



# **DX-BT31**

## **Serial Port**

## **Application Guide**

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# 1. Introduction

The DX-BT31 Bluetooth module supports dual-mode Bluetooth 5.0 protocol and features a built-in standard serial protocol. It enables data interaction between the module and mobile devices, PCs, or main devices via the serial interface. Additionally, AT commands can be used to configure and modify the module's parameters. This allows devices to integrate into the IoT at a very low cost and high speed, making them more convenient and intelligent.

## 1.1. Basic Parameters Of Serial Port

- Module serial port default parameters: 115200 bps/8/n/1 (baud rate/data bit/ no parity/stop bit)
- The module supports software flow control
- Module BLE UUID : SERVICE UUID: FFE0  
NOTIFY UUID: FFE1  
WRITE UUID: FFE2

## 1.2. 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.

## 1.3. Module Data Throughput

Data Throughput			
Android -> Module -> UART		UART -> Module -> Android	
Baud rate	115200	Baud rate	115200
Connection interval time (ms)	15	Connection interval time (ms)	15
APP data packet size (bytes)	450	UART data packet size (bytes)	390
Sending interval (ms)	20	Sending interval (ms)	20
Throughput (bytes/s)	80100	Throughput (bytes/s)	2774
Characteristic	Write without Response	Characteristic	Notify
iPhone -> Module -> UART		UART -> Module -> iPhone	
Baud rate	115200	Baud rate	115200
Connection interval time (ms)	30	Connection interval time (ms)	30

APP data packet size (bytes)	120	UART data packet size (bytes)	140
Sending interval (ms)	20	Sending interval (ms)	20
Throughput (bytes/s)	10300	Throughput (bytes/s)	12759
Characteristic	Write without Response	Characteristic	Notify

#### Remark

above table is for reference only. The data throughput is related to the MTU value and connection interval of the mobile phone Bluetooth. The data is subject to actual conditions.

## 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 “transmission” interface to search for connections, and after connecting to the module, data transmission can be performed. The APP interface is as follows:



Figure 1 Android APP interface

### 2.2. IOS Test APP

IOS test APP Download 'LIGHTBLUE' in the Apple APP Store and use this APP to perform data transmission test. The APP interface is as follows:

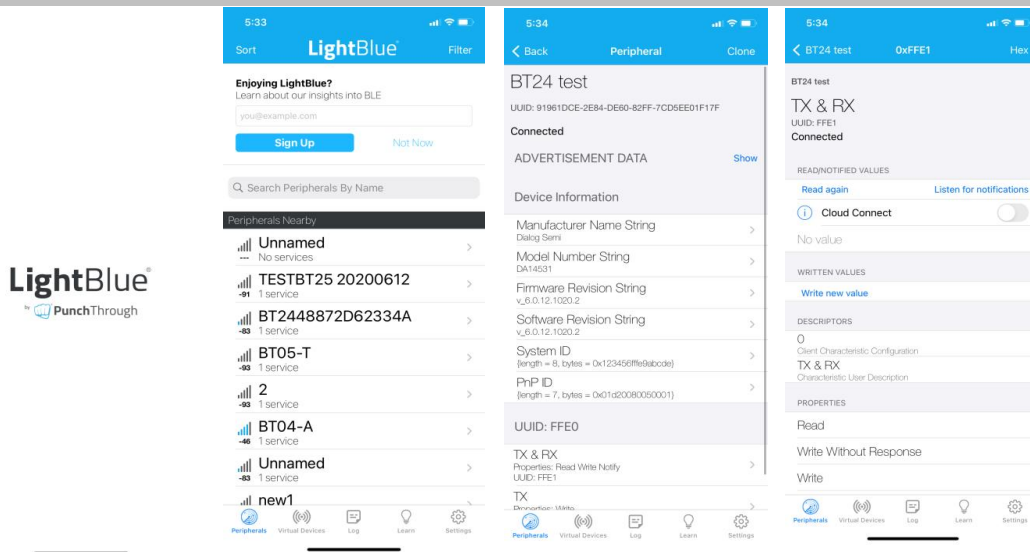


Figure 2 IOS mobile phone APP interface

## 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:

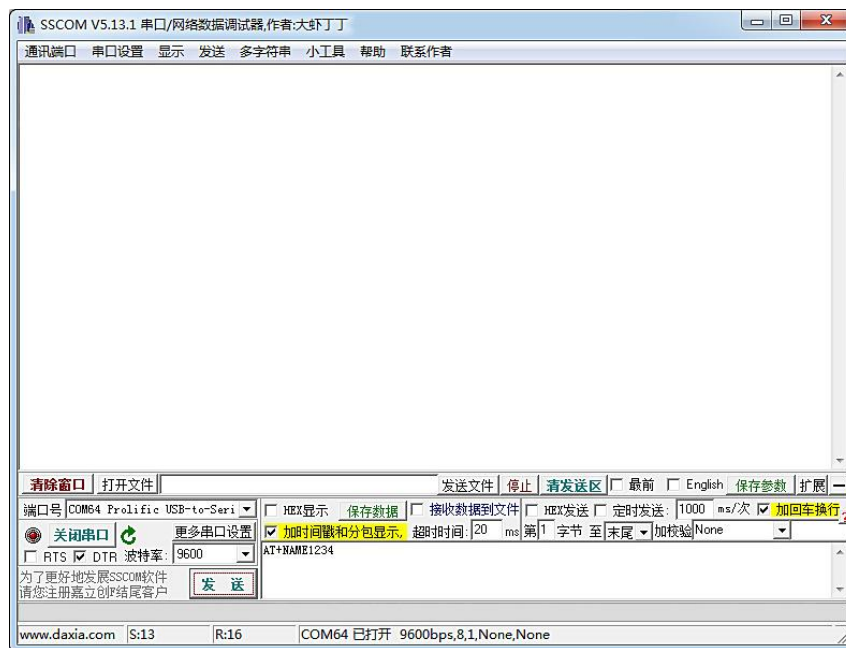


Figure 3 Computer serial port software diagram



## 3. Serial Port Usage

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

#### 3.1.1. Module testing minimum system

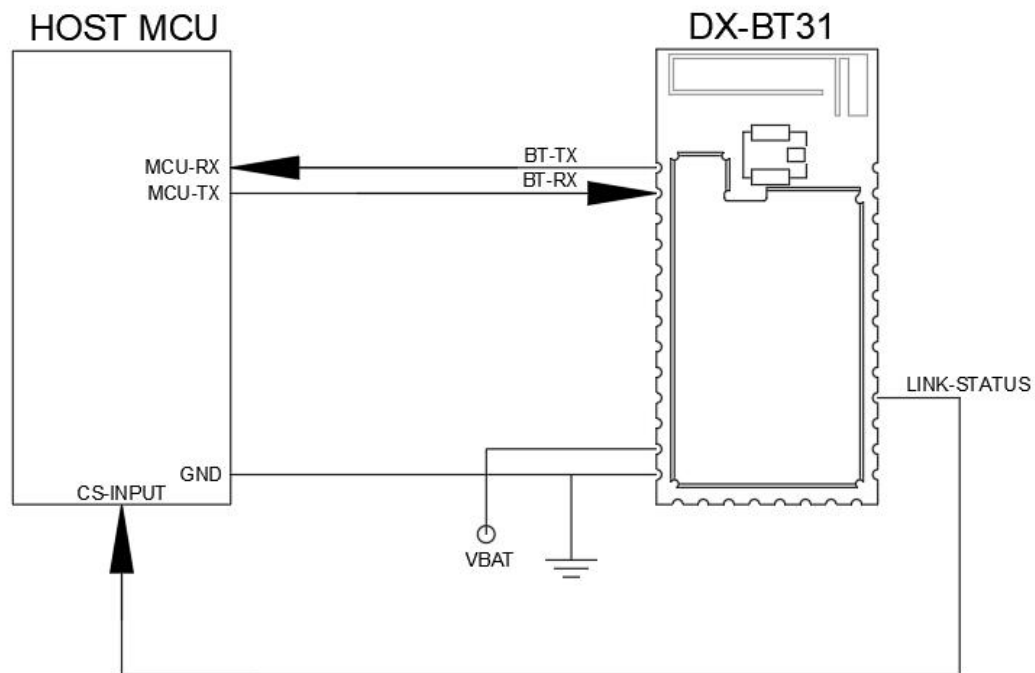


Figure 4 Module minimum system diagram

