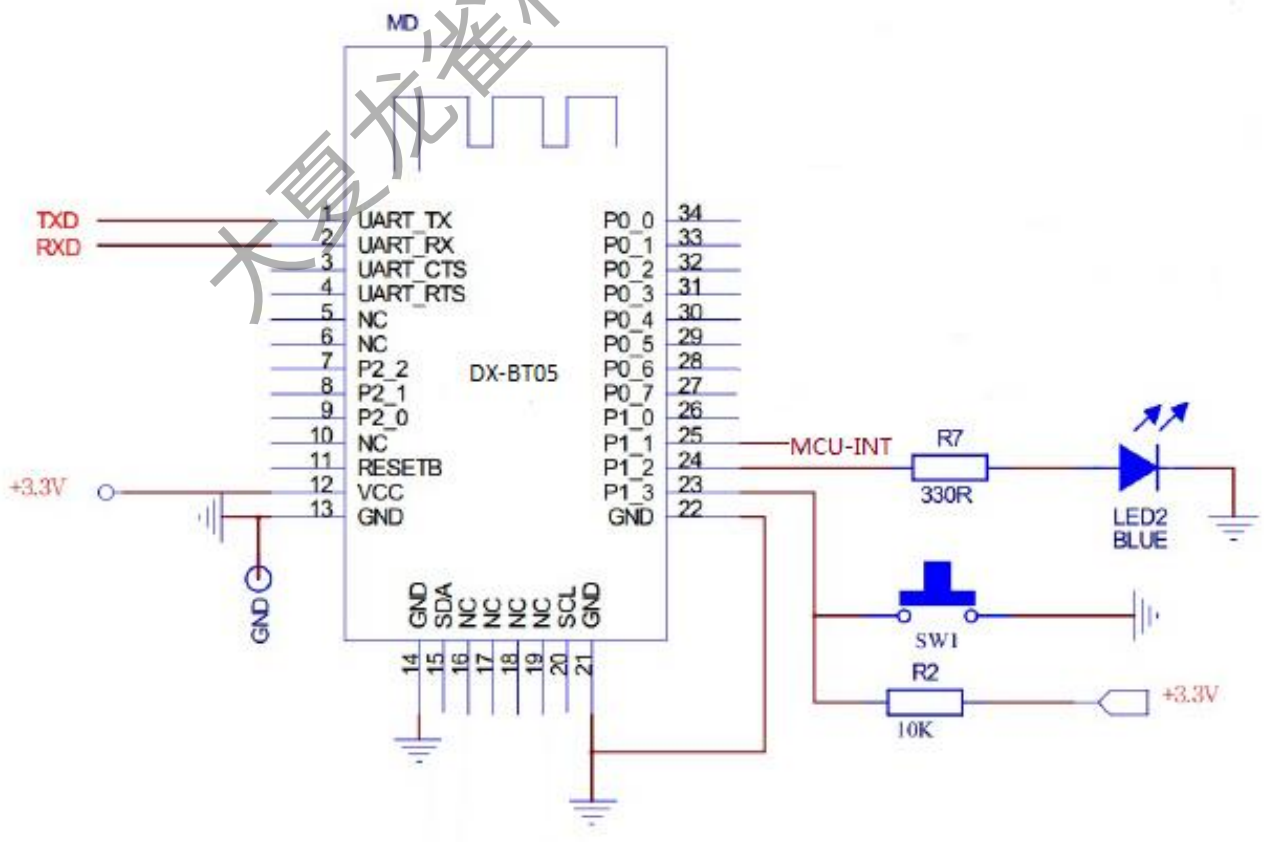
### Data throughput:

| Android ->BT05 -> UART | | UART ->BT05 -> Android | |
|---|---|---|---|
| **Baud rate** | 115200 | **Baud rate** | 115200 |
| **Connection interval (ms)** | 20 | **Connection interval (ms)** | 20 |
| **Serial packet size (bytes)** | 200 | **Serial packet size (bytes)** | 200 |

