Ultra Low Energy Bluetooth 5.0 BLE Module

JDY-23 Slave Bluetooth Module User Manual

JDY-23 Ultra Low Energy Bluetooth 5.0 BLE Module

version

version	date	Description
V2.1	2018-08-07	release version

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1. Product introduction

The JDY-23 transparent transmission module is based on the Bluetooth 5.0 protocol standard, the working frequency band is 2.4GHZ range, the modulation method is GFSK, The maximum transmission power is 4db, and the maximum transmission distance is 60 meters. It adopts imported original chip design and supports users through AT commands Modify the device name, baud rate and other instructions, which is convenient and flexible to use.

JDY-23 Bluetooth module can realize the data transmission between the module and the mobile phone. By default, you can quickly use BLE Bluetooth without configuration. Carry out product applications.

Make BLE application in products faster and more convenient

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Two, debugging tools

2.1: Enter JDY-LED to download from Apple Store of IOS test tool
       Comes in the Android test tool package

2.2 Serial port tool (included in the data package)

Instructions for using serial port tools
      You don't need to input \r\n to send commands using the serial port tool that comes with the data package.
Add \r\n to the end

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3. Module parameter details

3.1 Module parameters

JDY-23 product parameters

model	JDY-23
Working frequency	2.4G
Transmit power	4db (maximum)
Communication Interface	UART
Operating Voltage	1.8V – 3.6V
Operating temperature	-40℃-80℃
antenna	Built-in PCB antenna
Receiving sensitivity	-97dbm
Transmission distance	60 meters
Master-slave support	Slave
Module size	19.6 * 14.94 *1.8 mm (length, width and height)
Bluetooth version	BLE 5.0 (compatible with BLE4.0, BLE4.2)
Wake-up state current	800uA (with broadcasting)
Light sleep state current	<50uA (with broadcast)
Deep sleep current	9uA (no broadcast)
Command parameter save	Parameter configuration power-off data is saved
SMT soldering temperature	<260℃
rf-TX/RX peak current 5mA	

3.2 Operating current

Operating mode	status	Average current	Remarks
Wake up serial port transparent transmission	connected	800uA	Generally communicate with APP, it is recommended
Deep sleep without broadcasting	No broadcast	3uA	Do not set the broadcast too long, too long
Light sleep with broadcast	100mS broadcast interval	200uA	Affect connection time, generally recommend 100
	200mS broadcast interval	80uA	Between 500mS, if fast connection is required
Average power consumption	300mS broadcast interval	50uA	And there is no requirement for power consumption, can broadcast
	400mS broadcast interval	Following current Lower	Set the interval to the shortest
Wake up transparent transmission	connected	Around 1mA	In the connected state, the PWRC Pin is pulled low to send AT command or directly set Set working mode, please check AT+STARTEN command

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3.3 JDY-23 sleep mode description

Sleep mode	instruction	Function Description
Wake up (With broadcast)	AT+STARTEN1	Mode 1: Power-on wake up, users need to sleep through AT+SLEEP Command control, wake-up can be awakened by PWRC pin low level
Power on sleep (With broadcast)	AT+STARTEN0	Mode 0: In this mode, the power consumption is very low, connect to wake up and transmit power The current is 900uA, and the disconnection current is less than 200uA (can be set Set the broadcast interval current as low as 30uA), in this mode, the PWRC pin After waking up, if the serial port does not send data or is not connected within 10 seconds Will automatically go to sleep again

3.4 Description of common problems

problem	Question answer
1: How to disconnect Bluetooth when MCU is connected connection	In the connected state, the serial port can send "AT+DISC\r\n" Disconnect
2: What is the current when the module wakes up and transparently transmits	About 4mA
3: How much data can be written to the serial port one time at 9600 baud rate	Not byte limit
4: After configuring the parameters of the serial port, do you need to restart after setting the module parameters Start it to take effect	It is recommended to restart
5: How to test the deep sleep current of the test module It is recommended to connect the VCC and GND pins to test the current	

3.5 Factory common default parameter configuration

sequence	Features	Factory default parameters	instruction
1	Serial port baud rate	9600	AT+BAUD4
2	Sleep mode	Wake up	AT+STARTEN1
3	Broadcast name	JDY-23	AT+NAMEJDY-23
4	Broadcast interval	200MS	AT+ADVIN1

