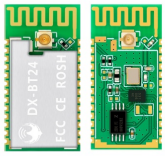


Shen Zhen Dx Smart Technology DX-BT24 Bluetooth Module User Manual

Contents [hide

Shen Zhen

Shen Zhen Dx Smart Technology DX-BT24 Bluetooth Module

Overview

DX- BT24 5.1 Bluetooth module is built by Shenzhen DX- SMART Technology Co., Ltd. for intelligent wireless data transmission. It uses the British DAILOG 14531 chip, configures 256Kb space, and follows V5.1 BLE Bluetooth specifications. 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.

Module default parameters

Bluetooth Protocol	Bluetooth Specification V5.1 BLE
Working Frequency	2.4GHz ISM band
Communication Interface	UART
Power Supply	3.3V
Communication distance	80M (Open and unobstructed environment)
Physical Dimension	27(L)mm x 13 (W)mm x 2(H) mm
Bluetooth Authentication	FCC CE ROHS REACH
Bluetooth Name	BT24
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
Work temperature	MIN:-40℃ – MAX:+85℃
Customized requirements	If you have other special function requirements, you can contact us to customize the module.

Application area

DX-BT24 module supports BT5.1 BLE protocol, which can be directly connected to iOS devices that have BLE Bluetooth function, and supports background program resident operation. Successful application of BT24 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;
- The anti-lost device, LED light control;

Power consumption parameters

Broadcast interval: 540ms			
Mode	**Status**	**Current**	**Unit**
Low power mode	**Discoverable**	**19**	**uA**
	Connected	**341**	**uA**
Normal working mode	**Discoverable**	**270**	**uA**
	Connected	**341**	**uA**
When transparently transmitting data(11520Bytes/s)	**Connected**	**MIN:341uA MAX:3.5** **(MIN is the minimum amount of data, MAX is the power consumption at the maximum amount of data)**	**mA**

Radio frequency characteristics

Rating	**Value**	**Unit**
BLE Transmit power	**-19.5~+2.5**	**dBm**
BLE Sensitivity	**-94**	**dBm**

