



DX-BT27

MASTER MODULE SERIAL UART APPLICATION GUIDE

Version: 2.1

Date: 2022-01-05



Update Record

Version	Date	Illustrate	Author
V2.1	2022/01/05	initial version	DL

Contact Us

Shenzhen DX-SMART Technology Co., Ltd.

Email: sales@szdx-smart.com

Tel: 0755-29978125

Web: www.szdx-smart.com

Add: Room 601, Block A1, Huafeng Zhigu, Hangkong Road, Baoan District, Shenzhen

Contents

1. Introduction	- 5 -
1.1. Applicable Modules	- 5 -
1.2. Serial Port Basic Parameters	- 5 -
1.3. AT Command And Transparent Transmission Mode	- 5 -
1.4. Module Data Throughput	- 6 -
1.5. Computer Test Software	- 7 -
2. Serial Port Usage	- 7 -
2.1. Use Serial Port To Read And Write AT Commands	- 7 -
2.1.1. Module Test Minimal System	- 7 -
2.1.2. The Process Of Reading And Writing AT Commands On The Computer	- 9 -
2.1.3. MCU Read And Write AT Command Process	- 10 -
2.2. Use Serial Communication	- 11 -
2.2.1. Use Master Bluetooth To Communicate With Slave Modules	- 11 -
2.2.2. How To Make Master-Slave Modules Match In Pairs	- 12 -
3. Detailed Explanation Of Related AT Commands	- 12 -
3.1. Command Format Description	- 12 -
3.2. Indication Format	- 13 -
3.3. Examples Of AT Commands	- 13 -
4. AT Command	- 13 -
4.1. Basic Commands	- 13 -
4.1.1. Test Command	- 13 -
4.1.2. Read Firmware Version	- 14 -
4.1.3. Read MAC Address	- 14 -
4.1.4. Read/Write Local Name	- 14 -
4.1.5. Set/Query—Serial-port Stop Bit	- 14 -
4.1.6. Set/Query—Serial-port Parity Bit	- 15 -
4.1.7. Set/Query—UART Baudrate	- 15 -
4.1.8. Disconnect Bluetooth	- 15 -
4.1.9. Software Reset	- 16 -
4.1.10. Restore Factory Settings	- 16 -
4.2. Connect Instruction	- 16 -
4.2.1. Set/Query—Module Search Mode	- 16 -
4.2.2. Set/Query—Filter Signal Strength	- 17 -
4.2.3. Set/Query—Search Time Length	- 17 -
4.2.4. Manually Search For Bluetooth Devices	- 18 -
4.2.5. Manually Connect A Bluetooth Device	- 18 -
4.2.6. Connect To The Specified Address Bluetooth	- 19 -

4.2.7. Set/Query—Bind Bluetooth Address	- 19 -
4.2.8. Set/Query—Automatically Connect To Bluetooth Devices	- 19 -
4.2.9. Clear Connection Memory	- 20 -
4.3. List Of Error Codes	- 20 -
5. Value-added Services	- 21 -

Picture index

Figure 1 : Computer serial port software diagram	- 7 -
Figure 2 : Module minimum system diagram	- 8 -
Figure 3 : Demonstration diagram of computer serial port	- 9 -
Figure 4 : Read and write AT command logic reference diagram	- 10 -
Figure 5 : Master-slave module communication flow chart	- 11 -

1. Introduction

DX-SMART Technology DX-BT27 series main mode Bluetooth module has 5.1 Bluetooth protocol, and the module has built-in standard serial port protocol. You can communicate with our slave bluetooth modules, including BT27 series, BT04-E series and other bluetooth modules of our company, through the serial port of this module. You can connect and communicate between devices through the master-slave module, so as to join the Internet of Things at a very low cost and at a very fast speed, making the devices more convenient and smart.

1.1. Applicable Modules

Series	Module
BT27 series	BT27

1.2. Serial Port Basic Parameters

- Module serial port default parameters: 9600bps/8/n/1 (Baud/Data /No parity/Stop Bits)

1.3. AT Command And Transparent Transmission Mode

- AT command mode: When the module is not connected to other slave devices, it is in command mode and can respond to commands.
- Transparent Transmission Mode: After the module is connected to other devices, it is in transparent transmission mode, and data can be transmitted at this time.

