

1. Introduction:

MM32W0x2xxB Bluetooth Low Energy (BLE) Module is designed for intelligent wireless data transmission by Shanghai MindMotion Microelectronics Co., Ltd, following the BLE V4.2 Bluetooth specification. It supports the Bluetooth SPP protocol. It can send and receive data from all versions of Android phones. It can also pair and connect with IOS devices that support BLE. No additional authorization fee is required. It can run in the background as a resident program. It supports AT commands. Due to its flexibility, users can change serial port baud rates, device names, key pairs and other arguments as required.

MM32W0x2xxB BLE Module supports UART interface, I2C interface and USB interface. It has many advantages such as low cost, small size, low power consumption and highly sensitive data receiving and dispatching. It only requires a few peripheral components to realize its powerful wireless data transmission function.

2. Features:

Bluetooth Protocol: Support Bluetooth Specification V4.2 BLE and have a longer communication distance than traditional Bluetooth

Operating Frequency Band: 2.4GHz ISM band

Modulation Mode: GFSK (Gaussian Frequency Shift Keying)

Sensitivity: $\leq -80\text{dBm}$ at 0.1% BER

Transmission Rate: Asynchronous: 1Mbps Synchronous: 1Mbps

Security Feature: Authentication and encryption; support AES encryption for 128/192/256-bit keys

Support Service: Central & Peripheral UUID FFE0, FFE1

Power Supply: +3.3VDC 50mA

Power Consumption: Support SLEEP, STOP and STANDBY low energy modes

Dimension: 26mm x 13mm x 1mm

3. Applications:

This module is mainly intended for wireless data communication within a short distance. It can connect with mobile phones in pairs, or connect to a Bluetooth device on a PC. In addition, data can be transmitted between two modules. It can directly replace the serial line to avoid cumbersome cable connection.

- Bluetooth GPS;
- Bluetooth wireless data transfer;

- Industrial telecontrol and telemetry;
- POS system and scanners;
- Traffic, underground positioning, and alarm;
- Automated data acquisition system;
- Wireless data transfer; banking system;
- Wireless data acquisition; building automation, security, wireless monitoring of engine room equipment, and access control system
- Intelligent home and industrial control;
- Vehicle inspection equipment;
- Voting equipment for interactive TV programs;
- Energy-efficient equipment of government street lights;
- Wireless LED display system;

- Bluetooth joysticks and Bluetooth game controllers;
- Bluetooth printers;
- Bluetooth remote control toys;
- Anti-lost alarm and LED light control;

4. Physical Characteristics:

Operating Frequency Band	2.4GHz ISM band
Bluetooth Specification	BLE4.2
Output Power Class	Class 2
Operating Voltage	3.3V
Operating Current	≤50mA
Host Interface	UART, I2C, USB, SPI
Antenna	Built-in 2.4GHz antenna; no user adjustment is required.
Memory Size	Up to 128K bytes of Flash , and 110K of available user space
SRAM	Up to 20K bytes of SRAM, and 16K of available user space
Dimension	26mm (L) x 13 (W) mm x 1mm (H)

5. Electrical Characteristics:

Absolute Maximum Ratings		
Rating	Min	Max
Storage temperature	-40℃	+85℃
Supply voltage: VBAT	-0.3V	3.6V
Other terminal voltages	VSS-0.3V	VDD+0.3V

Recommended Operating Conditions		
Operating Condition	Min	Max
Operating temperature range	-40℃	+85℃
Guaranteed RF performance range	-40℃	+85℃

Supply voltage: VBAT	2.3V	3.9V
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6. Pin Out Description:

No.	Pin Name	Function	Description
1	PA9	UART_TX	serial port data output
2	PA10	UART_RX	serial port data input
3	PA11	CTS/USBDM	UART transfer allowed /USBDM
4	PA12	RTS/USBDP	UART transfer requested /USBDM
5	PA7	ADC/TIMX	ADC channel/PWM input and output

