# DX-BT24-HID
# Serial Port Application Guide

Version：2.1

Date：2023-03-01

## Update Record

| Version | date | illustrate | author |
|---------|------|-----------|--------|
| V2.1 | 20 23 / 3 / 1 | Initial release | DL |

## Contact Us

**Shenzhen Daxia Longque Technology Co., Ltd.**

Email: manager@szdx-smart.com

Tel: 0755-2997 8125

Website: http://en.szdx-smart.com/

Address: Room 601, Block A1, Huafeng Zhigu, Hangkong Road, Hangcheng Street, Bao'an District, Shenzhen

# Contents

## Figure Contents

## Table Contents

# 1. Introduction

The Daxia Longque Technology DX-BT24-HID Bluetooth module features Bluetooth 5.1 protocol and has a built-in standard serial communication protocol. It allows for data interaction, HID reconnection, and data transmission between the module and mobile devices, PCs, or master devices via the serial interface. Additionally, AT commands can be used to configure and modify the module's parameters. This enables devices to quickly and cost-effectively integrate into the Internet of Things (IoT), making them more convenient and intelligent.

## 1.1. Application Interface

### 1.1.1. Module pin definition
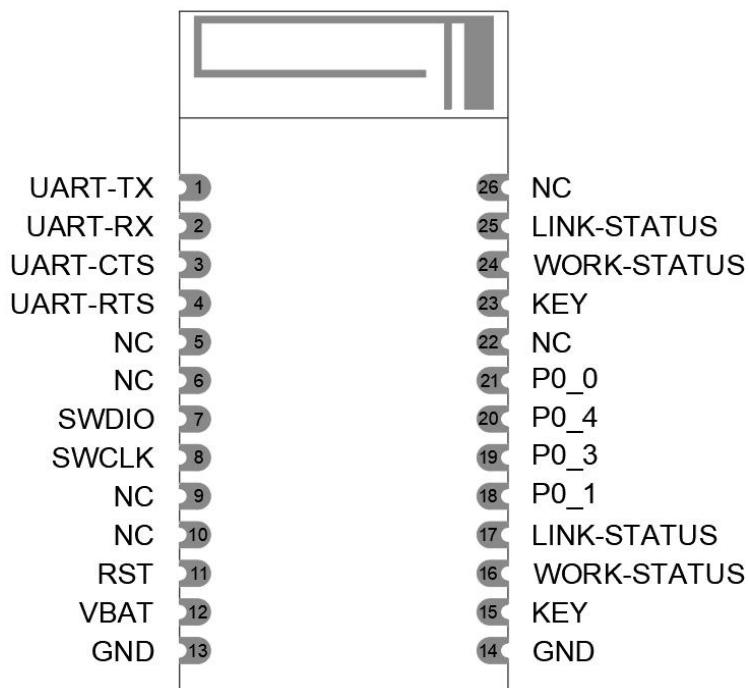


**Figure 1: Module pin definition**

## 1.1.2. Pin Definition

**Table 1: Pin definition table**

| Pin number | Pin Name | Pin Function | illustrate |
|---|---|---|---|
| 1 | UART-TX | Serial data output | |
| 2 | UART-RX | Serial data input | |
| 3 | UART-CTS | UART clear to send, low level is effective | Connected to pin 8 |
| 4 | UART-RTS | UART request to send, low level is valid | Connected to pin 7 |
| 5,6,9,10,22,26 | NC | Dangling | |
| 7 | SWDIO | Debug data port | Programmable input/output pins |
| 8 | SWCLK | Debug clock port | Programmable input/output pins |
| 11 | RST | Reset<br>Wake up from hibernation mode | Please refer to 1.1.3 for details. |
| 12 | VBAT | Power input pin | 3.3V (typical) |
| 13 | GND | Power Ground | |
| 14 | GND | Power Ground | |
| 15 | KEY | Disconnect pin | Please refer to 1.1.4 for details. |
| | | Low power mode wakeup | Please refer to 1.1.4 for details. |
| | | Enter pairing mode | Please refer to 1.1.4 for details. |
| 16 | WORK-STATUS | Module working status output pin | Not connected:<br>1s high level 1s low level<br>Connection status:<br>3s high and 50ms low<br>Low power / hibernation mode : always low |
| 17 | LINK-STATUS | Bluetooth connection status pin | Unconnected state: output low level<br>Connection status: output high level |
| 18,19,20,21 | P0_1,P0_3,P0_4,P0_0 | Dangling | Can only be suspended |
| twenty three | KEY | Connected to pin 15 | Programmable input/output pins |
| twenty four | WORK-STATUS | Connected to pin 16 | Programmable input/output pins |
| 25 | LINK-STATUS | Connected to pin 17 | Programmable input/output pins |

### 1.1.3. RST Reset Pin Description

**Table 2: RST pin definition table**

| Pin Name | Pin Number | I/O | describe | Remark |
|----------|-----------|-----|----------|--------|
| RST | 11 | DI | Module reset | Low level is effective Leave it unused if not in use |