| | | | |
|---|---|---|---|
| **Transmission interval (ms)** | 70 | **Transmission interval (ms)** | 70 |
| **Throughput (bytes/s)** | 2500 | **Throughput (bytes/s)** | 2800 |
| **Characteristic Write** | Write without Response | **Characteristic Notify** | Notify |
| **iPhone 6 ->BT05 -> UART** | | **UART ->BT05 -> iPhone 6** | |
| **Baud rate** | 115200 | **Baud rate** | 115200 |
| **Connection interval (ms)** | 30 | **Connection interval (ms)** | 30 |
| **Serial packet size (bytes)** | 100 | **Serial packet size (bytes)** | 200 |
| **Transmission interval (ms)** | 50 | **Transmission interval (ms)** | 120 |
| **Throughput (bytes/s)** | 2000 | **Throughput (bytes/s)** | 1800 |
| **Characteristic Write** | Write without Response | **Characteristic Notify** | Notify |

Note: This table parameter is for reference only and does not represent the maximum data throughput that the module can support.

## 7. Module pin description and minimum circuit diagram:



## 8. Pin function description:

| Pin number | Pin name | Pin description |
|---|---|---|
| 1 | UART_TX | Serial data output |
| 2 | UART_RX | Serial data input |
| 3 | UART_CTS | NC |
| 4 | UART_RTS | NC |
| 5 | NC | NC |
| 6 | NC | NC |
| 7 | P2_2 | Debug clock port |
| 8 | P2_1 | Debug data port |
| 9 | P2_0 | Programmable input and output port |
| 10 | NC | NC |
| 11 | RESETB | Low level reset, at least 5ms |
| 12 | VCC | 3.3 V |
| 13 | GND | Land |
| 14 | GND | Land |
| 15 | SDA | Data port |
| 16 | NC | NC |
| 17 | NC | NC |
| 18 | NC | NC |
| 19 | NC | NC |
| 20 | SDL | Clock port |
| 21 | GND | Land |
| 22 | GND | Land |
| 23 | P1_3 | SW1 system button, see other configuration |
| 24 | P1_2 | LED light pin， See other configurations |
| 25 | P1_1 | Bluetooth connection indicator (not connected low, connection high) |
| 26 | P1_0 | Programmable input and output port |
| 27 | P0_7 | Programmable input and output port |
| 28 | P0_6 | Programmable input and output port |
| 29 | P0_5 | Programmable input and output port |

| | | |
|---|---|---|
| 30 | P0_4 | Programmable input and output port |
| 31 | P0_3 | Programmable input and output port |
| 32 | P0_2 | Programmable input and output port |
| 33 | P0_1 | Programmable input and output port |
| 34 | P0_0 | Programmable input and output port |

## 9. Detailed description of function pins:

**1. P15 pin (P0_7): LED indicator pin**

• Used to indicate the status of the Bluetooth module. Correspondence between the LED flashing mode and the Bluetooth module status is shown in the following table:

| Mode | LED Display | Module Status |
|---|---|---|
| Slave mode | Uniformly slow flashing (800ms-on, 800ms-off) | standby mode |
| | Long bright | Connection Status |
| Main mode | Evenly flashing (300ms-on,300ms-off) | Search and connect |
| | Long bright | Connection Status |

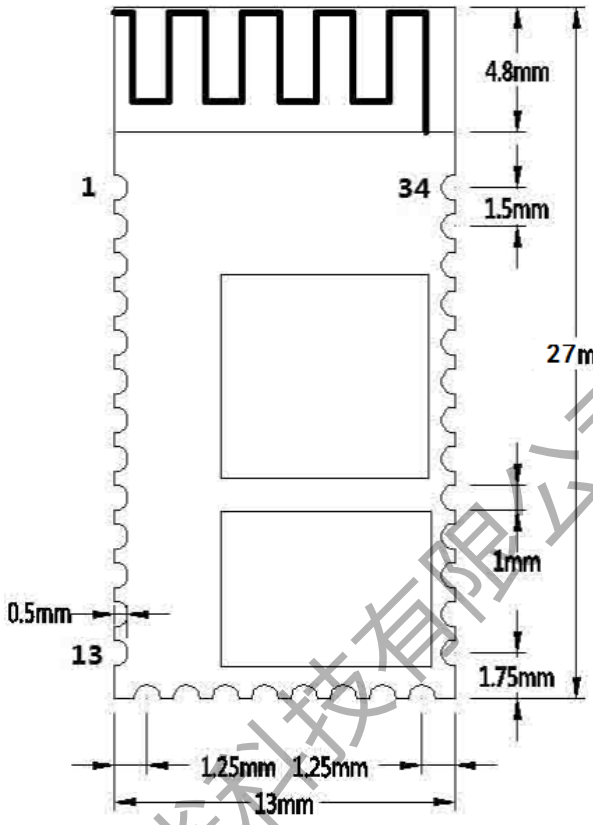
**2. P13 pin (P1_1): connection status indicator**

| Pin state | Module status |
|---|---|
| Output low level | standby mode |
| Output high level | Connection Status |