1.4. Module Data Throughput

Data throughput			
Master module -> BT27 series slave		BT27 series slave->Master module	
Baud	115200	Baud	115200
connection interval(ms)	15	connection interval(ms)	15
data pack(bytes)	240	data pack(bytes)	240
send interval(ms)	20	send interval(ms)	20
Throughput(bytes/s)	8918	Throughput(bytes/s)	8918
Characteristic	Write without Response	Characteristic	Notify
Master module->BT04-XX Dual mode slave		BT04-XX Dual mode slave->Master module	
Baud	115200	Baud	115200
connection interval(ms)	15	connection interval(ms)	15
data pack(bytes)	20	data pack(bytes)	20
send interval(ms)	20	send interval(ms)	20
Throughput(bytes/s)	694	Throughput(bytes/s)	694
Characteristic	Write without Response	Characteristic	Notify
Master module -> BT04-XX BLE mode slave		BT04-XX BLE mode slave->Master module	
Baud	115200	Baud	115200
connection interval(ms)	15	connection interval(ms)	15
data pack(bytes)	40	data pack(bytes)	40
send interval(ms)	20	send interval(ms)	20
Throughput(bytes/s)	1380	Throughput(bytes/s)	1380
Characteristic	Write without Response	Characteristic	Notify

Remark

The data in the above table is for reference only. The maximum MTU value supported by this module is 253. The data throughput is related to the MTU value of the mobile phone's Bluetooth and the connection interval. The actual data shall prevail.



1.5. Computer Test Software

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

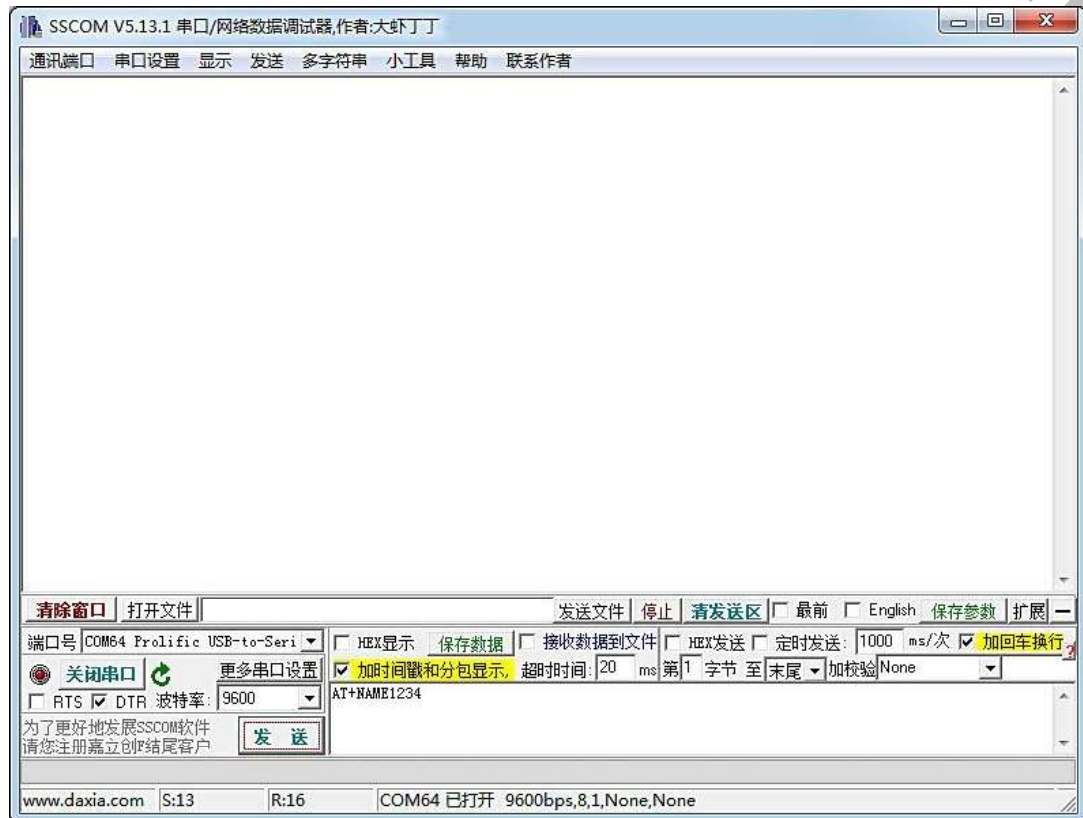
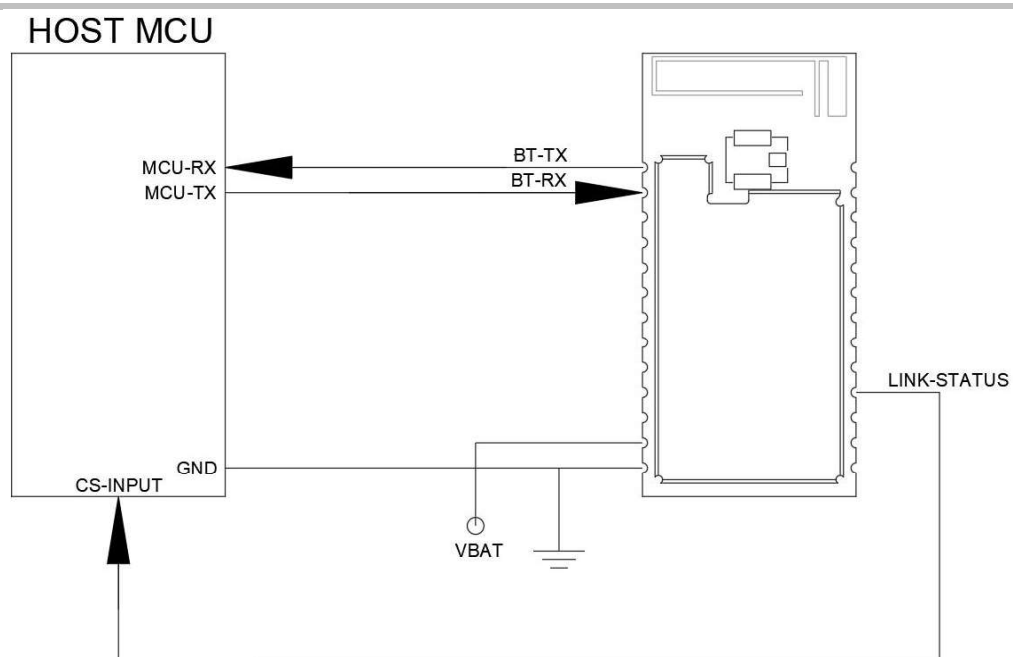