**Table 3: RST pin function definition table**

| Module Status | Operate method | result |
|---------------|----------------|--------|
| Hibernation | Pull the RST pin low for at least 200ms and then release it | Reset wake-up |
| Other | Pull the RST pin low for at least 200ms and then release it | Reset |

| Remark |
|--------|
| The RST signal is sensitive to interference, so it is recommended that the routing should be as short as possible and grounded. |
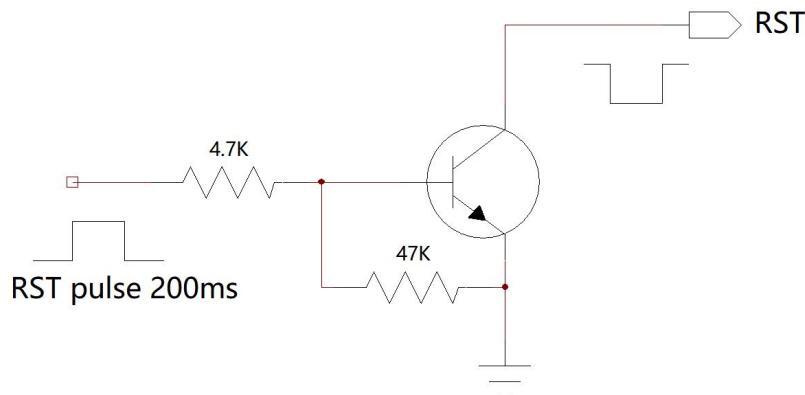


**Figure 2: Reset reference circuit**
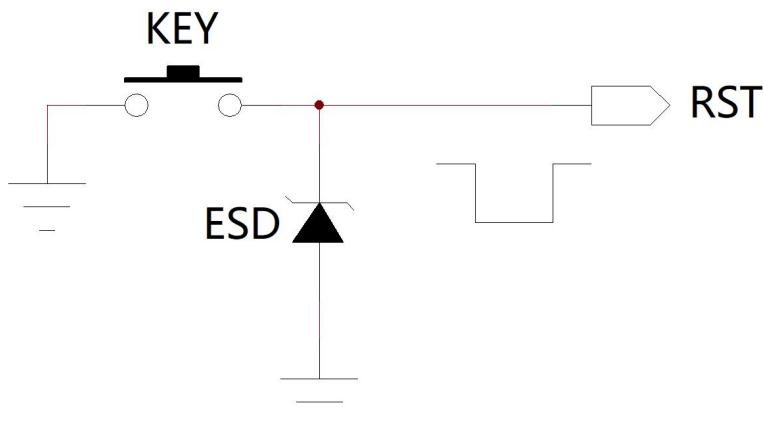


**Figure 3: Push button reset reference circuit**

### 1.1.4. KEY Pin Description

**Table 4: KEY pin definition table**

| Pin Name | Pin Number | I/O | Describe | Remark |
|---|---|---|---|---|
| KEY | 15 | DI | | |

**Table 5: KEY pin function definition table**

| Module Program | Module Status | Operate method | result |
|---|---|---|---|
| HID | Connection Status | Pull the KEY pin low for at least 200ms and then release it | Disconnect |
| | Low power standby mode | Pull the KEY pin low for at least 200ms and then release it | wake |
| | Standby mode | Pull the KEY pin low three times within 500ms | Clear pairing parameters |

**Remark**

HID- Clear pairing parameters : Clear the pairing information with the mobile phone. The module will automatically disconnect and restart. After clearing, the mobile phone will reconnect and the module will automatically disconnect.

### 1.1.5. Current Consumption

| HID mode power consumption | | | |
|---|---|---|---|
| **Mode** | **State** | **Current** | **Unit** |
| Hibernation Mode | - | 2.08 | uA |
| Low Power Mode | Not connected | 21.35 | uA |
| | Connected | 358.04 | uA |
| Normal Working Mode | Not connected | 280.80 | uA |
| | Connected | 358.04 | uA |
| When transparently transmitting data | Connected | MIN: 358.04 uA MAX: 813.6 uA | MIN is the power consumption when no data is sent; MAX is the power consumption when the module sends data at 10626 bytes/s |

**Remark**

Above table is the result of testing under a broadcast interval of 540ms and is for reference only. The power consumption of this module varies at different broadcast intervals, so the specific power consumption is subject to actual conditions.

## 1.2.  Basic Parameters Of Serial Port

- Module serial port default parameters: 9600bps/8/n/1 (baud rate/data bit/ no parity/stop bit)
- Module BLE UUID : SERVICE UUID: FFE0
  NOTIFY/WRITE UUID: FFE1
  WRITE UUID: FFE2

## 1.3.  At Command Mode And Transparent Transmission Mode

- AT command mode: When the module is not connected to other devices, it is in command mode and can respond to commands.
- Transparent transmission mode: When the module is connected to other devices, it is in transparent transmission mode and can start transmitting data.

## 1.4.  Module Data Throughput

| Data Throughput | | | |
|---|---|---|---|
| **Android -> Module -> UART** | | **UART -> Module -> Android** | |
| Baud rate | 115200 | Baud rate | 115200 |
| Connection interval time (ms) | 15-20 | Connection interval time (ms) | 15-20 |
| APP data packet size (bytes) | 253 | UART data packet size (bytes) | 2 53 |
| Sending interval (ms) | 20 | Sending interval (ms) | 1 0 |
| Throughput (bytes/s) | 12144 | Throughput (bytes/s) | 10120 |
| Characteristic | Write without Response | Characteristic | Notify |
| **iPhone -> Module -> UART** | | **UART -> Module -> iPhone** | |
| Baud rate | 115200 | Baud rate | 115200 |
| Connection interval time (ms) | 15 -20 | Connection interval time (ms) | 15 -20 |
| APP data packet size (bytes) | 17 0 | UART data packet size (bytes) | 300 |
| Sending interval (ms) | 20 | Sending interval (ms) | 20 |
| Throughput (bytes/s) | 6800 | Throughput (bytes/s) | 9536 |
| Characteristic | Write without Response | Characteristic | Notify |

**Remark**

Above table is for reference only. This module supports a maximum mtu value of 253. The data throughput is related to the mtu value and connection interval of the mobile phone bluetooth. The data is subject to the actual situation.