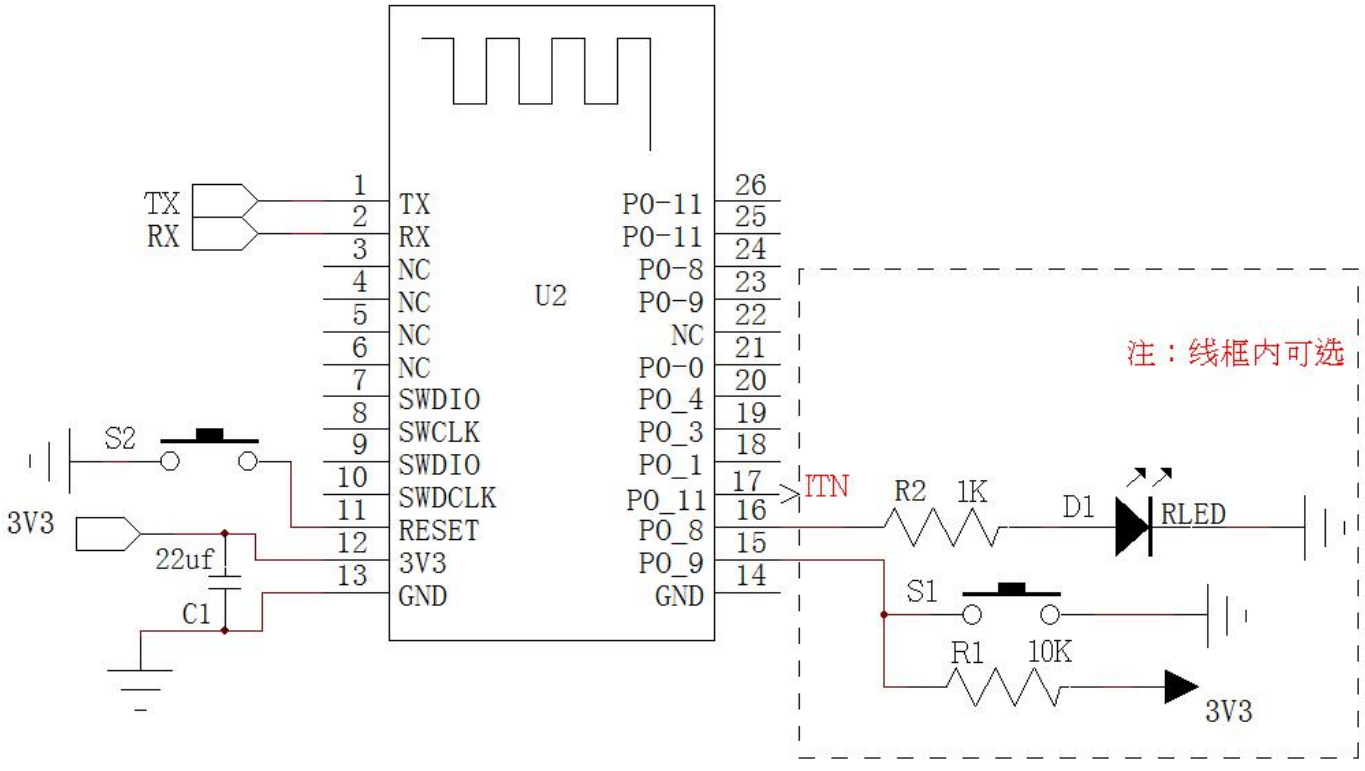
Transparent transmission parameters

Data throughput

Android ->BT24 -> UART		UART ->BT24 -> Android	
Baud rate	115200	**Baud rate**	115200
Connection interval (ms)	15	**Connection interval (ms)**	15
Serial packet size (bytes)	230	**Serial packet size (bytes)**	320
Transmission interval (ms)	20	**Transmission interval (ms)**	20
Throughput (bytes/s)	10120	**Throughput (bytes/s)**	10626
Characteristic Write	Write without Response	**Characteristic Notify**	Notify
iPhone 6 ->BT24 -> UART		**UART ->BT24 -> iPhone 6**	
Baud rate	115200	**Baud rate**	115200
Connection interval (ms)	30	**Connection interval (ms)**	30
Serial packet size (bytes)	140	**Serial packet size (bytes)**	180
Transmission interval (ms)	20	**Transmission interval (ms)**	50
Throughput (bytes/s)	5600	**Throughput (bytes/s)**	3240
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.

Module pin description and minimum circuit diagram



Pin function description

Pin number	Pin name	Pin description
1	P0_6	Serial data output
2	P0_7	Serial data input
3	NC	NC
4	NC	NC
5	NC	NC
6	NC	NC
7	SWDIO	Debug data port
8	SWCLK	Debug clock port
9	SWDIO	Connected to pin 7, IO port can be customized
10	SWCLK	Connected to pin 8, IO port can be customized
11	Reset	Reset Input 200ms low level pulse
12	VCC	V3.3
13	GND	Land
14	GND	Land
15	P0_9	Disconnect pin(200ms low power pulse disconnection) Low power mode wake up(200ms low power pulse wake up)
16	P0_8	LED light pin(Not connected: 1s on, 1s off, connected: 3s on, 50ms off)
17	P0_11	Bluetooth connection indicator (not connected low, connection high)
18	P0_1	NC Can only be left floating
19	P0_3	NC Can only be left floating
20	P0_4	NC Can only be left floating
21	P0_0	Programmable input and output
22	NC	NC
23	P0_9	Connected to pin 15, IO port can be customized
24	P0_8	Connected to pin 16, IO port can be customized
25	P0_11	Connected to pin 17, IO port can be customized
26	P0_11	Connected to pin 17, IO port can be customized

Detailed description of function pins

16 feet (P0_8): LED indicator pin

Used to indicate the status of the Bluetooth module, the LED flashing mode corresponds to the status of the Bluetooth module, see the table below

Module	**LED display**	**Module status**
Slave module	Flashes slowly and evenly(1s-on,1s-off)	standby mode
	Bright 3s Extinguish 50ms(3s-on,50ms-off)	Connection Status
	Light off in low power mode	