**3. P16 pin (P0_6): connection interrupt pin (module is in the connected state)**

| Pin state | Module status |
|---|---|
| No action | Connection Status |
| Input 200ms low pulse | Interrupt connection, module enters standby |
| Master mode input 200ms low level pulse | Clear module connection memory |

## 10. Dimensions:




## 11. LAYOUT Precautions:

The DX-BT05 Bluetooth module works in the 2.4G wireless band. It should try to avoid the influence of various factors on the wireless transceiver. Pay attention to the following points:

1. the product shell surrounding the Bluetooth module to avoid the use of metal, when using part of the metal shell, should try to make the module antenna part away from the metal part.

2. The internal metal connecting wires or metal screws of the product should be far away from the antenna part of the module.

3. The antenna part of the module should be placed around the PCB of the carrier board. It is not allowed to be placed in the board, and the carrier board under the antenna is slotted. The direction parallel to the antenna is not allowed to be copper or traced. It is also a good choice to directly expose the antenna part out of the carrier board.

4. It is recommended to use insulating material for isolation at the module mounting position on the substrate. For example, put a block of screen printing (TopOverLay) at this position.

# 12. AT COMMAND

## (Note: AT command mode when the module is not connected)

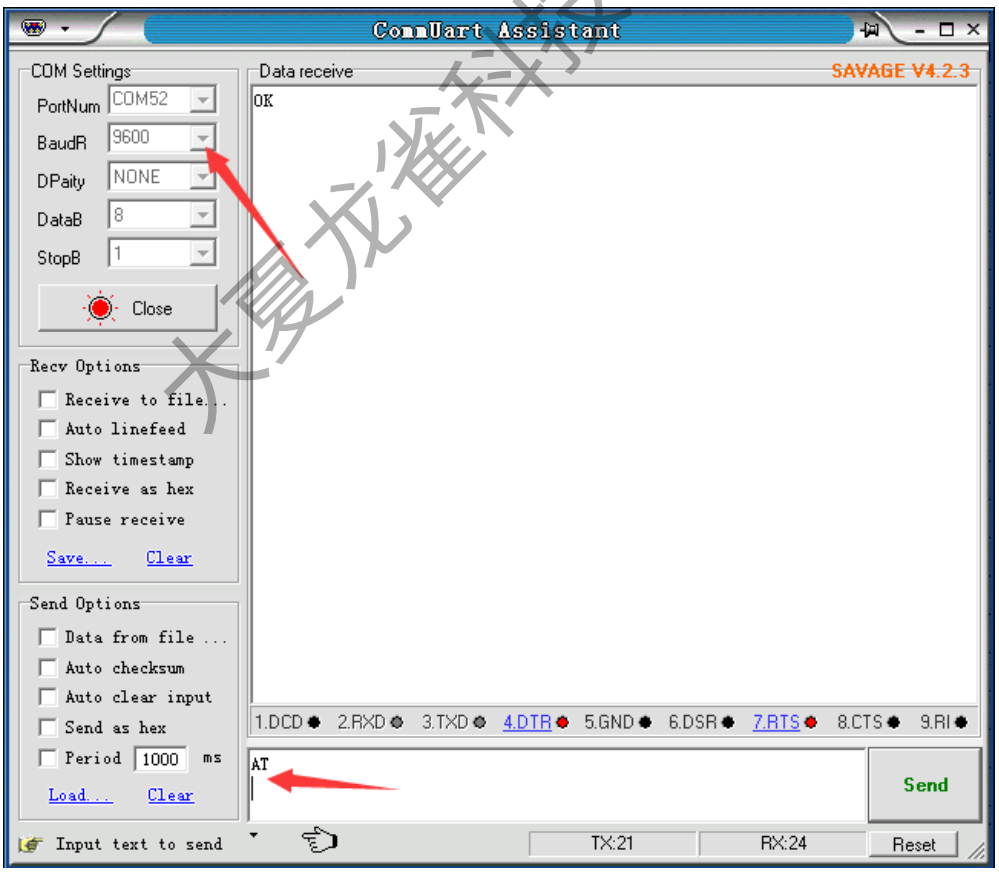
1. AT command, which belongs to the character line instruction, is parsed according to the line (that is, AT command must be returned by carriage return or \r\n, hexadecimal number is 0D0A)