# 2. Mobile Testing APP and PC Tools

## 2.1. Android Test APP

Install the Android test APP in the data package to the Android phone, open the transparent transmission interface to search for connections, and after connecting to the module, data transmission can be performed. The APP interface is as follows:



**Figure 4: Android APP interface**

## 2.2. IOS Test APP

IOS test APP Download 'DX-SMART' in the Apple Store and use this APP to perform data transmission test. The APP interface is as follows:
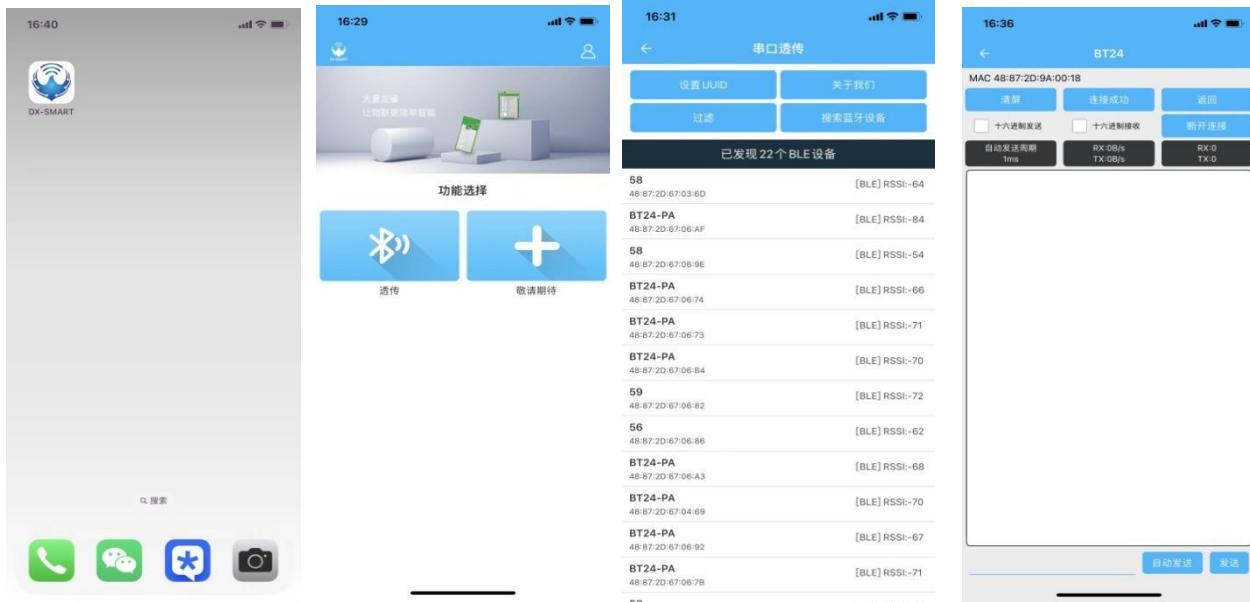
**Figure 5: IOS mobile phone APP interface**

## 2.3. Computer Test Software

For the computer test software, please download and install the sscom5.13.1 computer serial port software in the data package for testing. The serial port software interface is as follows:
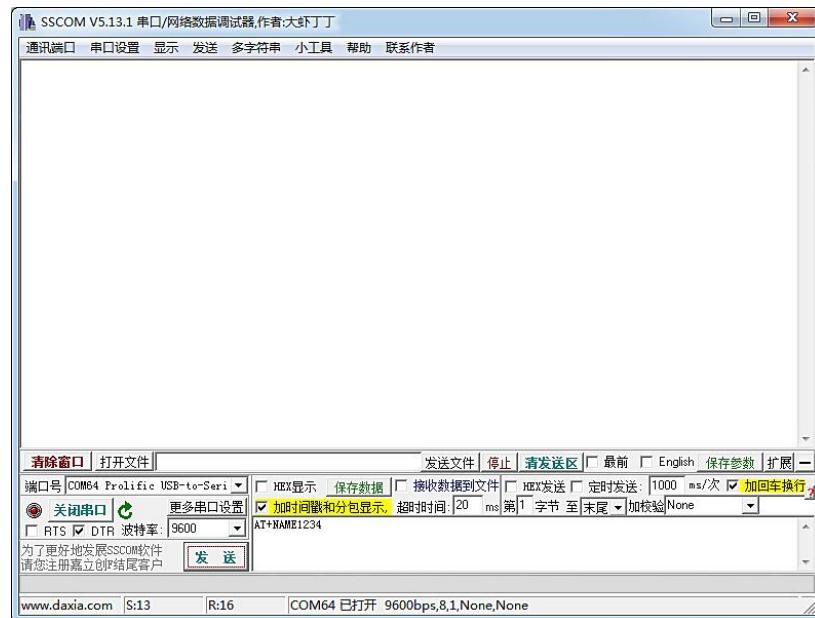


