User Manual

Product Name: Bluetooth module
Model Name: DX-BT19-S

Manufacture: SHEN ZHEN DX-SMART TECHNOLOGY CO., LTD

Table Of Contents

1．Overview

DX-BT19 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	BT19
Serial Port Parameters	9600、8 data bits、1 stop bit、No check、No flow control
Service UUID	FFE0
Notify\Write UUID	FFE1
Write UUID	FFE2
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-BT19 module supports BT4 .0 BLE protocol, which can be directly connected to iOS devices that have BLE Bluetooth function, and supports background program resident operation.

Successful application of BT19 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 ->BT19 -> UART		UART ->BT19 -> 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 ->BT19 -> UART		UART ->BT19 -> 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:
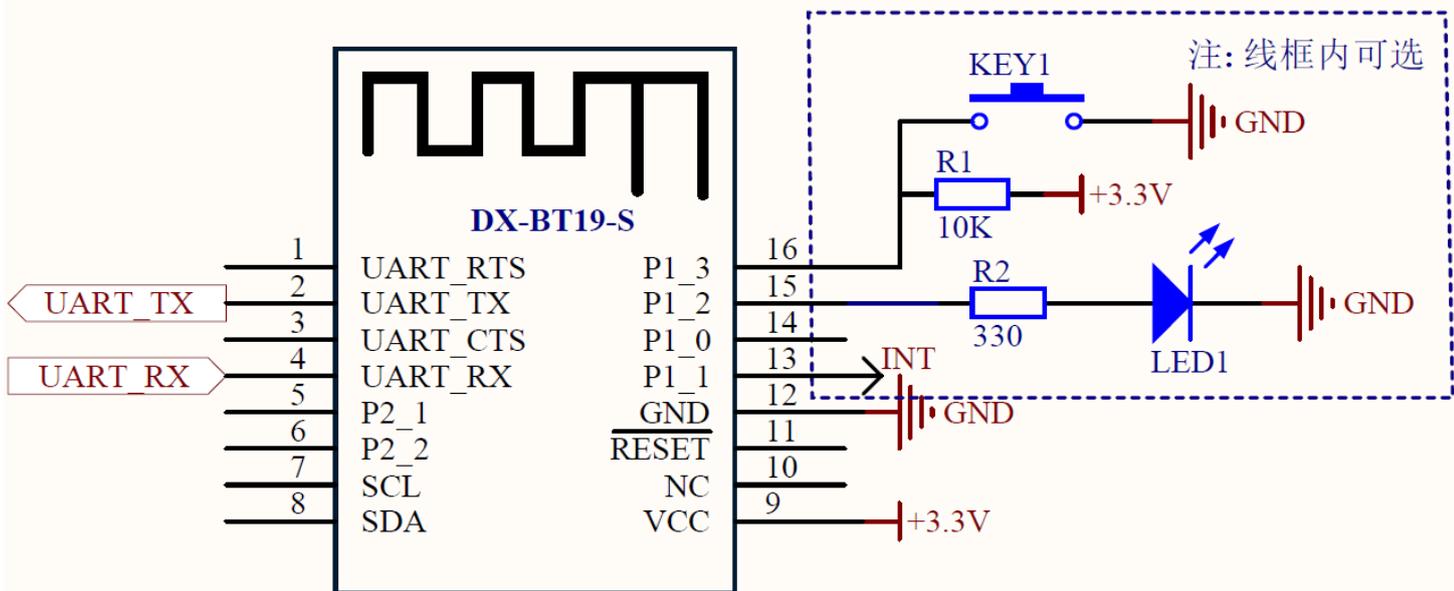
8. Pin function description:

Pin number	Pin name	Pin description
1	UART_RTS	NC

2	UART_TX	Serial data output
3	UART_CTS	NC
4	UART_RX	Serial data input
5	P2_1	Debug data port
6	P2_2	Debug clock port
7	SCL	Clock port
8	SDA	Data port
9	VCC	3.3 V
10	NC	NC
11	RESETB	Low level reset, at least 5ms
12	GND	Land
13	P1_1	Bluetooth connection indicator (not connected low, connection high)
14	P1_0	Programmable input and output port
15	P1_2	LED light pin
16	P1_3	SW1 system button,

9．Detailed description of function pins:

1. P15 pin (P1_2): 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 module	Uniformly slow flashing (800ms-on, 800ms-off)	standby mode
	Long bright	Connection Status
Main module	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 (P1_3): 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