The above is the serial port transparent transmission communication function, if you have special functions, please contact JDY technical support QQ: 2011811297

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3.6 Pin definition

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3.7 Pin function description

Pin	Features	Description
1	VCC	Power supply (1.8-3.6V)
2	NULL	air
3	NULL	air
4	OUTPUT1	IO1 output pin (support APP control high and low level
5	OUTPUT2	IO2 output pin (support APP control high and low level
6	STAT	Connection status pin, connected to high level, not connected to low level
7	INPUT7/PWM4	INPUT7 mode: as an input pin, APP can read the state of this pin
		PWM mode: PWM4 output pin, APP can control PWM4 pulse width
		The default is: INPUT7 mode
8	OUTPUT3	IO3 output pin (support APP control high and low level
9	OUTPUT4	IO4 output pin (support APP control high and low level
10	OUTPUT5	IO5 output pin (support APP control high and low level
11	INPUT6/PWM3	INPUT6 mode: as an input pin, APP can read the state of this pin
		PWM mode: PWM3 output pin, APP can control PWM3 pulse width
		The default is: INPUT6 mode
12	INPUT5/PWM2	INPUT5 mode: as an input pin, APP can read the state of this pin
		PWM mode: PWM2 output pin, APP can control PWM2 pulse width
		The default is: INPUT5 mode
13	OUTPUT6	IO6 output pin (support APP control high and low level
14	OUTPUT7	IO7 output pin (support APP control high and low level
15	INPUT4	It is an input pin, APP can read the state of this pin
16	EINT2	Interrupt input pin (press in the connected state to actively send IO status to APP
17	ALED	Broadcast indicator pin

18	INPUT3/PWM1	INPUT3 mode: as an input pin, APP can read the state of this pin
		PWM mode: PWM1 output pin, APP can control PWM1 pulse width
		The default is: INPUT3 mode
19	TXD	Serial output pin (TTL level
20	RXD	Serial input pin (TTL level
twenty one	EINT1	Interrupt input pin (press in the connected state to actively send IO status to APP
twenty two	PWRC	Sleep wake-up pin, active low
		In the connected state, the AT command can be sent through the PWRC pin low
twenty three	RST	Reset pin, active low
twenty four	GND	Power ground

By default, JDY-23 supports the transparent transmission of data between the module and the APP, and the APP can control the 7-channel IO high and low level of the module (OUTPUT1, OUTPUT2, OUTPUT3, OUTPUT4, OUTPUT5, OUTPUT6, OUTPUT7) , APP can read the module 7 input IO level status (PWRC,

EINT1, EINT2, INPUT3, INPUT4, INPUT5, INPUT6, INPUT7), among which EINT1 and EINT2 are interrupt input pins.

It can actively report the IO level status in the connected state

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3.8 PCB package size

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Four, serial **AT** command set

JDY-23 module serial port must add \r\n when sending AT command

sequence	instruction	effect	Master-slave	default
1	AT+VER	version number	S	JDY-23-V2.1
2	AT+RST	Soft reset	S	-
3	AT+DISC	AT command to disconnect	S	-
4	AT+STAT			00
5	AT+MAC	MAC address	S	-
6	AT+BAUD	Baud rate	S	9600
7	AT+SLEEP	Sleep	S	
8	AT+NAME	Broadcast name	S	JDY-23
9	AT+STARTEN	Power on sleep or wake up	S	0 (wake up after power on)
10	AT+ADVIN	Broadcast interval	S	1 (200mS)
11	AT+HOSTEN	Slave mode or IBEACON working mode	S	0 (Slave)
12	AT+IBUUID	UUID of IBEACON	S	FDA50693A4E24FB1AFC FC6EB07647825
13	AT+MAJOR	MAJOR of IBEACON	S	10
14	AT+MINOR	MINOR of IBEACON	S	7
15	AT+IBSING	Signal calibration at 1 meter		0x32
16	AT+ALED	Broadcast LED indicator switch		1
17	AT+IBPWR	SING value of IBEACON	S	50
18	AT+DEFAULT	reset	S	-
19	AT+POWR	Transmit power	S	8
20	AT+ENLOG	Serial output LOG switch	S	0
twenty one	AT+MTU	Set the length of the serial port to send packets to the APP	S	1
twenty two	AT+BATT	Set battery	S	0