**Figure 6: Computer serial port software diagram**

# 3. Serial Port Usage

## 3.1. Use the serial port to read and write AT commands

### 3.1.1. Module Testing Minimum System
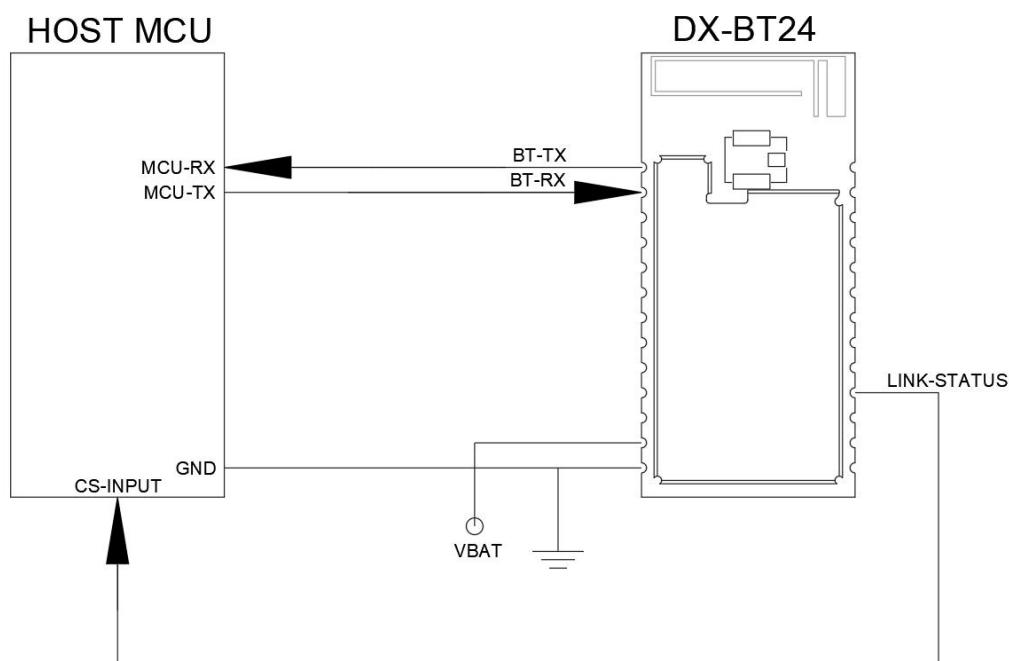


**Figure 7: Module minimum system diagram**

### 3.1.2. Computer side read and write AT command process

Install the serial assistant software on the computer, use the USB to TTL serial cable to connect to the module for communication, refer to the "module test minimum system" for wiring, and then send AT commands to query and configure parameters. Note: The module is powered by 3.3V.

Example: Change the name of the Bluetooth module to: 1234.

Install sscom5.13.1 computer serial port software, open the serial port software and select the corresponding COM port, install the default parameter configuration of the serial port software, that is, 9600bps/8/n/1 (baud rate/data bit/ no parity/stop bit), fill in the corresponding AT+NAME1234

command, and be sure to add carriage return and line feed (you can directly press the Enter key) or check "Add carriage return and line feed", and then send the command, as shown below:
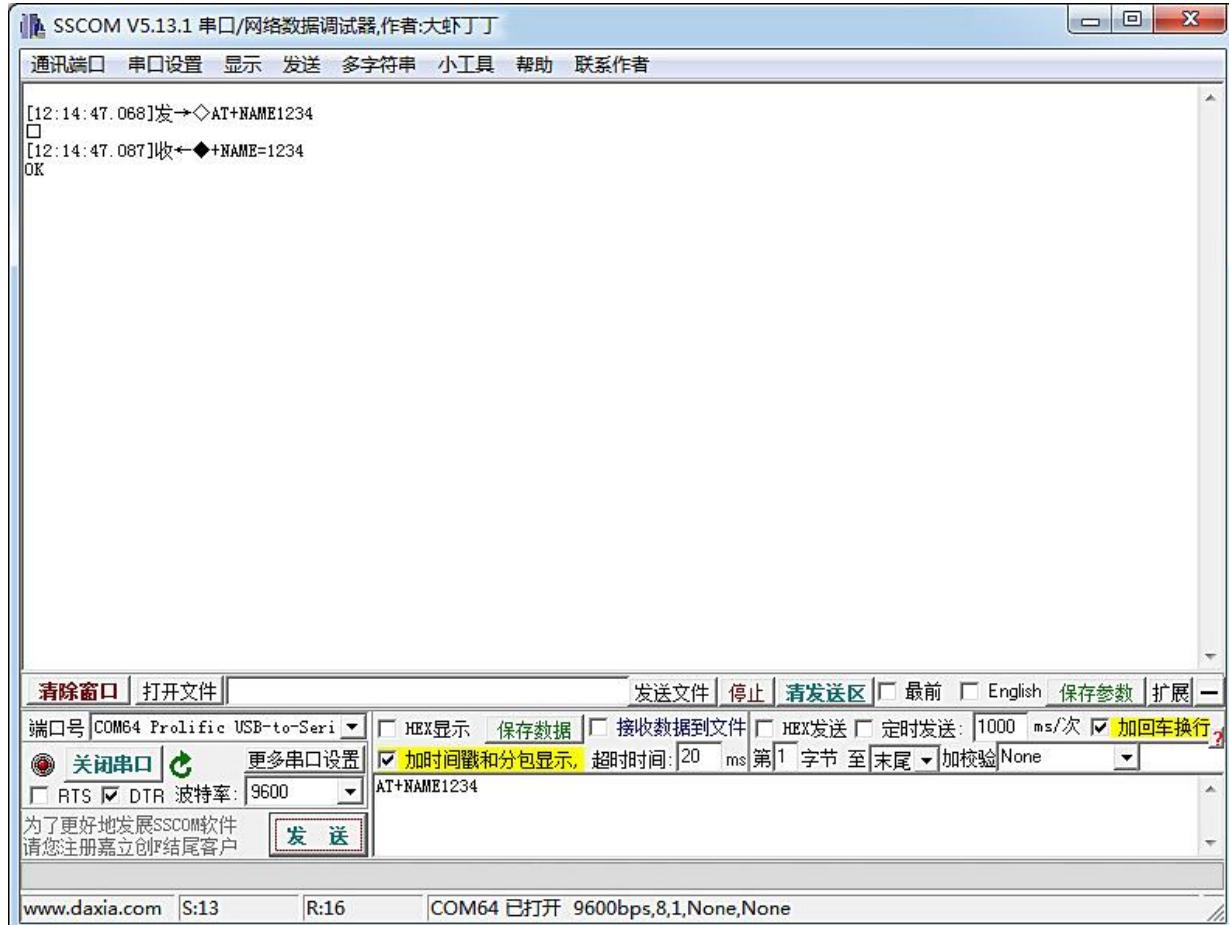