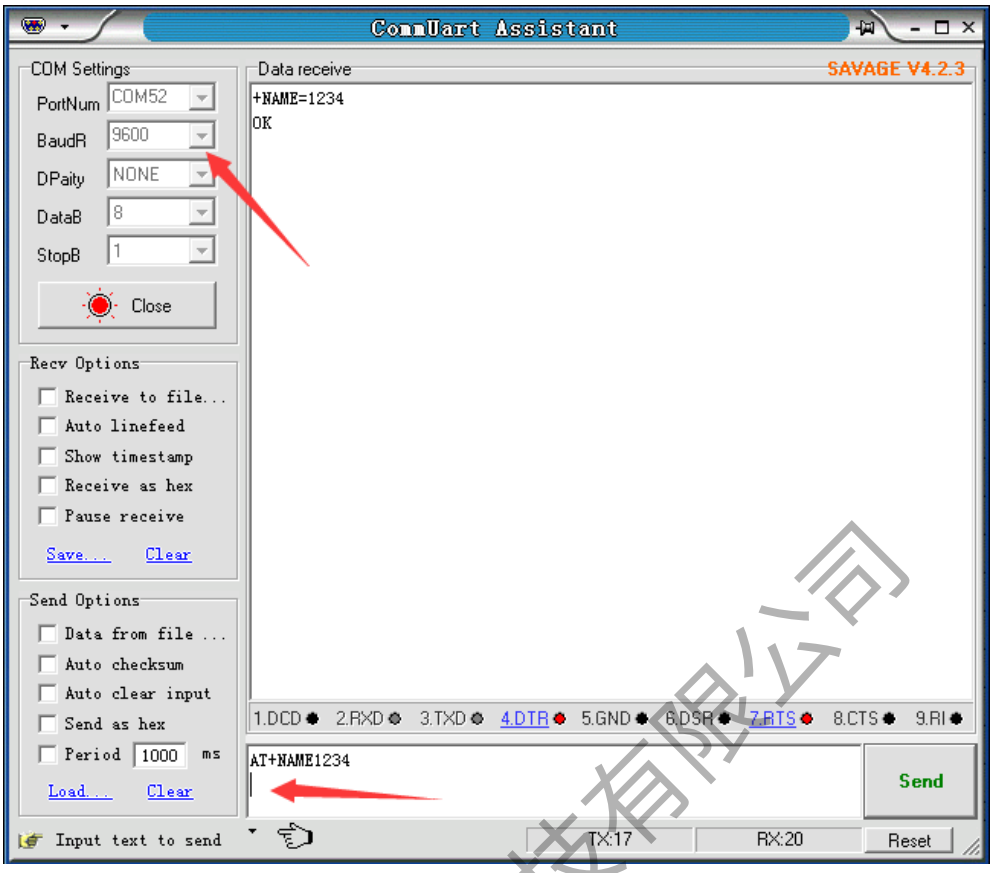
2. The AT command supports case and the instruction prefix is AT+, which can be divided into parameter setting instructions and read instructions.

3. Set the instruction format: AT+<CMD><PARAM> Operation returns successfully: +<CMD>=<PARAM>\r\n OK\r\n Failure does not return characters.

4. Read instruction format: AT+<CMD>Operation succeeds: +<CMD>=<PARAM>\r\n Failure does not return a return character.

**AT command format example (Figure 1 is AT test command, Figure 2 is to change the Bluetooth name to 1234):**






**1、Test Command:**

| Function | Command | Response | Description |
|---|---|---|---|
| **Test instructions** | AT\r\n | OK\r\n | |

**2、Get The Software Version:**

| Function | Command | Response | Description |
|---|---|---|---|
| **Query version number** | AT+VERSION\r\n | +VERSION=<version>\r\n<br>OK\r\n | <version > Software version number |

Note: The version will be different depending on different modules and customization requirements.