Note: The green text indicates the new function, the red bold part needs special attention

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Five, **AT** command description

Special note: JDY-23 module serial port AT command needs to add terminator \r\n

Query—version number

instruction	response	parameter
AT+VER	+VER:JDY-23-V2.1	no

Settings-soft reset

instruction	response	parameter
AT+RST	+OK	no

Settings-disconnect

instruction	response	parameter
AT+DISC	+OK	no

Note: In the connected state, send AT+DISC directly to disconnect, or pull the PWRC pin low to send an AT command

Query-connection status

instruction	response	parameter
AT+STAT	+STAT:<Param>	00: means not connected
		01: means connected

Note: In the connected state, send AT+DISC directly to disconnect, or pull the PWRC pin low to send an AT command

Setting/Query--MAC address

instruction	response	parameter
AT+MAC<Param>	+OK	Param: (MAC address string)
AT+MAC	+MAC:<Param>	

Support AT command to modify MAC address, example: AT+MAC112233445566\r\n

Setting/Query--Baud rate

instruction	response	parameter
AT+BAUD<Param>	+OK	Param: (1-9)
		0——11520
		1-57600
		2——38400
AT+BAUD	+BAUD:<Param>	3-19200
		4-9600
		5-4800
		6-2400
		Default value: 4

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Setting/Query--Sleep command

instruction	response	parameter
AT+SLEEP<Param>		Param: (1-2)
AT+SLEEP	+OK	1: Light sleep (with broadcast)
		2: Deep sleep (no broadcast)

In AT+STARTEN0 state, there is no need to send AT+SLEEP command, the module will automatically go to sleep, and the mobile phone will automatically wake up after connectio

It will automatically go to sleep after disconnection, wake up on the falling edge of PWRC pin, and there is no data transmission or reception or no connection in the serial port after

Will automatically go to sleep in seconds

Setting/Query--Broadcast Name

instruction	response	parameter
AT+NAME<Param>	+OK	Param: Module Bluetooth name
AT+NAME	+NAME:<Param>	Maximum length: 24 bytes
		Default name: JDY-23

Settings/Query-Power-on sleep and wake-up read and write

instruction	response	parameter
AT+STARTEN<Param>	+OK	Param: (0-1)
AT+STARTEN	+STARTEN:<Param>	1: Power on wake up, sleep can be controlled by AT+SLEEP
		0: Power-on sleep, connection wakeup, disconnection sleep

Setting/Query--Broadcast interval

instruction	response	parameter
AT+ADVIN<Param>	+OK	Param: (0-9)
		0: 100ms
		1: 200ms
		2: 300ms
AT+ADVIN	+ADVIN:<Param>	3: 400ms
		4: 500ms
		5: 600ms
		6: 700ms
		7: 800ms
		8: 900ms
		9: 10000ms
		Default: 1

Setting/Query--module working mode

instruction	response	parameter
AT+HOSTEN<Param>	+OK	Param: (0-3)
AT+HOSTEN	+HOSTEN:<Param>	0: Transparent transmission from the machine (APP, applet)
		3: Slave (iBeacon) mode
		Defaults:

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Setting/Query--iBeacon UUID

instruction	response	parameter
AT+IBUUID<Param>	+OK	Param: Hexadecimal UUID
AT+IBUUID	+IBUUID:<Param>	Defaults:
		FDA50693A4E24FB1AFCFC6EB07647825

Example: AT+IBUUID FDA50693A4E24FB1AFCFC6EB07647825

Setting/Query----iBeacon Major

instruction	response	parameter
AT+MAJOR<Param>	+OK	Param: (0000-FFFF)
AT+MAJOR	+ MAJOR:<Param>	Default: 000A

If the Major value is 10008, the AT command is: AT+MAJOR2718　　　　2718 is 10008 hexadecimal data

Settings/Query--iBeacon Minor

instruction	response	parameter
AT+MINOR<Param>	+OK	Param: (0000-FFFF)
AT+MINOR	+MINOR:<Param>	Default: 0007

If the Minor value is 10180, the AT command is: AT+MINOR27C4　　　27C4 is 10180 hexadecimal data

Setting/Query--iBeacon IBSING

instruction	response	parameter
AT+IBSING<Param>	+OK	Param: (00-FF)
AT+IBSING	+IBSING:<Param>	Default: 40