**Figure 8: Computer Serial Port Demonstration Diagram**

### 3.1.3. MCU Read And Write At Command Process

For the wiring of reading and writing AT commands on the MCU side, refer to "Module Test Minimum System". For example, to modify the Bluetooth name and query the Bluetooth address code, refer to the following figure for the specific instruction program logic flow:
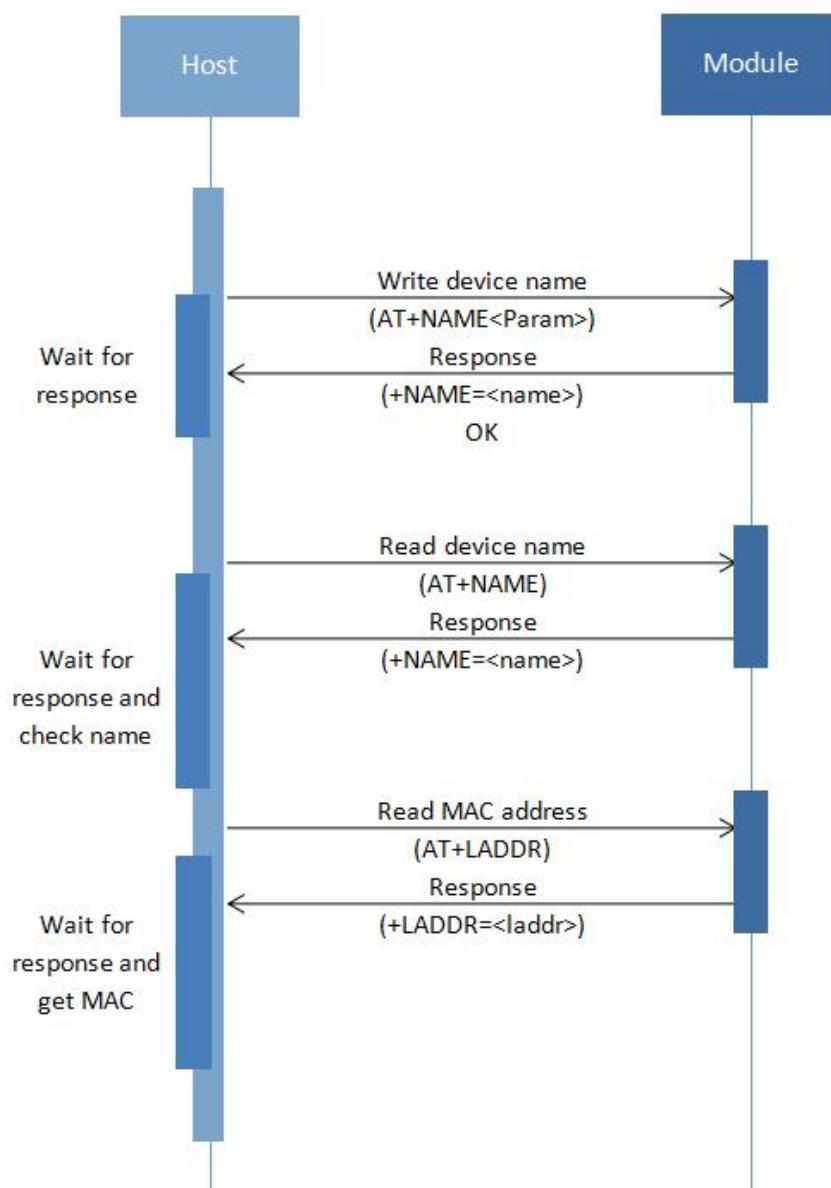
**Figure 9: Read And Write At Command Logic Reference Diagram**

## 3.2. Using serial communication

### 3.2.1. Use PC to communicate with the module

Because this module uses the BLE serial port protocol, the PC cannot use its own Bluetooth or Bluetooth adapter for connection and communication . If you need to connect the Bluetooth module , you need to use our main module on the PC to connect and communicate . For the specific process, please refer to 3.2.3 "Use the main Bluetooth to communicate with the module".