10．Dimensions:
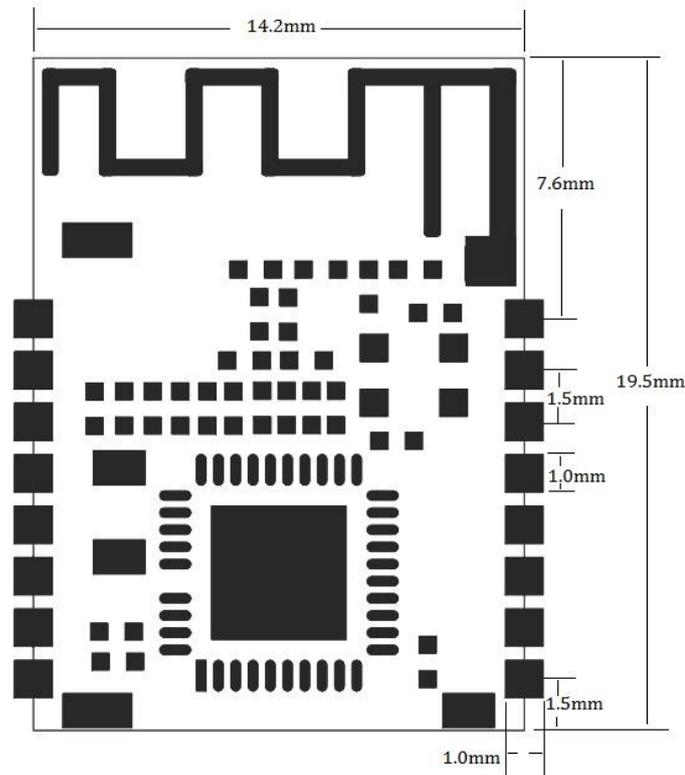
11．LAYOUT Precautions:

The DX-BT19 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):
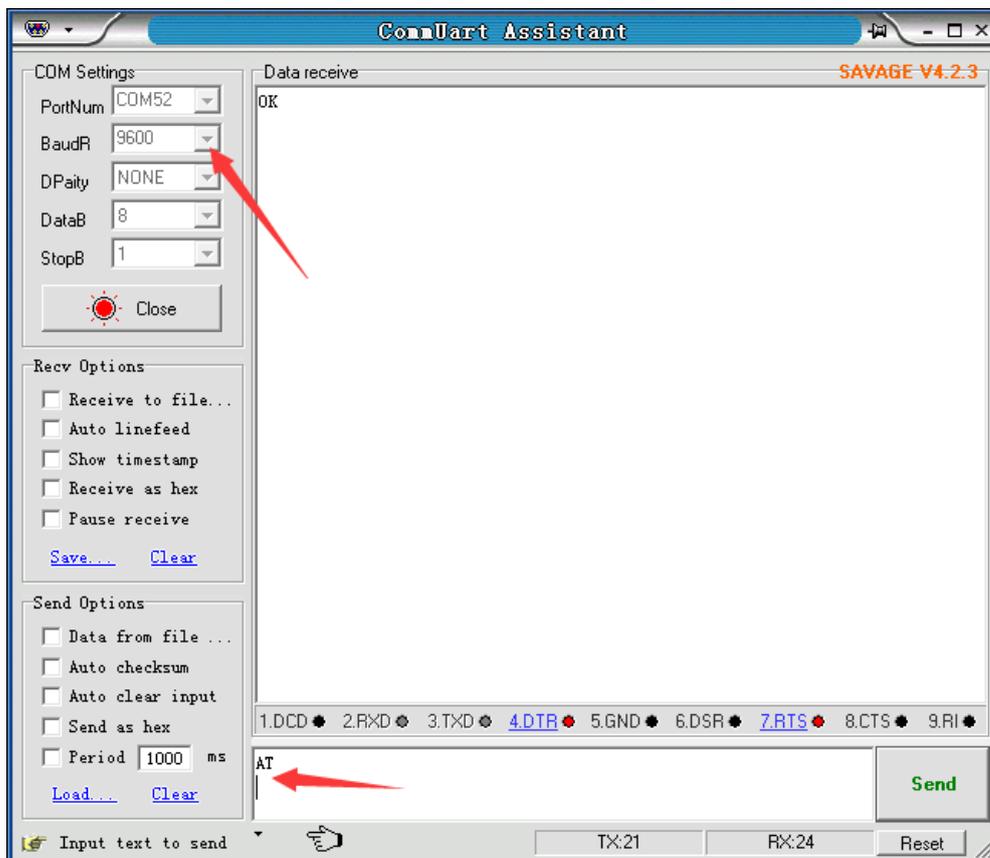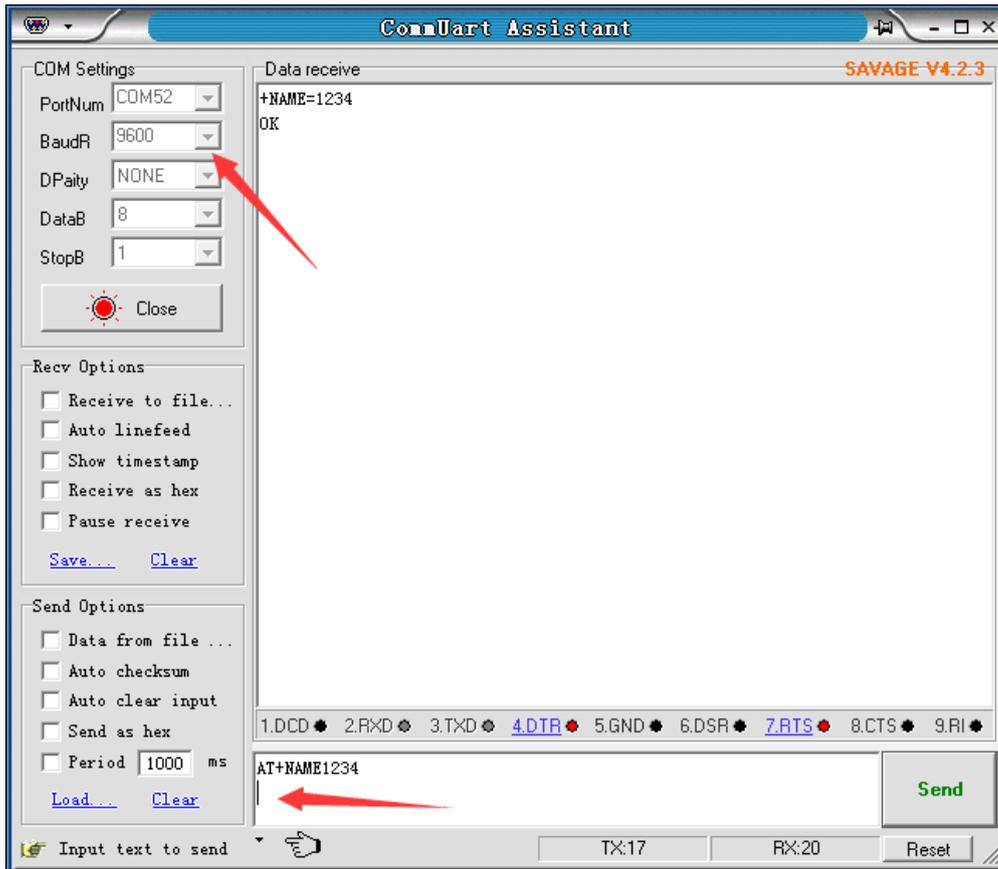
1、Test Command:

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 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 Default name: BT19
Set the module Bluetooth name	AT+NAME<name>\r\n	+NAME=<name>\r\n OK	

Example:

1. Send Settings:

　　　　AT+NAME=DX-BT19\r\n 　　——Set module device name："DX-BT19"

　　return：

　　　　+NAME=DX-BT19\r\n 　　——Set module device name："DX-BT19" successed

　　　　OK\r\n

2. Send inquiry：

　　　　AT+NAME\r\n 　　　　——Query module name

　return：

　　　　+NAME=DX-BT19\r\n 　　——Return module device name："DX-BT19"

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 1:1200 2:2400 3:4800 4:9600 5:19200 6:38400 7:57600 8:115200 Default：4 (9600)
Set the module baud	AT+BAUD<baud>\r\n	+BAUD=<baud>\r\n 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
Set module serial port stop bit	AT+STOP<Param>\r\n	+STOP=<Param>\r\n OK	0 -1 Stop bit 1 -2 Stop bit Default：0

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 0 -1 No check
Set the module serial parity bit	AT+PARI<Param >\r\n	+PARI=<Param>\r\n OK	1 -2 Odd parity 2 -2 Even parity Default：0

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

Function	Command	Response	Description
Query status	AT+NOTI\r\n	+NOTI=<Param>\r\n	< Param> Check Digit 0- Not notified 1- Notice Defaults：0
Set status	AT+NOTI<Param>\r\n	+NOTI=<Param>\r\n OK	

9、Set/Query—Notification connection with address code (only slave module is valid): The connection success module returns OK+CONN0x112233445566：

Function	Command	Response	Description
Notification connection with address code	AT+NOTP\r\n	+NOTP=<Param>\r\n	< Param> Check Digit 0- Not notified

Notification connection with address code	AT+NOTP<Param>\r\n	+NOTP=<Param>\r\n OK	1- Notice Defaults：0

10、Settings\Query—SERVICE UUID：

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

Example：Set the service UUID to：FE00

1. Send Settings：

AT+UUID0XFF00 \r\n

return：

+UUID=0XFF00 r\n

OK

11、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
Set module notify \write UUID	AT+CHAR<UUID>\r\n	+CHAR =<UUID>\r\n OK	Default：FFE1