Figure 1: Computer serial port software diagram

2. Serial Port Usage

2.1. Use Serial Port To Read And Write AT Commands

2.1.1. Module Test Minimal System





2.1.2. The Process Of Reading And Writing AT Commands On The Computer

Install the serial assistant software on the computer, use the USB to TTL serial cable to communicate with the module, refer to "Module Test Minimum System" for wiring, and then send AT commands to query and configure parameters. Note: The power supply of the module is 3.3V.

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

Install the sscom5.13.1 computer serial port software, open the serial port software and select the corresponding COM port, and configure the default parameter configuration of the serial port software installation: 9600bps/8/n/1 (baud rate/data bit/no parity/stop bit), Fill in the corresponding AT+NAME1234 command, and be sure to add a 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:

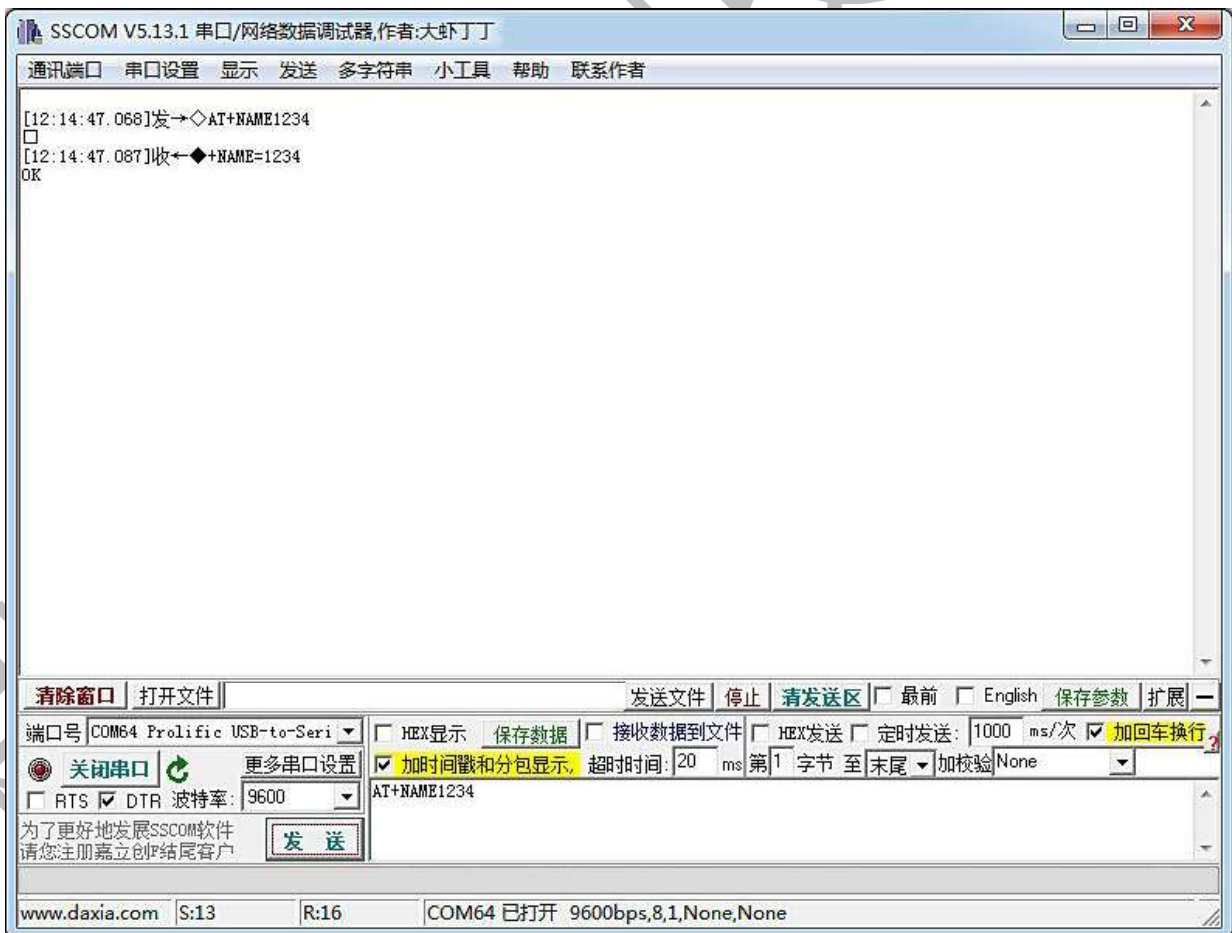


Figure 3: Demonstration diagram of computer serial port



2.1.3. MCU Read And Write AT Command Process

For the wiring of MCU reading and writing AT commands, please refer to "Module Test Minimum System". For example, modify the Bluetooth name and query the Bluetooth address code. The specific instruction program logic flow refers to the following figure:

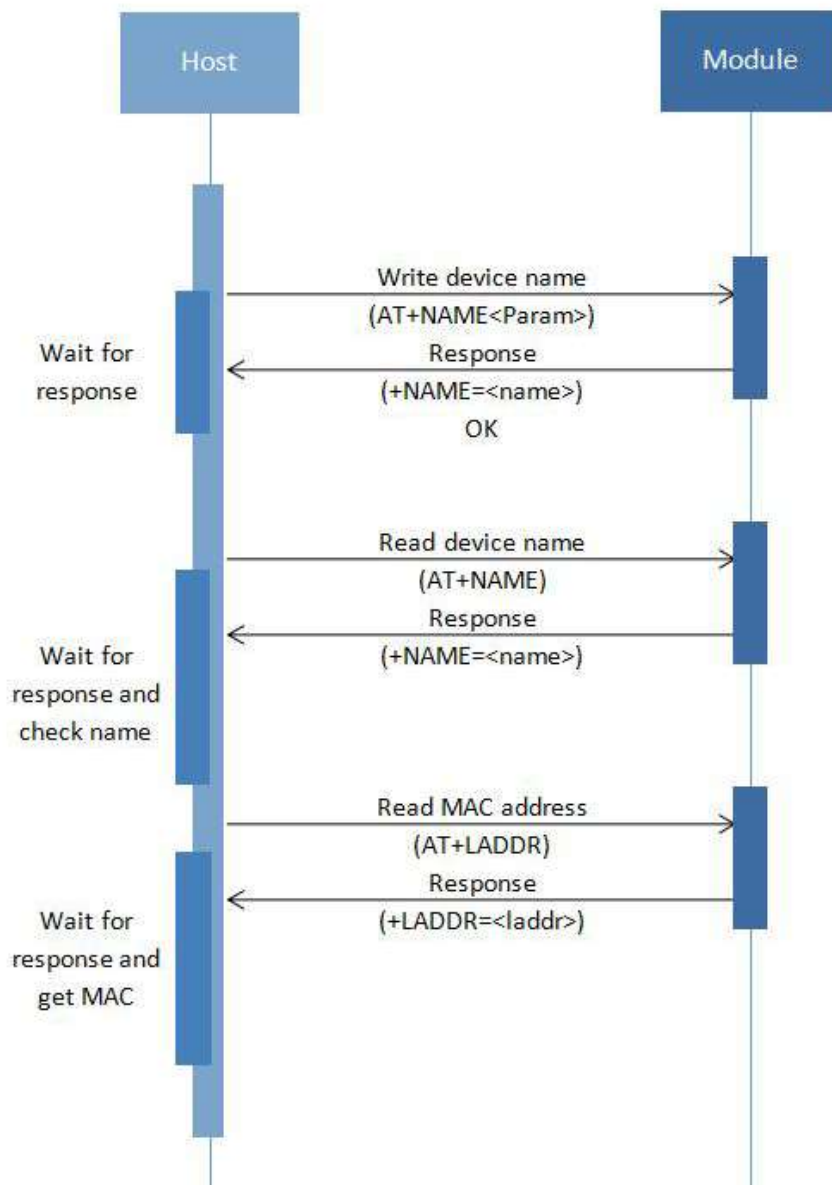


Figure 4: Read and write AT command logic reference diagram



2.2. Use Serial Communication

2.2.1. Use Master Bluetooth To Communicate With Slave Modules

The connection between the master module and the slave module needs to use AT commands to connect and communicate. The process is as follows:

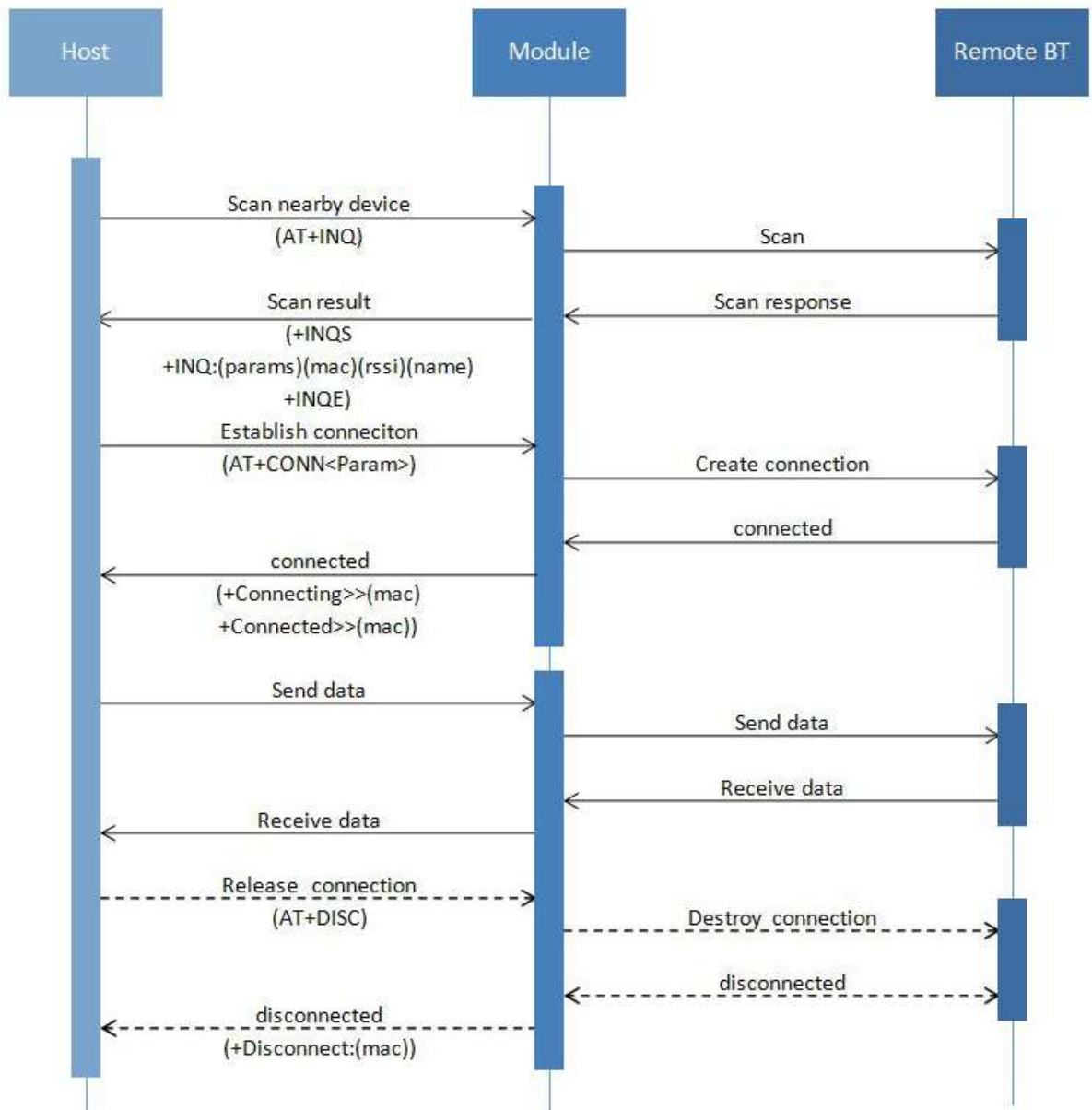


Figure 5: Master-slave module communication flow chart



2.2.2. How To Make Master-Slave Modules Match In Pairs

The master module is BT27, the slave module is BT27, and the two modules are used in pairs.

Example: Use pairing mode to quickly connect the slave module. The pairing mode is to facilitate the master module to connect with the specified slave quickly and accurately when there are multiple slaves in the surrounding area.

- Use the AT command to set the main module mode to mode 2, that is, send AT+MODE2, and then set the module to automatic connection, that is, send AT+AUTOCONN1.
- Let the slave module enter the pairing mode, that is, pull down the KEY pin of the slave module for at least 100ms until it is connected to the master module and then release it. Or send the pairing mode command, that is, send AT+SEADV534d4152542d00 to let the module enter the pairing mode. To exit pairing mode, send AT+CLEARADV to clear.
- After the main module is connected to the slave module, the main module will bind the bluetooth address code of the slave module. Even after power failure or disconnection, the main module will automatically connect to the slave module. To clear the binding, send AT+CLEAR or use the key to clear.

3. Detailed Explanation Of Related AT Commands

3.1. Command Format Description

AT+Command<param1, param2, param3> <CR><CF>

- All commands start with AT , end with <CR><LF> , In the table showing commands and responses in this document, <CR><LF> is omitted, and only commands and responses are displayed.



- All AT command characters are uppercase.