### 3.2.2. Use the mobile terminal to communicate with the module

MCU communicates with the mobile terminal through the Bluetooth module. The process is as follows:
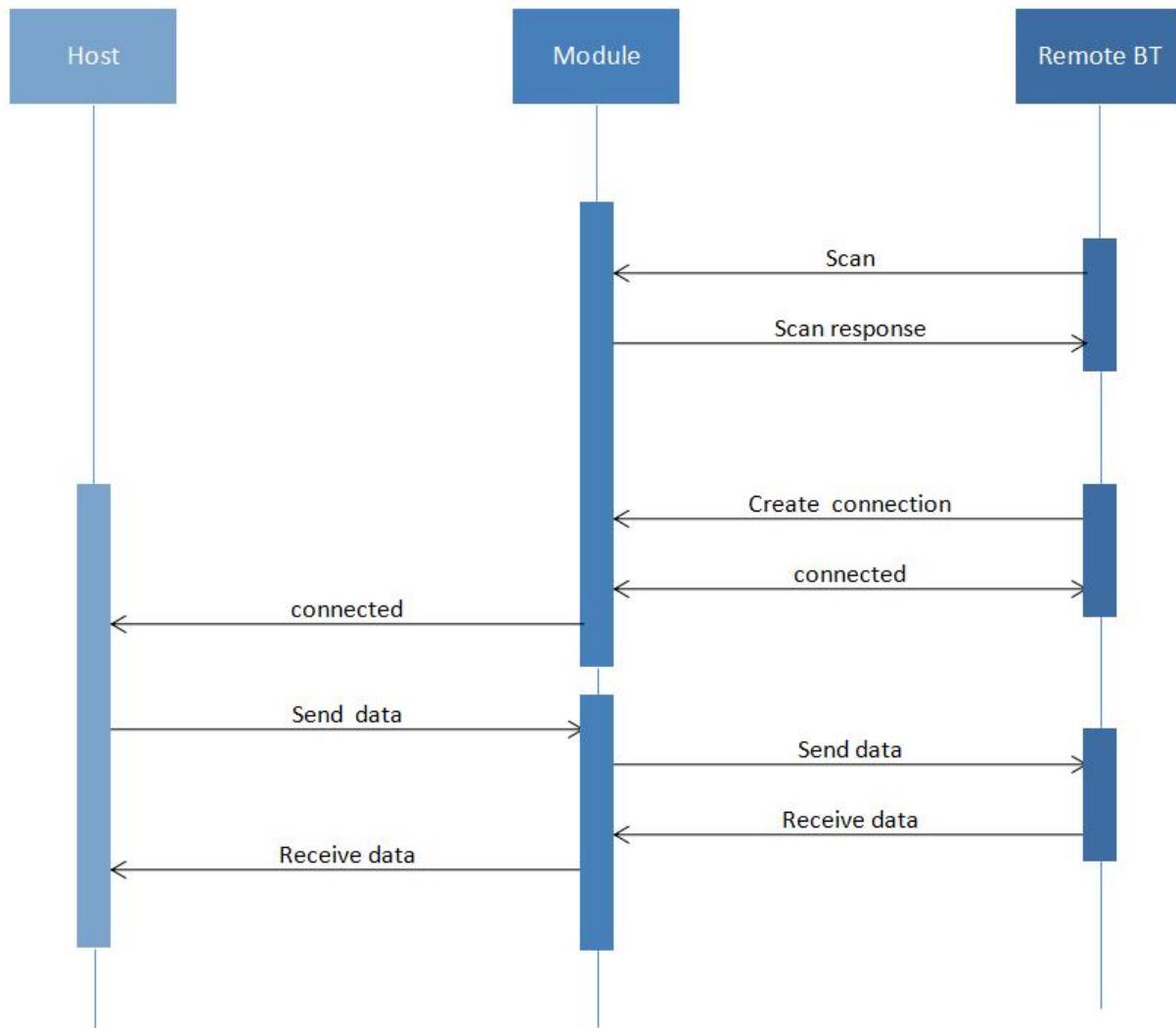