Pin 17 (P1_11): connection status indication pin

Pin status	**Module status**
Output low	standby mode
Output high level	Connection Status

Pin 15 (P0_9): connection interruption pin (the module is in the connected state is valid)

Pin status	**Module status**
No action	Connection Status
Input 200ms low-level pulse from the module	The connection is interrupted and the module enters low power consumption mode(Enter the previously set working mode, if not set, it is the normal working mode)

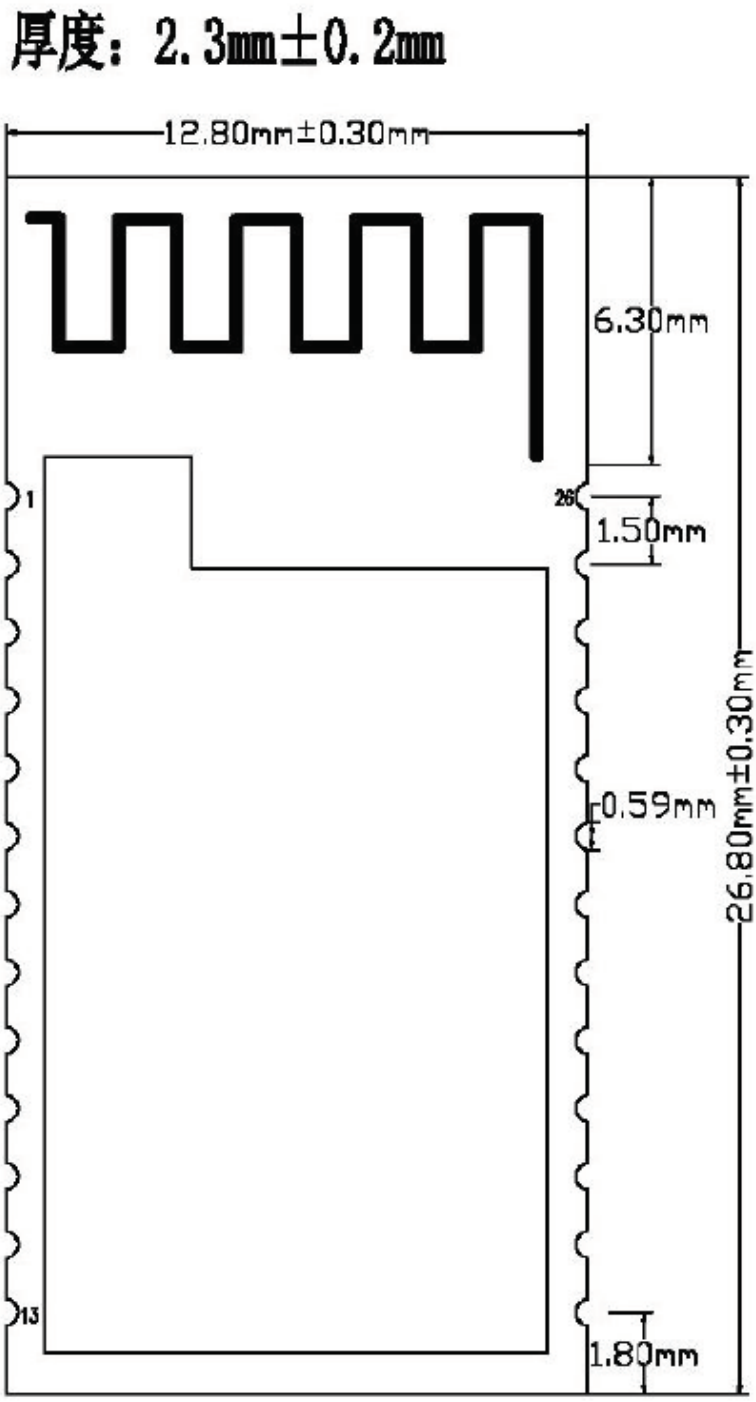
Pin15 (P0_9): low-power mode wake-up pin (the module is effective in low-power mode)

Pin status	**Module status**
No action	Low power mode
Input 200ms low-level pulse from the module	Wake up from low power mode, the module enters the standby state