**3、Set/Query Module Bluetooth MAC:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module MAC address | AT+LADDR\r\n | +LADDR=<laddr>\r\n | <laddr> Bluetooth 12-bit MAC Address Code |

**4、Set/Query Device Name:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module Bluetooth name | AT+NAME\r\n | +NAME=<name>\r\n | <name> Bluetooth name, up to 18 bytes<br>Default name: BT05 |
| Set the module Bluetooth name | AT+NAME<name>\r\n | +NAME=<name>\r\n<br>OK | |

**Example**:

1. Send Settings:

AT+NAME=DX-BT05\r\n ——Set module device name：“DX-BT05”

return：

+NAME=DX-BT05\r\n ——Set module device name：“DX-BT05” successed

OK\r\n

2. Send inquiry：

AT+NAME\r\n ——Query module name

return：

+NAME=DX-BT05\r\n ——Return module device name：“ BT05”

**5、Set/Query - Serial Port Baud Rate:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module baud | AT+BAUD?\r\n | +BAUD=<baud>\r\n | <baud> Baud rate corresponding serial number<br>1:1200<br>2:2400<br>3:4800<br>4:9600<br>5:19200<br>6:38400<br>7:57600<br>8:115200<br>Default：4 (9600) |
| Set the module baud | AT+BAUD=<baud>\r\n | +BAUD=<baud>\r\n<br>OK\r\n | |

**Note:** The module must be re-powered after setting the baud rate, enabling the new baud rate for data communication and AT command resolution.

**Example**: Setting the Serial Port Baud Rate: 38400

1. Send Settings:

AT+BAUD6 \r\n

return：

+BAUD=6\r\n
OK\r\n

2. Send inquiry：

AT+BAUD?\r\n

return：

+BAUD=6\r\n
OK\r\n

**6、Set/Query - Serial Port Stop Bit:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module serial port stop bit | AT+STOP\r\n | +STOP=<Param>\r\n | < Param> Stop bit<br>0 -1 Stop bit<br>1 -2 Stop bit<br>Default：0 |
| Set module serial port stop bit | AT+STOP=<Param>\r\n | +STOP=<Param>\r\n<br>OK | |

**7、Set / Query - Serial Parity Bit:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module serial parity bit | AT+PARI\r\n | +PARI=<Param>\r\n | < Param> Check Digit<br>0 -1 No check<br>1 -2 Odd parity<br>2 -2 Even parity<br>Default：0 |
| Set the module serial parity bit | AT+PARI=<Param >\r\n | +PARI=<Param>\r\n<br>OK | |

**8、Set/Query—Notify the host computer connection status (slave mode is valid): The connection success module returns OK+CONN：**

| Function | Command | Response | Description |
|---|---|---|---|
| Query to inform the host computer connection status | AT+NOTI\r\n | +NOTI=<Param>\r\n | < Param> Check Digit<br>0- Not notified<br>1- Notice |

| | | | |
|---|---|---|---|
| Set to notify the host computer connection status | AT+NOTI=<Param>\r\n | +NOTI=<Param>\r\n<br>OK | Defaults：0 |

**9、Settings\Query—SERVICE UUID：**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module service UUID | AT+UUID\r\n | +UUID =<service>\r\n | <service> Service UUID<br>Default service UUID:FFE0 |
| Set module service UUID | AT+UUID=<service>\r\n | +UUID =<service>\r\n<br>OK | |

**Example**：Set the service UUID to：FE00

1. Send Settings：

AT+UUID0XFF00 \r\n

return：

+UUID=0XFF00 r\n

OK

**10、Settings\Query—NOTIFY UUID\ WRITE UUID：**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module notify\write UUID | AT+CHAR\r\n | +CHAR=<UUID >\r\n | <UUID> notify\write UUID<br>Default：FFE1 |
| Set module notify \write UUID | AT+CHAR=<UUID>\r\n | +CHAR =<UUID>\r\n<br>OK | |