**Figure 10: Module communication flow chart**

### 3.2.3. Use the main Bluetooth to communicate with the module

The master module and slave module need to use AT commands to connect and communicate. The process is as follows:
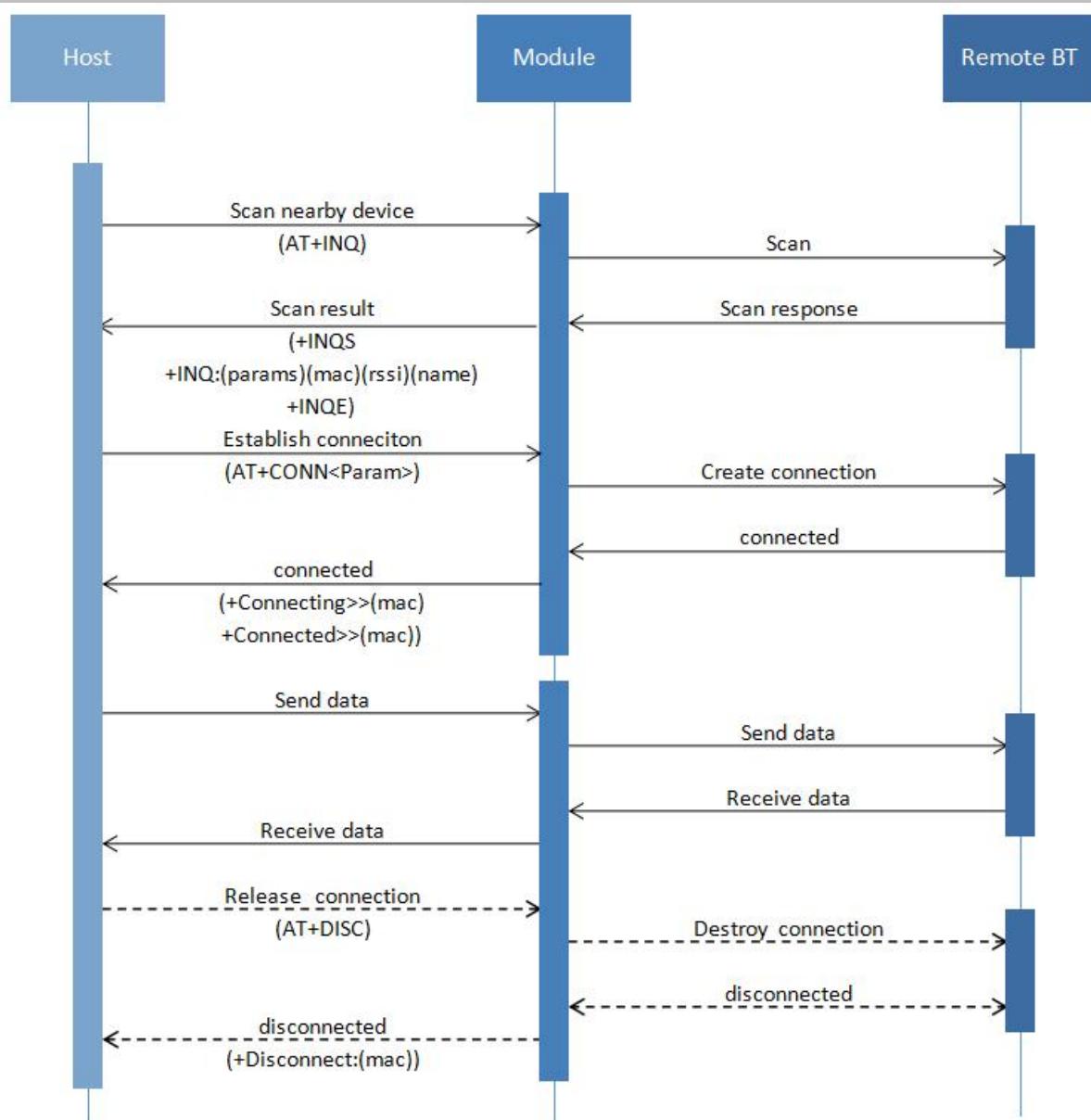
**Figure 11: Master-slave module communication flow chart**

# 4. Detailed Explanation Of Related AT Commands

## 4.1. Command Format Description

**AT+Command< param 1, param 2, param 3> <CR><CF>**

- All commands begin with AT and end with <CR><LF>. In the tables showing commands and responses in this document, <CR><LF> is omitted and only the commands and responses are shown .
- All AT command characters are uppercase.
- The content in <> is optional. If there are multiple parameters in the command, they are separated by commas. The actual command does not contain angle brackets.
- <CR> is the carriage return character \r, which is 0X0D in hexadecimal.
- <LF> is the line feed character \n, which is 0X0A in hexadecimal.
- If the command is executed successfully, the corresponding command will be returned with OK. If it fails, EEROR=< > will be returned, and the "< >" content is the corresponding error code (please refer to 5.7 ).

## 4.2. Response Format Instructions

**+Indication<= param 1, param 2, param 3><CR><CF>**

- The response command starts with a plus sign "+" and ends with <CR><CF>
- The response parameter is after "="
- If there are multiple parameters in the response parameter, they will be separated by commas.

## 4.3. At Command Examples

Example : Change the Bluetooth device name to 1234
     Send: AT+NAME1234
     Return: +NAME=1234
          OK

# 5. AT Commands Explained

## 5.1. Basic Instructions

### 5.1.1. Test Instructions

| Function | Instruction | Response | Illustrate |
|---|---|---|---|
| Test Instructions | AT | OK | For testing serial port |

### 5.1.2. Check Software Version

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query version number | AT+VERSION | +VERSION=<version> | <version> Software version number<br>The versions will be different according to different modules and customized requirements |

### 5.1.3. Query Module Address Code

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query MAC Address | AT+LADDR | +LADDR=<laddr> | <laddr>Bluetooth MAC address code |

### 5.1.4. Set\Query Bluetooth Device Name

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query Bluetooth name | AT+NAME | +NAME=<name> | <name>Bluetooth name, up to 28 bytes<br>Default name : BT24 -HID |
| Set Bluetooth name | AT+NAME<name> | +NAME=<name><br>OK | |

**Remark**

After setting this command, you need to restart for it to take effect.