Comparison of low power mode and normal working mode

	Normal working mode	**Low power mode**
AT command	Send AT commands after power-on	P0_9 200ms low power pulse wake up to send AT command
Light status	Even slow blinking	light is not on

Dimensions

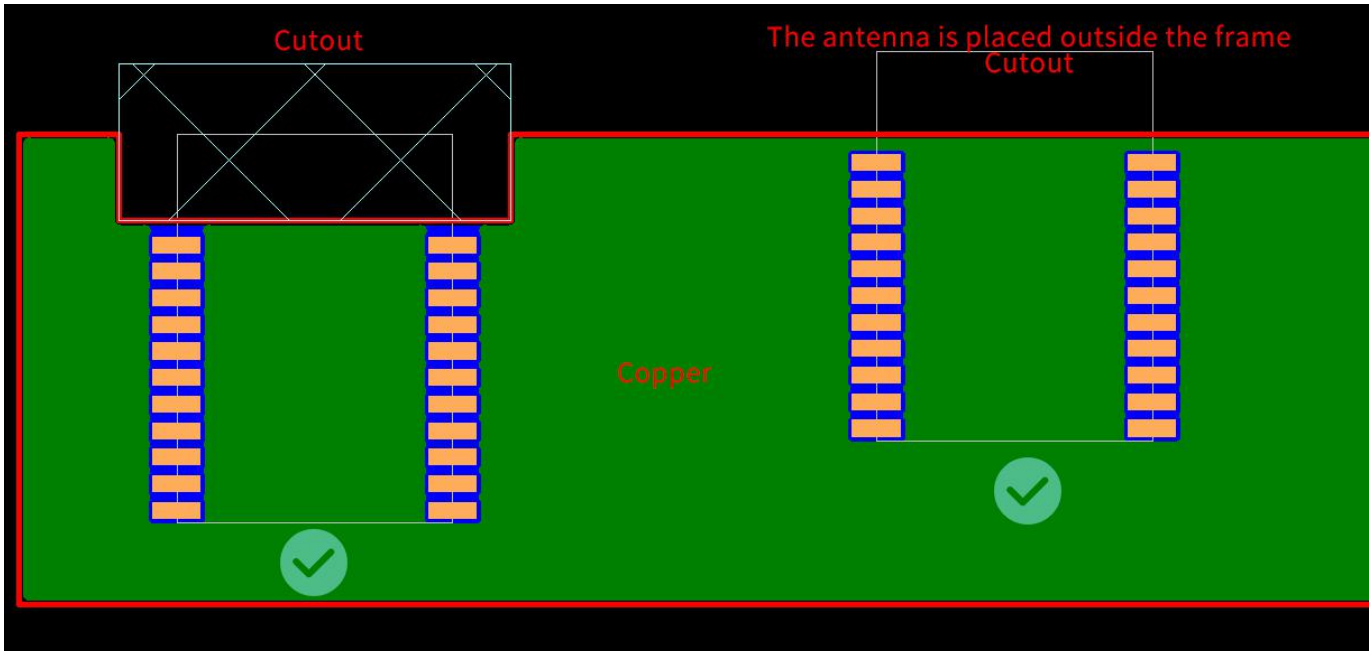


LAYOUT Precautions:

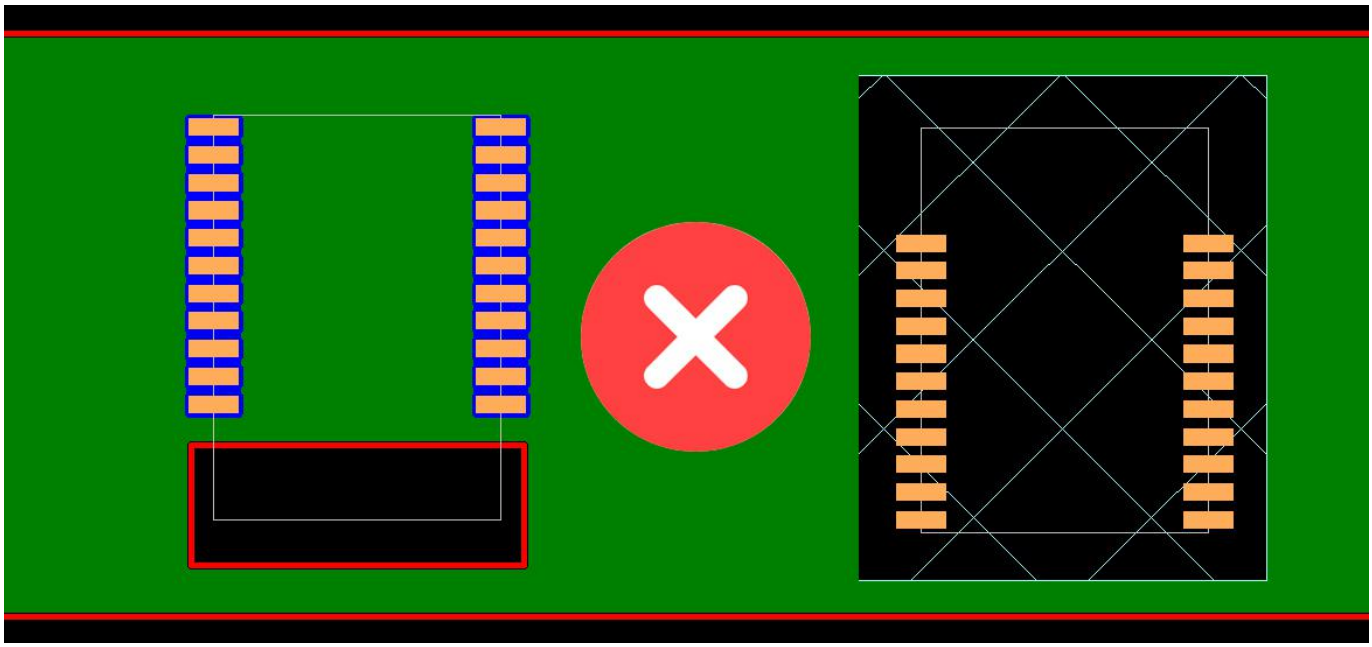
The DX-BT24 Bluetooth module works in the 2.4G wireless band. It should try to avoid the influence of various factors on the wireless transceiver. Pay attention to the following points:

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.