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：

+CHAR= FE01r\n

OK\r\n

12、Settings\Query—WRITE UUID：

Function	Command	Response	Description
Query module write UUID	AT+WRITE\r\n	+WRITE=<UUID >\r\n	<UUID> write UUID Default：FFE2
Set module write UUID	AT+WRITE<UUID	+WRITE=<UUID>\r\n	

	>\r\n	OK	

13、Settings\Query—Wait for the channel to be established after connecting：

Function	Command	Response	Description
Query	AT+WAIT\r\n	+WAIT=<wait>\r\n	<wait>
Set	AT+WAIT<wait>\\r\n	+WAIT=<wait>\r\n\n\nOK	0: Not wait\n\n1: wait\n\nDefault：0

14、Settings\Query - Low Power Mode: (only slave module is valid)

Function	Command	Response	Description
Query module low power mode	AT+PWRM\r\n	+PWRM=<Param>\r\n	< Param >(0、1)
Set module low power mode	AT+PWRM<Param>\r\n	+PWRM=<Param>\r\n\n\nOK	0：Low power mode\n\n1：working mode\n\nDefault：1

15、Settings\Query - Broadcast time interval: (only slave module is valid)

Function	Command	Response	Description
Query Broadcast time interval	AT+ ADVI \r\n	+ ADVI=<Param>\r\n	Param：0~F\n0—100ms\n1—152.5ms\n2—211.25ms\n3—318.75ms\n4—417.5ms\n5—546.25ms\n6—760ms\n7—852.5ms\n8—1022.5ms\n9—1285ms\nA—2000ms\nB—3000ms\nC—4000ms\nD—5000ms\nE—6000ms\nF—7000ms\nDefault：0
Set Broadcast time interval	AT+ADVI<Param>\r\n	+ ADVI=<Param>\r\n\n\nOK	

Note: This instruction can be used to reduce power consumption

16、**Settings\Query - Module transmit power: (only slave module is valid)**

Function	Command	Response	Description
Query module transmit power	AT+POWE\r\n	+POWE=<POWE>\r\n	<POWE>: 0：-23 dB 1：-6 dB 2： 0 dB Default：2
Set module transmit power	AT+POWE<POWE>\r\n	+POWE=<POWE>\r\n OK\r\n	

17、**Software restart：**

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

18、**Restore default settings：**

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

19、**Query – Master Mode (only master module is valid)：**

Function	Command	Response	Description
Query module master module	AT+ROLE\r\n	+ ROLE=<Param>\r\n	< Param > 1: master module

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

20、**Search for Bluetooth devices (only master module 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）

21、**Print search to device list (only master module is valid)：**

Function	Command	Response	Description
Print list	AT+SHOW\r\n	Print search to device list	

22、**Settings\Query—Automatically search for Bluetooth devices (only master module is valid)：**

Function	Command	Response	Description
Query module search mode	AT+AUTOINQ\r\n	+AUTOINQ=<Param>\r\n	< Param >（0、1）
Set module search mode	AT+AUTOINQ<Param>\r\n	+AUTOINQ=<rParam>\r\n OK	0：Manual search 1：Auto Search Defaults：0

23、**Connect a Bluetooth device (only master module 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

24、**Settings\Query—Automatically connect to Bluetooth device (only master module is valid):**

Function	Command	Response	Description

Query module connection mode	AT+AUTOCONN\r\n	+AUTOCONN=<Param>\r\n	<Param>（0、1） 0：Manual connection 1：Auto connection Default: 0
Set module connection mode	AT+AUTOCONN<Param>\r\n	+AUTOCONN=<Param>\r\n OK	

25、Connect to the remote specified address Bluetooth (only master module is valid)：

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

26、Bind the specified address to Bluetooth: (The address will be remembered after power-off) (only master module is valid)

Function	Command	Response	Description
	AT+BIND<Param>\r\n		Param：MAC Example：0x112233445566

Note: This command needs to be configured to automatically search for automatic connections to take effect.

27、Clear connection memory and clear bound: (only master module is valid)：

Function	Command	Response	Description
Clear memory	AT+CLEAR \r\n	OK\r\n	

Note: AT+CLEAR is used to clear the last slave module of the main module to clear the bound and memorized (the main module is connected to a slave module when it is set to automatically search for automatic connection, after disconnecting, it will continue to find the connection. This slave module, if you need to connect a new slave module, needs to clear the previous memory).

13．Contact us

Shen Zhen DX-SMART Technology Co., Ltd.

Address：511 ,Building C, Yuxing Technology Park, Yuxing Chuanggu, Bao'an District, Shenzhen, China

Tel: 0755-2997 8125   **Fax:** 0755-2997 8369

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

Single Module

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
Integral antenna with antenna gain 0dBi
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, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
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.

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.

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-BT19-S Or Contains FCC ID: 2AKS8DX-BT19-S"

When the module is installed inside another device, the user manual of the host must contain below warning statements;
1. 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.
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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
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 modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement，then the host can be sold legally.