#### 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 (Can directly press the Enter key) or check "Add carriage return and line feed", and then send the command, as shown below:

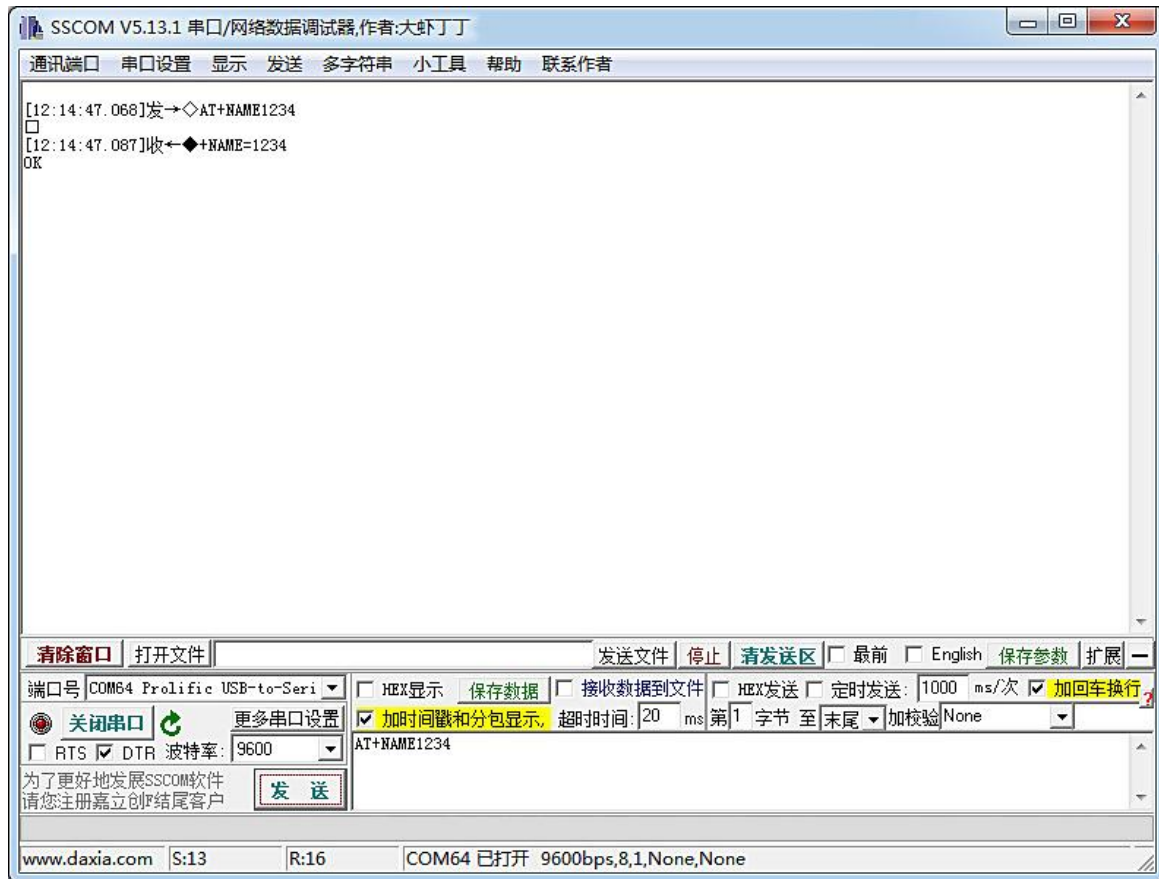


Figure 5 Computer serial port demonstration diagram

### 3.1.3. MCU read and write AT command process

The MCU side reads and writes AT commands, with wiring reference to the 'Module Test Minimal System.' For example, modifying the Bluetooth name and querying the Bluetooth address code. The specific command program logic flow is as follows:

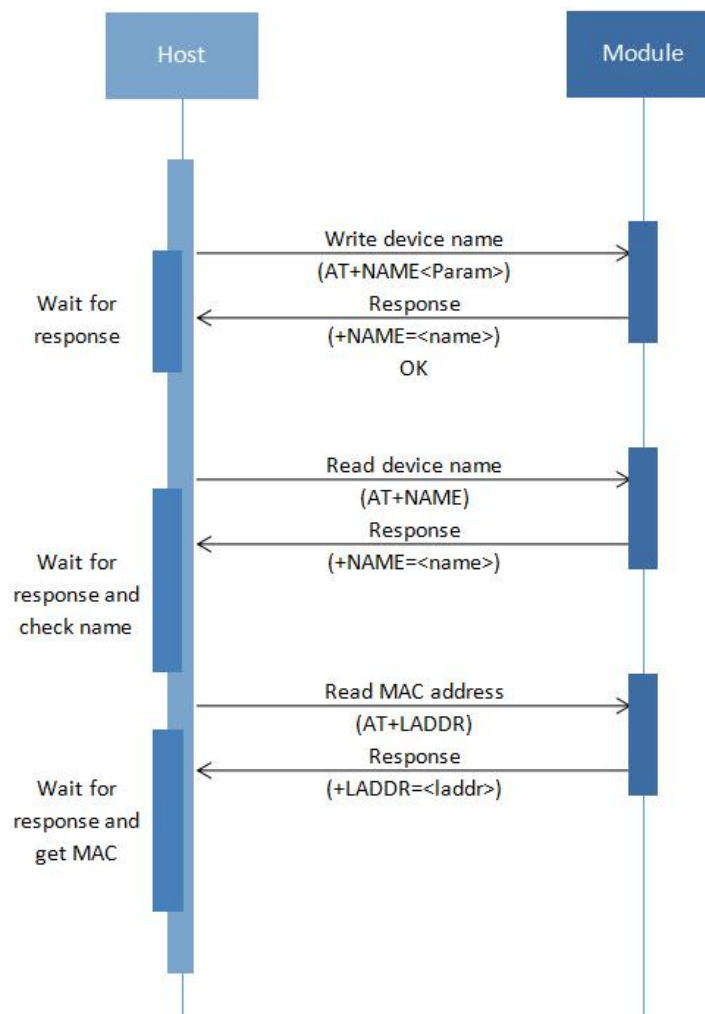


Figure 6 Read and write AT command logic reference diagram

## 3.2. Using serial communication

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

Since this module uses the BLE serial protocol, the PC side cannot use the built-in Bluetooth or Bluetooth adapter for connection and communication temporarily. To connect to the Bluetooth module, you need to use our company's main module on the PC side, and use the main module for connection and communication. For detailed procedures, please refer to 'Using the Main Bluetooth Module for Communication' and 'DX-BT24 Series Bluetooth Module\_Main Mode\_Application Guide.'