Recommend



Not recommend

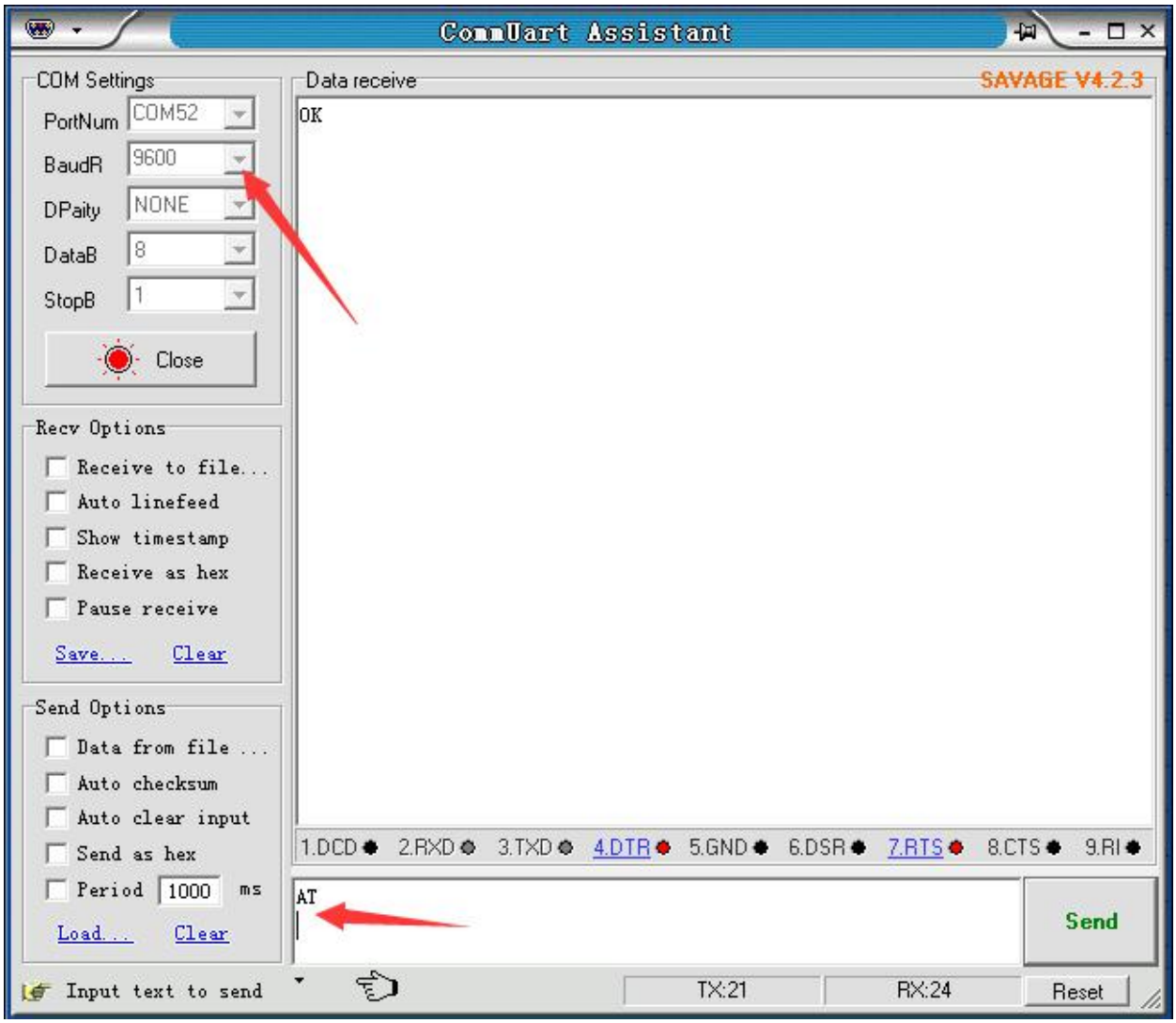


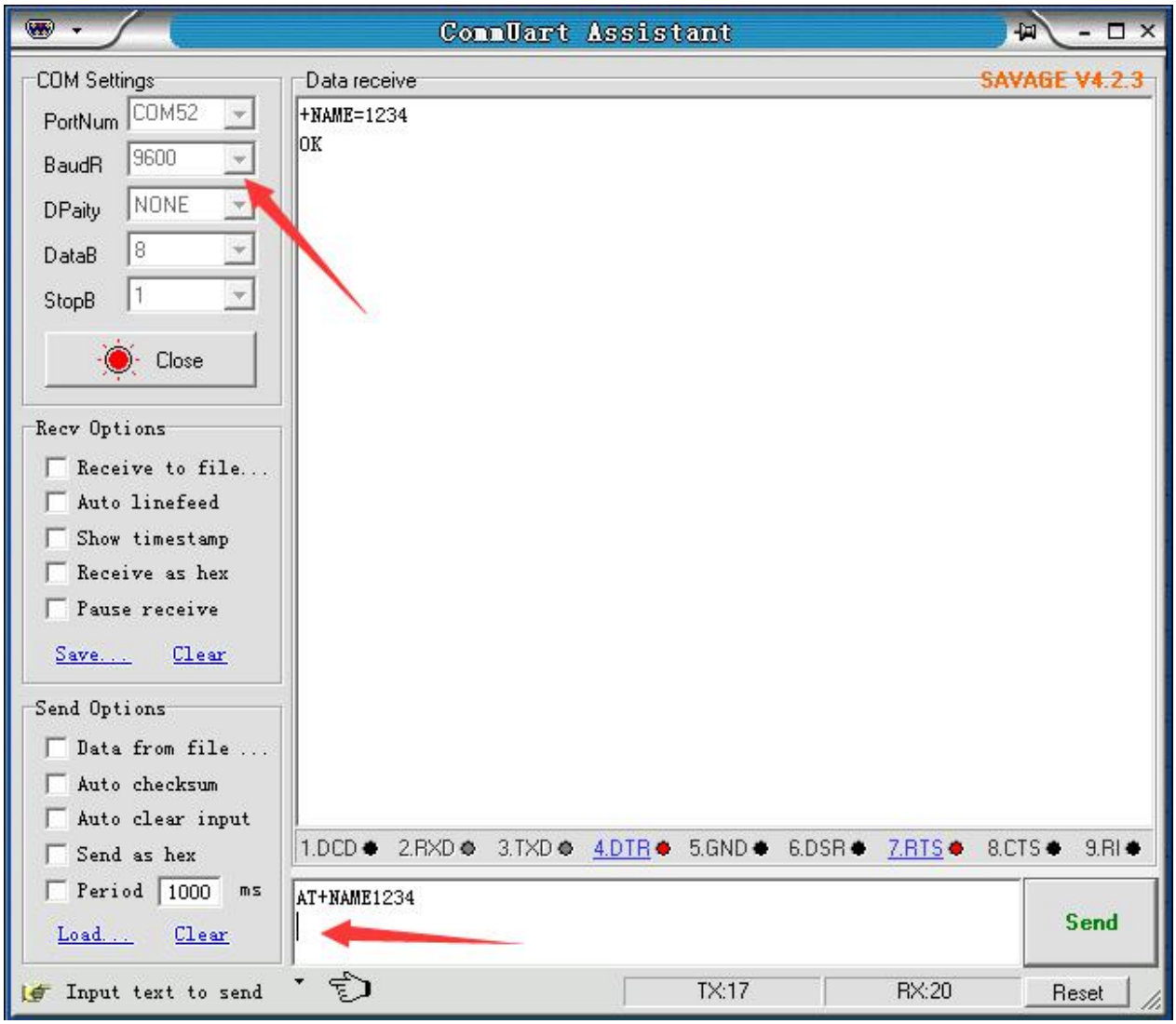
AT COMMAND

(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, a 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.In addition to the 9th and 10th settings, the other parameters need to be restarted after setting the parameters for the new parameters to take effect.
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):





Test Command:

Function	Command	Response	Description
Test instructions	AT \r\n	OK\r\n	

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.

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

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 20 bytes Default name: BT 24
Set the module Bluetooth name	AT+NAME<name >\r\n	+NAME=<name>\r\n OK	

Example:

1. Send Settings:

AT+NAME=DX-BT24\r\n ——Set module device name: "DX-BT24"

return:

+NAME=DX-BT24\r\n ——Set module device name: "DX-BT24" successed

OK\r\n

2. Send inquiry:

AT+NAME\r\n ——Query module name

return:

+NAME=DX-BT24\r\n ——Return module device name: "DX-BT24"

Settings\Query—Bluetooth name suffix MAC

Function	Command	Response	Description
Query Bluetooth name suffix MAC	AT+NAMAC\r\n	+NAMAC=<Param>\r\n	<Param >(0,1,2) 0: No MAC suffix after t he name 1:Open name suffix 12-digit MAC 2:Open name suffix 6-digit MAC Default 0
Set Bluetooth name suffi x MAC	AT+NAMAC<Param>\r\n	+NAMAC=<Param>\r\n O K	

Set/Query – Serial Port Baud Rate:

Function	Command	Response	Description
Query module baud	AT+BAUD\r\n	+BAUD=<baud>\r\n	<baud> Baud rate

Set the module baud	AT+BAUD<bau	+BAUD=<baud>\r\n	corresponding serial
			number
	d>\r\n	OK\r\n	1:2400
			2:4800
			3:9600
			4:19200
			5:38400
			6:57600
			7:115200
			Default 3(9600)

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: 57600

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

Set/Query – Serial Port Stop Bit:

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

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 1 -2 Odd parity 2 -2 Even parity
Set the module serial parity bit	AT+PARI<Param >\r\ n	+PARI=<Param>\r\n OK	

Set/Query—Notify the host computer connection status : 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- No t notified 1- Notice Defaults 0
Set status	AT+NOTI<Para m>\r\n	+NOTI=<Param>\r\n OK	

Set/Query—Notification connection with address code: 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- No t notified 1- Notice Defaults 0
Notification connection with address code	AT+NOTP<Para m>\r\n	+NOTP=<Param>\r\n OK	