- <>The content inside is optional, If there are multiple parameters in the command, Separate by comma ",", The angle brackets are not included in the actual command.
- <CR>stands for "carriage return" \r, corresponding hex is 0X0D.
- <LF>stands for "line feed" \n, corresponding hex is 0X0A.
- The command is executed successfully, the corresponding command is returned and ends with OK, and EEROR=<> if it fails, The content of "<>" is the corresponding error code (Please refer to 4.3.)

3.2. Indication Format

+Indication<=param1, param2, param3><CR><CF>

- All Indication starts with plus sign "+", ends with <CR><CF>
- "=" is followed by the indication parameter
- If indication has multiple parameters, parameters must be separated by ",", "

3.3. Examples Of AT Commands

Example: Modify the name of the Bluetooth device to 1234

Send: AT+NAME1234

Return: +NAME=1234

OK

4. AT Command

4.1. Basic Commands

4.1.1. Test Command

Function	Command	Response	Description
Test command	AT	OK	Test uart communication

4.1.2. Read Firmware Version

Function	Command	Response	Description
Read version	AT+VERSION	+VERSION= <version>	<version >firmware version According to different modules and customized requirements version will be different

4.1.3. Read MAC Address

Function	Command	Response	Description
Read MAC address	AT+LADDR	+LADDR= <laddr>	<laddr>MAC address

4.1.4. Read/Write Local Name

Function	Command	Response	Description
Read Bluetooth name	AT+NAME	+NAME= <name>	<name>Bluetooth name The maximum length is 28 bytes Default name: BT27
Write Bluetooth name	AT+NAME<name>	+NAME= <name> OK	

Remark:

After setting this command, it needs to restart to take effect.