### 5.1.5. Setting\Query—Serial Port Stop Bit

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query the serial port stop bit | AT+STOP | +STOP = <param> | < param >sequence number<br>0 : 1 stop bit<br>1 : 2 stop bits |
| Set the serial port | AT+STOP< param > | +STOP = <param> | |

| | | |
|---|---|---|
| stop bit | OK | Default value: 0 |

**Remark**

After setting this command, you need to restart for it to take effect.

### 5.1.6. Setting\Query—Serial Port Check Bit

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query the serial port check bit | AT+PARI | +PARI = \<param\> | \< param \>sequence number<br>0 : No verification<br>1 : odd parity<br>2 : Even parity<br>Default value: 0 |
| Set the serial port parity bit | AT+PARI\< param \> | +PARI = \<param\><br>OK | |

**Remark**

After setting this command, you need to restart for it to take effect.

### 5.1.7. Setting\Query—Serial Port Baud Rate

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query baud rate | AT+BAUD | +BAUD=\<baud\> | \<baud\> baud rate corresponding serial number<br>1:2400 5 : 38400 2:4800 6 : 57600<br>3:9600 7 : 115200 4: 19200<br>Default value: 3（9600） |
| Setting the baud rate | AT+BAUD\<baud\> | +BAUD=\<baud\><br>OK | |

**Remark**

After setting this command, you need to restart for it to take effect.

### 5.1.8. Query / Set —Pairing Code

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query pairing code | AT+PIN | + PIN = \<param\> | \< param \> pairing code<br>Default pairing code : 123456 |
| Set pairing code | AT + PIN \<param\> | + PIN = \<param\><br>OK | |

**Remark**

After setting this command, the module will restart immediately to take effect

## 5.1.9. Query / Set — BLE Mode

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query BLE mode | AT+ BLE MODE | + BLE MODE = <param> | <param> sequence number<br>0: BLE password + back connection<br>1: BLE password + no reconnection<br>2 : BLE without password<br>+ back connection<br>Default value: 0 |
| Setting BLE Mode | AT+ BLE MODE< param > | + BLE MODE = <param><br>OK | |

**Remark**

After setting this command, the module will restart immediately to take effect

## 5.1.10. Clear Paired Parameters

| Function | instruction | response | illustrate |
|---|---|---|---|
| Clear pairing parameters and content | AT+HIDCLEAR | OK | |

**Remark**

This command can be used to clear the paired phone parameters and restart.

## 5.1.11. Disconnect Bluetooth

| Function | instruction | response | illustrate |
|---|---|---|---|
| Disconnect | AT+DISC | | Disconnect |

**Remark**

This command can only be used in transparent transmission mode, and can only be sent from the serial port. It is invalid when sent from the mobile phone. You can also disconnect through the KEY pin.

## 5.1.12. Software Restart

| Function | instruction | response | illustrate |
|---|---|---|---|
| Software Restart | AT+RESET | +RESET<br>OK<br>Power On | |

### 5.1.13. Restore factory settings

| Function | instruction | response | illustrate |
|---|---|---|---|
| Restore factory settings | AT+DEFAULT | +DEFAULT OK | |

## 5.2. Power consumption instructions

### 5.2.1. Setting\Query—Energy Saving Mode

| Function | instruction | response | illustrate |
|---|---|---|---|
| Query energy saving mode | AT+PWRM | +PWRM = <param> | <param> ( 0, 1 , 2 ) 0: Low power mode |
| Setting Energy Saving Mode | AT+PWRM< param > | +PWRM = <param> OK | 1: Normal working mode 2: Hibernation mode Default value: 1 |

### 5.2.2. Query\Set—Module Transmit Power

| Function | instruction | response | illustrate | |
|---|---|---|---|---|
| Query the transmit power | AT+POWE | +POWE= <powe> | <powe> Serial number: 1: -19.5 dB 2: -13.5 dB 3: -10dB 4: -7dB 5: -5dB 6: -3.5dB | 7: -2dB 8: -1dB 9: 0dB A: +1dB B: +1.5dB C: +2.5dB Default: C |
| Set the transmit power | AT+POWE <powe> | +POWE= <powe> OK | | |

**Remark**

This command can be used to reduce power consumption and adjust the module broadcast distance.

## 5.3. Error Code List

the error code in EEROR=<> is listed as follows:

| Return Value | Error message description |
|---|---|
| 101 | Parameter length error |
| 102 | Parameter format error |
| 103 | Parameter data abnormality |
| 104 | Instruction Error |

# 6. Value-added Services

In order to meet the various functional requirements of customers, our company can provide the

following technical value-added services:

- Module program customization, such as IO function port customization, AT command customization, broadcast package customization, etc.
- Module PCB hardware customization can be customized to the hardware requirements of customers.
- Various Bluetooth solutions can be customized, and a full set of Bluetooth software and hardware solutions can be customized according to customer needs.
- A full set of networking solutions can be customized according to customer needs.

If you have any of the above customization requirements, please contact our sales staff directly.