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	+UUID =<service>\r\n	Default service
	>\r\n	OK	UUID:FFE0
			(This UUID is a 4-digit
			hexadecimal number)

Example

Set the service UUID to FE00

1. Send Settings
2. AT+UUID0XFF00 \r\n return +UUID=0XFF00 r\n OK

settings\Query—NOTIFY UUID\ WRITE UUID

Query module notify\write UUID	AT+CHAR\r\n	+CHAR=<UUID >\r\n	<UUID>notify\write UUID Default FFE1 (This UUID i s a 4-digit hexadecimal number)
Set module notify \write UUI D	AT+CHAR<UUID> \r\n	+CHAR =<UUID>\r\n 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
2. AT+CHAR0XFE01\r\n return +CHAR= FE01r\n OK\r\n

Settings\Query—WRITE UUID

Function	**Command**	**Response**	**Description**
Query module write UUID	AT+WRITE\r\n	+WRITE=<UUID >\r\n	<UUID> write UUID Defaul t FFE2 (This UUID is a 4-digit hexadecimal number)
Set module write UUID	AT+WRITE<UUID >\r\n	+WRITE=<UUID>\r\n OK	

Settings\Query – Low Power Mode:

Function	**Command**	**Response**	**Description**
Query module low power mode	AT+PWRM\r\n	+PWRM=<Param>\r\n	< Param >(0 1) 0 Low po wer mode 1 working mode Default 1
Set module low power mode	AT+PWRM<Para m>\r\n	+PWRM=<Param>\r\n OK	

Settings\Query – Broadcast time interval:

Function	Command	Response	Description
Query Broadcast time interval	AT+ ADVI \r\n	+ ADVI=<Param>\r\n	Param 0~F 0—100ms 1—152.5ms
Set Broadcast time interval	AT+ADVI<Param>\r\n	+ ADVI=<Param>\r\n OK	2—211.25ms 3—318.75ms 4—417.5ms 5—546.25ms 6—760ms 7—852.5ms 8—1022.5ms 9—1285ms A—2000ms B—3000ms C—4000ms D—5000ms E—6000ms F—7000ms Default 5

Note: This instruction can be used to reduce power consumption

Settings\Query – Module transmit power:

Function	Command	Response	Description
Query module transmit power	AT+POWE\r\n	+POWE=<POWE>\r\n	<POWE>: 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 module transmit power	AT+POWE<POWE>	+POWE=<POWE>\r\n	
	\r\n	OK\r\n	

Settings\Query—APP AT command

Function	Command	Response	Description
Query APP AT commands	AT+APPAT\r\n	+APPAT=<Param>\r\n	<Param >(0,1,2) 0:Close APP AT command
Set APP AT command	AT+APPAT<Param>\r\n	+APPAT=<Param>\r\n	
		OK	1:Open APP AT command Default 0

Note: This command opens the user to send AT commands with APP Note: APPAT command can only be enabled through UART; if you need to enter transparent transmission mode, you need to set to disable APP AT command.

Settings\Query—Bluetooth device type

Function	Command	Response	Description
Query Bluetooth device type	AT+TYPE\r\n	+TYPE=<Param>\r\n	<Param >: 0x0000:No types pecified 0x0040:Phone type 0x0080:Laptop type 0x03c1:Keyboard type 0x03c2:Mouse type … Default 0x0000
Set Bluetooth device type	AT+TYPE<Param>\r\n	+TYPE=<Param>\r\n OK	

Software restart

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

Restore default settings

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

Contact us

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

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247 Integral antenna with antenna gain 2.5dBi 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. 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-BT24 Or Contains

FCC ID: 2AKS8DX-BT24"

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:
2. This device may not cause harmful interference.
3. 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.

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 installs this modular with single 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 complies with FCC part 15C: 15.247 and 15.209 & 15.207,15B Class B requirement then the host can be sold legally.

Documents / Resources

	Shen Zhen Dx Smart Technology DX-BT24 Bluetooth Module [pdf] User Manual DX-BT24, DXBT24, 2AKS8DX-BT24, 2AKS8DXBT24, DX-BT24 Bluetooth Module, Bluetooth Module