**Note: This channel is a readable and writable channel (ie it can be read or written)**

Example: Set the notify \write UUID to：FE01

1. Send settings：

AT+CHAR0XFE01\r\n

return：

+NOTIFY= FE01r\n

OK\r\n

**11、Settings\Query - Low Power Mode:**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module low | AT+PWRM\r\n | +PWRM=<Param>\r\n | < Param >(0、1) |

| | | | |
|---|---|---|---|
| power mode | | | 0：Low power mode<br>1：working mode<br>Default：1 |
| Set module low power mode | AT+PWRM=<Param>\r\n | +PWRM=<Param>\r\n<br>OK | |

**12、Settings\Query - Master\Slave Mode：**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module master\slave mode | AT+ROLE\r\n | + ROLE =<Param>\r\n | < Param >（0、1）<br>0：Slave mode<br>1：Main mode<br>Defaults：0 |
| Set module master\slave mode | AT+ROLE=<Param>\r\n | + ROLE =<Param>\r\n<br>OK | |

Note：The main module can only search for the Bluetooth module connected to our company, and cannot search for other Bluetooth module devices.

**13、Search for Bluetooth devices (master mode is valid)：**

| Function | Command | Response | Description |
|---|---|---|---|
| Search for Bluetooth devices | AT+INQ\r\n | OK\r\n | |

Example：

Send search：

AT+INQ\r\n

return：

OK\r\n

+INQS\r\n ——Start

+INQ:1 0x001583000001 -63\r\n ——Bluetooth device 1

+INQ:2 0x001583000002 -56\r\n ——Bluetooth device 2

。。。 。。。

+INQE\r\n ——End

Devices Found x （x represents the quantity）

**14、Settings\Query—Automatically search for Bluetooth devices (master mode is valid)：**

| Function | Command | Response | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Query module search mode | AT+AUTOINQ\r\n | +AUTOINQ=<Param >\r\n | < Param >(0、1)<br>0：Manual search<br>1：Auto Search<br>Defaults：0 |
| Set module search mode | AT+AUTOINQ=<Param >\r\n | +AUTOINQ=<rParam >\r\n<br>OK | |

**15、Connect a Bluetooth device (master mode is valid)：**

| Function | Command | Response | Description |
|---|---|---|---|
| Connect a Bluetooth device | AT+CONN<Param>\r\n | Connection information | Param：1~9 device serial number searched |

Example (if searching for device 1 : 0x001583000001 ):

Send connection：

AT+CONN1r\n ——Connect the device with sequence number 1

return：

+Connecting>>0x001583000001\r\n ——connecting
+Connected>>0x001583000001\r\n ——connected

**16、Connect to the remote specified address Bluetooth (master mode is valid)：**

| Function | Command | Response | Description |
|---|---|---|---|
| Connect a Bluetooth device | AT+CONA<Param>\r\n | Connection information | Param：MAC address<br>Such as: 0x112233445566 |

**17、Settings\Query—Automatically connect to Bluetooth device (master mode is valid):**

| Function | Command | Response | Description |
|---|---|---|---|
| Query module connection mode | AT+AUTOCONN\r\n | +AUTOCONN=<Param >\r\n | < Param >(0、1)<br>0：Manual connection |

| | | | |
|---|---|---|---|
| Set module connection mode | AT+AUTOCONN=<Param >\r\n | +AUTOCONN=<Param >\r\n<br>OK | 1：Auto connection<br>Default: 0 |

18、**Clear connection memory（master mode is valid）：**

| Function | Command | Response | Description |
|---|---|---|---|
| **Clear connection memory** | AT+CLEAR \r\n | OK\r\n | |

**Note:** AT+CLEAR is the last slave module used to clear the memory of the main module. (The main module will continue to search for this slave module after disconnecting a slave module. If you need to connect a new slave module, you need to clear it. Previous memory).

19、**Software restart：**

| Function | Command | Response | Description |
|---|---|---|---|
| Software restart | AT+RESET\r\n | OK\r\n | |

20、**Restore default settings：**

| Function | Command | Response | Description |
|---|---|---|---|
| Restore default settings | AT+DEFAULT \r\n | OK\r\n | |



## 13. Contact us

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