This parameter is applied to the iBeacon signal calibration value at 1 meter

Setting/Query--ALED broadcast indicator LED light switch

instruction	response	parameter
AT+ALED<Param>	+OK	Param: (0-1)
AT+ALED	+ALED:<Param>	0: Turn off the broadcast LED indicator function
		1: Turn on the broadcast LED indicator function
		Default: 1

The broadcast indicator only works in AT+HOSTEN0 mode, and does not work in light sleep or try sleep mode

Restore factory configuration (restore to factory default configuration parameters)

instruction	response	parameter
AT+DEFAULT	+OK	no

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Setting / Query - Serial port output status information

instruction	response	parameter
AT+ENLOG<Param>	+OK	Param: (0-1)
		0: Serial port does not output (boot, connect,
AT+ENLOG	+ENLOG:<Param>	Disconnect, etc.) information
		1: Serial port output status information
		Default: 0

Set / Query- **MTU** byte

instruction	response	parameter
AT+MTU<Param>	+OK	Param: (1-2)
		1: 20 bytes
AT+MTU	+MTU:<Param>	2: 128 bytes
		Default: 1

Settings - battery service power

instruction	response	parameter
AT+BATT<Param>	+OK	Param: (0-100)
AT+BATT	+BATT:<Param>	0: indicates that the power is 0%
		99: indicates that the power is 99%
		Default: 0

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Six, mobile phone instructions

6.1、APP UUID list

Service UUID: 0xFFE0	(Service UUID	Default 0xFFE0)
Feature UUID: 0xFFE1	(For transparent transmission default 0xFFE1 attribute notify, write)	
Feature UUID: 0xFFE2	(Used for IO control default 0xFFE2 attribute write)	

6.2. APP controls the level of OUT output pin (feature FFE2

IO port number	Instruction (HEX	Features	Factory default level
OUT1	E7F100	Output low level	Low level
	E7F101	Output high level	
OUT2	E7F200	Output low level	Low level
	E7F201	Output high level	
OUT3	E7F300	Output low level	Low level
	E7F301	Output high level	
OUT4	E7F400	Output low level	Low level
	E7F401	Output high level	
OUT5	E7F5100	Output low level	Low level
	E7F501	Output high level	
OUT6	E7F600	Output low level	Low level
	E7F601	Output high level	
OUT7	E7F700	Output low level	Low level
	E7F701	Output high level	
All OUT	E7FF01	All OUT pins are high level and low level	
Pin	E7FF00	All OUT pins are low	

6.3 APP reads INT pin level status

APP sends a command to query the level status of all INT pins to the feature UUID: FFE2 (HEX

APP sends feature FFE2: E7A1

The module returns the INT pin level status to APP: E7A20101010101010101

Format description, E7A2 is the data header

Color corresponding to INT pin: PWRCEINT1EINT2INT3INT4INT5INT6INT7

6.4 Press the EINT pin to actively send data format to APP

EINT1 pin sends data to APP format: FC01010001

EINT2 pin sends data to APP format: FC01010001

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Seven, **JDY-23** basic application wiring diagram

7.1、JDY-23 and 3.3V MCU serial port transparent transmission wiring diagram

If the transparent transmission does not require low power consumption or does not need to send a disconnect command when connected, the PWRC pin can be left unconnected.

If you don't need low power consumption and you don't need to check the connection status, you only need to connect VCC, GND, RXD, TXD 4 pins

MCU password verification instructions:

At present, JDY-23 does not add the Bluetooth connection password function. If you need to determine the connection password to prevent others from illegally connecting, you can

The user's MCU is used to determine the password. After the user APP is connected to JDY-23, the user APP sends the password to the user MCU.

If the correct password sent by the APP is not received within 3 seconds after connection, the MCU will not receive any data sent by the APP, only

Only when the password is correct, the transparent transmission data of APP will be received. If the correct password is not sent to the user MCU within 3 seconds, the MCU will pu

Pin, send AT+DISC command to the Bluetooth module, immediately disconnect the Bluetooth module from the APP

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7.2, JDY-23 mobile phone APP control OUT pin high and low level and read the INT pin level wiring diagram

APP can control the high and low levels of OUT1 to OUT7 output pins. APP can read the level status of all input pins of EINT and INT.

EINT1 and EINT2 support active reporting of level status in the module connection status

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