### 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:

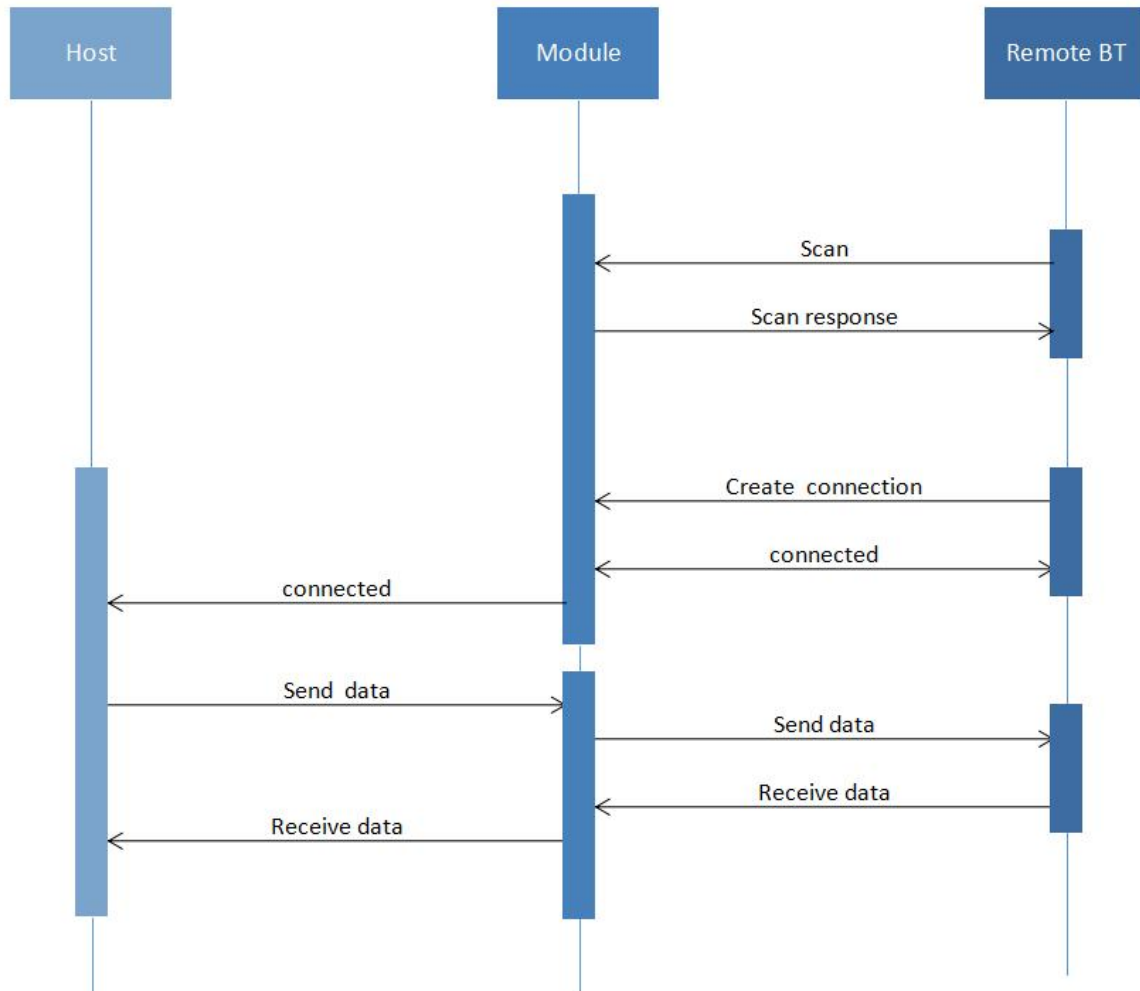


Figure 7 Module communication flow chart



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

The master module and the slave module need to use AT commands to connect and communicate.

The process is as follows:

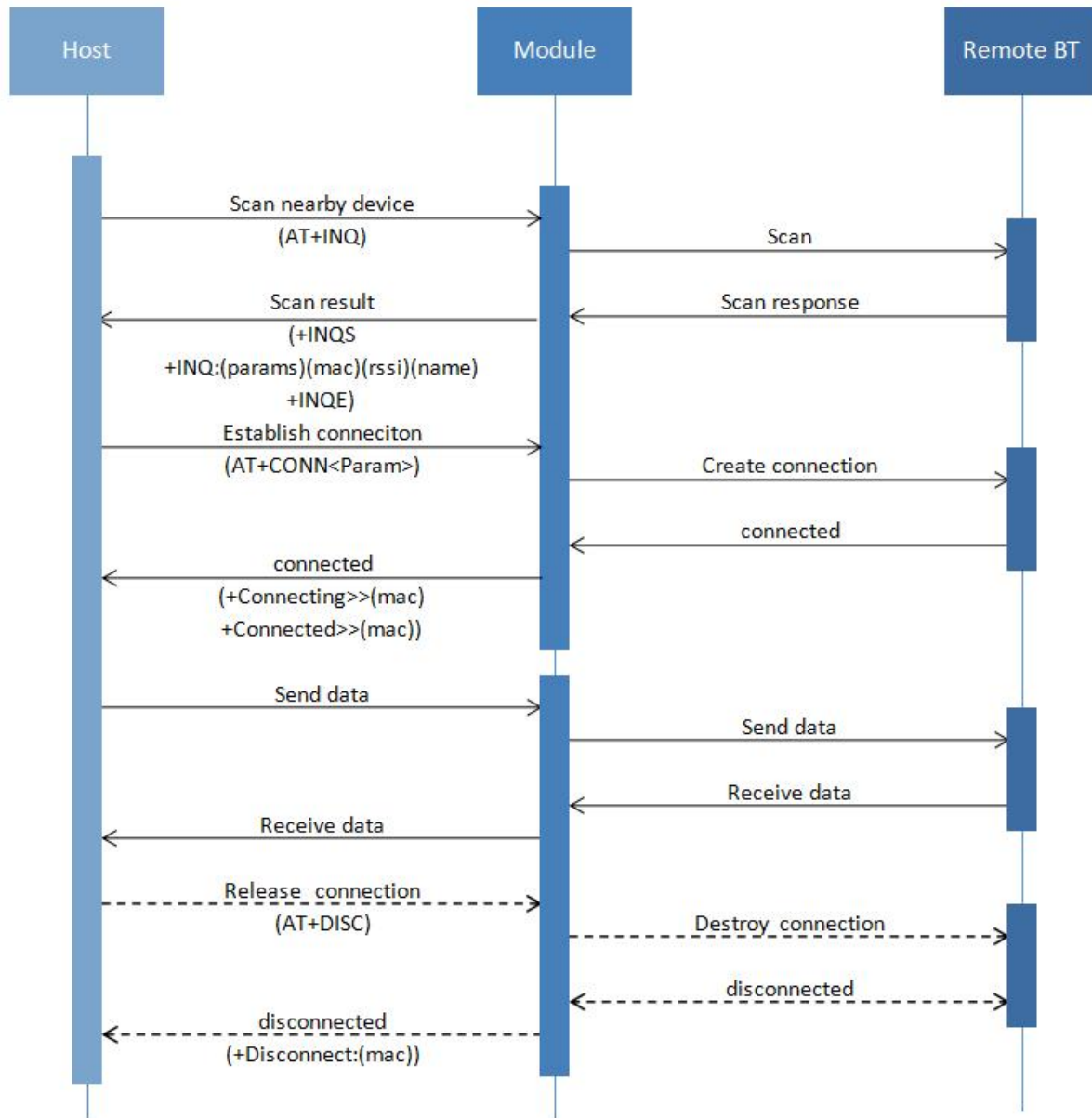


Figure 8 Master-slave module communication flow chart



## 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 and OK will be returned. If it fails, EEROR=<> will be returned, and the "<>" content is the corresponding error code (please refer to 5.7 ).

### 4.2. Response Format Commands

**+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+NAME = 1234

Return: +NAME=1234

OK

## 5. AT Commands

### 5.1. Basic Commands

#### 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+VER	+VER= <version> , <name> OK	<version> : software version number < name > : Bluetooth initial name

#### 5.1.3. Query SPP address code

Function	instruction	response	illustrate
Query MAC Address	AT+ADDR	+ADDR=< mac > OK	< mac > : MAC address code

#### 5.1.4. Query BLE address code

Function	instruction	response	illustrate
Query MAC Address	AT+ LE ADDR	+ LE ADDR=< mac > OK	< mac > : MAC address code