4.1.5. Set/Query—Serial-port Stop Bit

Function	Command	Response	Description
Query stop bit	AT+STOP	+STOP= <param>	< param>Serial number
Set stop bit	AT+STOP<param>	+STOP= <param>	0: 1 stop bit

OK

1: 2 stop bit

Defaults: 0

Remark:

After setting this command, it needs to restart to take effect.

4.1.6. Set/Query—Serial-port Parity Bit

Function	Command	Response	Description
Query parity bit	AT+PARI	+PARI= <param>	< param>Serial number
Set parity bit	AT+PARI<param>	+PARI= <param> OK	0: No Parity 1: Odd parity 2: Even parity Defaults: 0

Remark:

After setting this command, it needs to restart to take effect.

4.1.7. Set/Query—UART Baudrate

Function	Command	Response	Description
Read Baudrate	AT+BAUD	+BAUD= <baud>	<baud>serial number of Baudrate
Write Baudrate	AT+BAUD<baud>	+BAUD= <baud> OK	1:2400 5: 38400 2:4800 6: 57600 3:9600 7:115200 4: 19200 Defaults: 3(9600)

Remark:

After setting this command, it needs to restart to take effect.

4.1.8. Disconnect Bluetooth

Function	Command	Response	Description
Disconnect	AT+DISC		

Remark:

This command can only be used in transparent transmission mode, and can only be sent by the serial port, and is invalid when sent by the mobile phone. It is also possible to disconnect by pressing a key.

If the automatic search and automatic connection functions are turned on, after the main module is disconnected, the module will wait 5 seconds before reconnecting to the memorized Bluetooth address. The purpose of this action is to give the main module time to respond to the command.

4.1.9. Software Reset

Function	Command	Response	Description
Software Reset	AT+RESET	+RESET OK Power On	

4.1.10. Restore Factory Settings

Function	Command	Response	Description
Restore factory settings	AT+DEFAULT	+DEFAULT OK Power On	

4.2. Connect Instruction

4.2.1. Set/Query—Module Search Mode

Function	Command	Response	Description
Query module search mode	AT+MODE	+ MODE<Param>	<param>(0、1、2、3)

Set module search mode	AT+MODE<Param>	+ MODE<Param> OK	0: normal mode
			1: Filter manufacturer information
			2: pairing mode
			3: Get IBEACON information schema
			Defaults: 0

Remark:

- Normal mode: All BLE Bluetooth devices around can be searched. (Note: Only our slave modules can be connected, other devices cannot be connected.)
- Filter manufacturer information: Only modules in the broadcast package with our company's manufacturer information can be searched.
- Pairing mode: Only slave devices with pairing mode turned on can be searched.
- Get IBEACON information schema: After this mode is turned on, you can scan to obtain surrounding IBeacon broadcast packet information.

IBeacon search returns the format as: INQ:<param>,<uuid>,<rss>,<name>,<mac>

Example of IBeacon search:

+INQS

+INQ:1,1a4c0215fda5693a4e24fb1afcfc6eb76478251527c04cc5,-62,BT24,202105211ad7

+INQE

Devices Found 1

4.2.2. Set/Query—Filter Signal Strength

Function	Command	Response	Description
Query filter signal strength	AT+SCANRSSI	+SCANRSSI<rss>	<rss> signal strength1-100(decimal) Defaults: 100
Set filter signal strength	AT+SCANRSSI<rss>	OK	

Remark:

After setting the signal strength, the master module can only search for the slave modules whose signal strength is less than or equal to the set value.

4.2.3. Set/Query—Search Time Length



Function	Command	Response	Description
Query search time length	AT+TIMEINQ	+TIMEINQ<time>	<time>time (1-200) *100ms
Set search time length	AT+TIMEINQ<time>	OK	Defaults: 10

4.2.4. Manually Search For Bluetooth Devices

Function	Command	Response	Description
Search for bluetooth devices	AT+INQ	OK	
		+INQS	<param>serial number
		+INQ:<param>,<mac>,<rssi>,<name>	<mac>address code
		+INQ:<param>,<mac>,<rssi>,<name>	<rssi>Signal value
			<name>set name
		+INQE	<x>number(up to 8)
		Devices Found <x>	