#### 5.1.5. Set/query SPP Bluetooth device name

Function	instruction	response	illustrate
Query Bluetooth name	AT+NAME	+NAME=<name> OK	<name> : Bluetooth name Maximum length is 25 bytes Default name: DX-BT31
Set Bluetooth name	AT + NAME = <name>	OK	

#### Remark

Setting instructions takes effect immediately

### 5.1.6. Set/query BLE device name

Function	instruction	response	illustrate
Query Bluetooth name	AT+ LE NAME	+ LE NAME=<name> OK	<name> : Bluetooth name Maximum length is 25 bytes Default name: DX-BT31-LE
Set Bluetooth name	AT + LE NAME = <name>	OK	

#### Remark

Setting instructions takes effect immediately

### 5.1.7. Setting/Query—Serial port baud rate

Function	instruction	response	illustrate
Query baud rate	AT+BAUD	+BAUD= < baud > OK	< baud >: baud rate Support scope: 4800 9600 14400 19200 38400 57600 115200 230400 460800 921600 1000000 Default value: 115200
Setting the baud rate	AT+BAUD =< baud >	OK	

#### Remark

Setting instructions takes effect immediately

### 5.1.8. Settings/Query—Transparent Mode

Function	instruction	response	illustrate
Query transparent transmission mode	AT+TPMODE	+ TPMODE = <param> OK	< param >sequence number 0: Disable transparent transmission 1: Enable transparent transmission Default value: 1
Set the transparent transmission mode	AT + TPMODE = <param>	OK	

#### Remark

Setting instructions takes effect immediately

When Param=0, the transparent transmission is turned off. The module can still respond to AT commands in the connected state. If the transparent transmission is turned on in this state, the module will enter the transparent transmission mode after the response and will no longer respond to commands.

### 5.1.9. Settings/Query—Bluetooth device type

Function	instruction	response	illustrate
Query device type	AT+ COD	+ COD = <param> OK	<param> : Device type identification code Default value: 240400
Set the device type	AT + COD = <param>	OK	

#### Remark

- (1) The setting command needs to be restarted to take effect
- (2) The param parameter must be filled with 6 digits. If it is less than 6 digits, it needs to be supplemented with 0
- (3) If the cod value is 10C, the setting command is AT+COD=00010C

### 5.1.10. Settings/Query— Simple pairing status

Function	instruction	response	illustrate
Query pairing status	AT+ SSP	+ SSP = <param> OK	< param > : 0 : Disable easy pairing 1 : Enable easy pairing Default: 1
Set pairing status	AT + SSP = <param>	OK	

#### Remark

- (1) The setting command needs to be restarted to take effect
- (2) When in the simple pairing state, the mobile phone can enter the connection state without entering the pairing code when connecting to the module

### 5.1.11. Settings/Query—Pairing Code

Function	instruction	response	illustrate
Query pairing code	AT+PIN	+ PIN = <param> OK	<param> : pairing code Support 4~15 bytes Default pairing code : 0000
Set pairing code	AT + PIN = <param>	OK	

#### Remark

Setting instructions takes effect immediately

### 5.1.12. Query/clear pairing records

Function	instruction	response	illustrate
Query pairing records	AT+PLIST	list { + LIST =< param >,<mac > }	< param > : index number 0: Clear all pairing records



Clear pairing history	AT + PLIST = <param>	OK	1~5: Clear the pairing record of the specified index < mac > : Bluetooth pairing address
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#### Remark

- (1) Setting instructions takes effect immediately
- (2) list{}: represents the content of {} is output multiple times
- (3) After clearing the pairing record, when the module is in the state of closing the simple pairing, the mobile phone needs to re-enter the pairing code to connect to the module.

### 5.1.13. Software Restart

Function	instruction	response	illustrate
Software Restart	AT+REBOOT	OK	

### 5.1.14. Restore factory settings

Function	instruction	response	illustrate
Restore factory settings	AT+RESTORE	OK	

#### Remark

This directive is effective immediately

## 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.