4.2.5. Manually Connect A Bluetooth Device

Function	Command	Response	Description
Connect Bluetooth device	AT+CONN<param>	+Connecting>><mac>	<param>serial number
		+Connected>><mac>	<mac>address code

Remark:

Example

Send: AT+INQ

Return: OK

+INQS

+INQ:1,98dac032a6dd,-49,BT04-A

+INQ:2,202105211ad7,-59,BT27

+INQE

Devices Found 2

Need to connect BT27

Send: AT+CONN2

Return: +Connecting>>0x202105211ad7

+Connected>>202105211ad7

4.2.6. Connect To The Specified Address Bluetooth

Function	Command	Response	Description
Connect Bluetooth device	AT+CONA<mac>	+Connecting>><mac> +Connected>><mac>	<mac>address code

Remark:

Example, Connect to the remote specified Bluetooth device address: 112233AABBCC

Send: AT+CONA112233AABBCC

Return: +Connecting>> 0x112233aabbcc

+Connected>>112233aabbcc

4.2.7. Set/Query—Bind Bluetooth Address

Function	Command	Response	Description
Query bind bluetooth address	AT+BIND	+BAND<mac>	<mac>address code
Set bind bluetooth address	AT+BIND<mac>	OK	

Remark:

Example, The binding Bluetooth device address is: 112233AABBCC

Send: AT+BIND112233AABBCC

Return: OK

After binding the Bluetooth address, the module will automatically search and connect the device every time it is powered on. If you need to clear the binding, you can send AT+CLEAR to clear it. It can also be cleared by pressing the key.

4.2.8. Set/Query—Automatically Connect To Bluetooth Devices

Function	Command	Response	Description
Query module	AT+AUTOCONN	+AUTOCONN<param>	<param>(0, 1)



connection mode			0: Turn off
Set module connection mode	AT+AUTOCONN<param>	OK	1: Turn on Defaults: 0

Remark:

- 1、 After setting this command, it needs to restart to take effect.
- 2、 Set to automatic connection, after the master module is connected to the slave device, the master module will remember the Bluetooth address of the slave module, and the master module will automatically connect to the slave module after disconnection or reconnection. If you need to connect a new device, you can clear the memory Bluetooth address by pressing the button or AT+CLEAR.
- 3、 Set to automatic connection, if in AT+MODE0, AT+MODE1 mode, the module will automatically randomly search and connect peripheral slave devices. If in AT+MODE2 mode, the module only connects to the slave device that is in pairing state. If multiple modules go into pairing state, they will connect to slave devices randomly. This command is invalid in AT+MODE3 mode.

4.2.9. Clear Connection Memory

Function	Command	Response	Description
clear connection memory	AT+CLEAR	OK	

Remark:

This command can be used to clear the Bluetooth address code that the module automatically reconnects after the automatic search connection is turned on. You can also use the button to clear, please refer to the button status description in the Bluetooth technical manual for details.

4.3. List Of Error Codes

The detailed information of the error code in ERROR=<> is listed as follows:

Return Value	Error Message
101	Parameter length error
102	Parameter format error
103	Abnormal parameter data



5. 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 customer's hardware requirements.
- Various Bluetooth solutions can be customized, and a complete set of Bluetooth software and hardware solutions can be customized according to customer needs.
- A complete set of networking solutions can be customized, and a complete set of networkable and gateway solutions can be customized according to customer needs.

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

FCC Statement

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AKS8DX-BT27 Or Contains FCC ID: 2AKS8DX-BT27"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with Single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C : 15.247 and 15.209 requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 requirement, then the host can be sold legally.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

OEM INTEGRATION INSTRUCTIONS:

This device is intended only for OEM integrators under the following conditions:

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AKS8DX-BT27".

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below

concerning the need to notify host manufacturers that further testing is required.3 Explanation: This module meets the requirements of FCC part 15C(15.247).

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands. Explanation: The EUT has a Integral Antenna , and the antenna use a permanently attached antenna which is not replaceable.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module. Explanation: The Module is not a limited module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered); c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with Integral antenna designs, Please refer to the antenna specification book for antenna dimensions.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: 2AKS8DX-BT27.

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has a Integral Antenna, and the antenna use a permanently attached antenna which is unique.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2AKS8DX-BT27."

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone

modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: Top band can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuitry, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.