No.	Pin Name	Function	Description
6	PA6	ADC/TIMX	ADC channel/PWM input and output
7	PA5	ADC/TIMX	ADC channel/PWM input and output
8	PA4	ADC/TIMX	ADC channel/PWM input and output
9	PA13	GPIO	interface for downloading data
10	PA14	GPIO	clock for download line
11	NRST	NRST	reset pin
12	VDD	Power V3.3	power pin
13	GND	GND	ground connection
14	NC	NC	not connected
15	PB7	I2C_SDA/GPIO	I2C clock interface
16	PA15	SPI1_NSS	SPI chip select
17	PB5	SPI1_MOSI	SPI bus master out /slave in
18	PB4	SPI1_MISO	SPI bus master in /slave out
19	PB3	SPI1_SCK	SPI clock line
20	PB6	I2C_SCL/GPIO	I2C data interface
21	NC	NC	not connected
22	NC	NC	not connected
23	NC	NC	not connected
24	NC	NC	not connected
25	NC	NC	not connected
26	NC	NC	not connected
27	NC	NC	not connected
28	NC	NC	not connected
29	IRQ	GPIO	low-power control pin of RF module
30	PA0	GPIO	ADC channel/PWM input and output
31	PB2	GPIO	PWM input and output
32	PB1	GPIO	ADC channel/PWM input

			and output
33	PB0	GPIO	ADC channel/PWM input and output
34	PA8	GPIO	PWM input and output



Query for module version and supported commands

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AT+ HELP

IND:OK

IND:Ver1.0

AT+SETNAME=

AT+SETINTERVAL=

AT+LOWPOWER=

AT+MINFO

Query for module version and connection status

<p>Execution command</p> <p>AT+MINFO</p>	<p>Response:</p> <p>IND:OK</p> <p>IND:<version info></p> <p>IND:CON=<status></p>
	<p>Parameters:</p> <p><version info> module version information</p> <p><status> 0-disconnected, 1-connected</p>
	<p>Example:</p> <p>AT+MINFO</p> <p>IND:OK</p> <p>IND:Ver1.0</p> <p>IND:CON=0</p>

AT+SETNAME

Set module device name

<p>Execution command</p> <p>AT+SETNAME=<name></p>	<p>Response:</p> <p>IND:OK</p>
	<p>Parameters:</p> <p><name> Bluetooth device name, ASCII string</p>
	<p>Example:</p> <p>AT+SETNAME=Macrogiga</p> <p>IND:OK</p>

AT+SETINTERVAL

Set broadcast interval

<p>Execution command</p> <p>AT+SETINTERVAL=<time></p>	<p>Response:</p> <p>IND:OK</p>
	<p>Parameters:</p> <p><time> broadcast interval, unit: 0.625ms, maximum value of 3200, i.e. 2S</p>
	<p>Example:</p> <p>Set the broadcast interval to 100ms</p> <p>AT+SETINTERVAL=160</p> <p>IND:OK</p>

AT+BLESEND

Send data through transparent transmission

Execution command AT+BLESEND=<datalen>,0x<data>	Response: IND:OK
	Parameters: <datalen> data length to be sent, ASCII character, maximum length of 17 bytes <data> data to be sent, in hexadecimal format
	Example: AT+BLESEND=9,0x4D6163726F67696761 IND:OK

AT+LOWPOWER

Set low power level of module

Execution command AT+LOWPOWER=<level>	Response: IND:OK
	Parameters: <level> low power level, 0: Non-low power mode 1: Light sleep mode 2: Deep sleep mode
	Example: When the module goes into the deep sleep mode, the current is minimized and Uart requires hardware flow control. AT+LOWPOWER=2 IND:OK

AT+SETBAUD

Set baud rate

Execution command AT+SETBAUD=<baud>	Response:(use new baud rate) IND:OK
	Parameters: <baud> baud rate, ASCII character
	Example: Set baud rate to 9600 bps. AT+SETBAUD=9600 IND:OK

AT+SETADVFLAG

Bluetooth broadcast switch

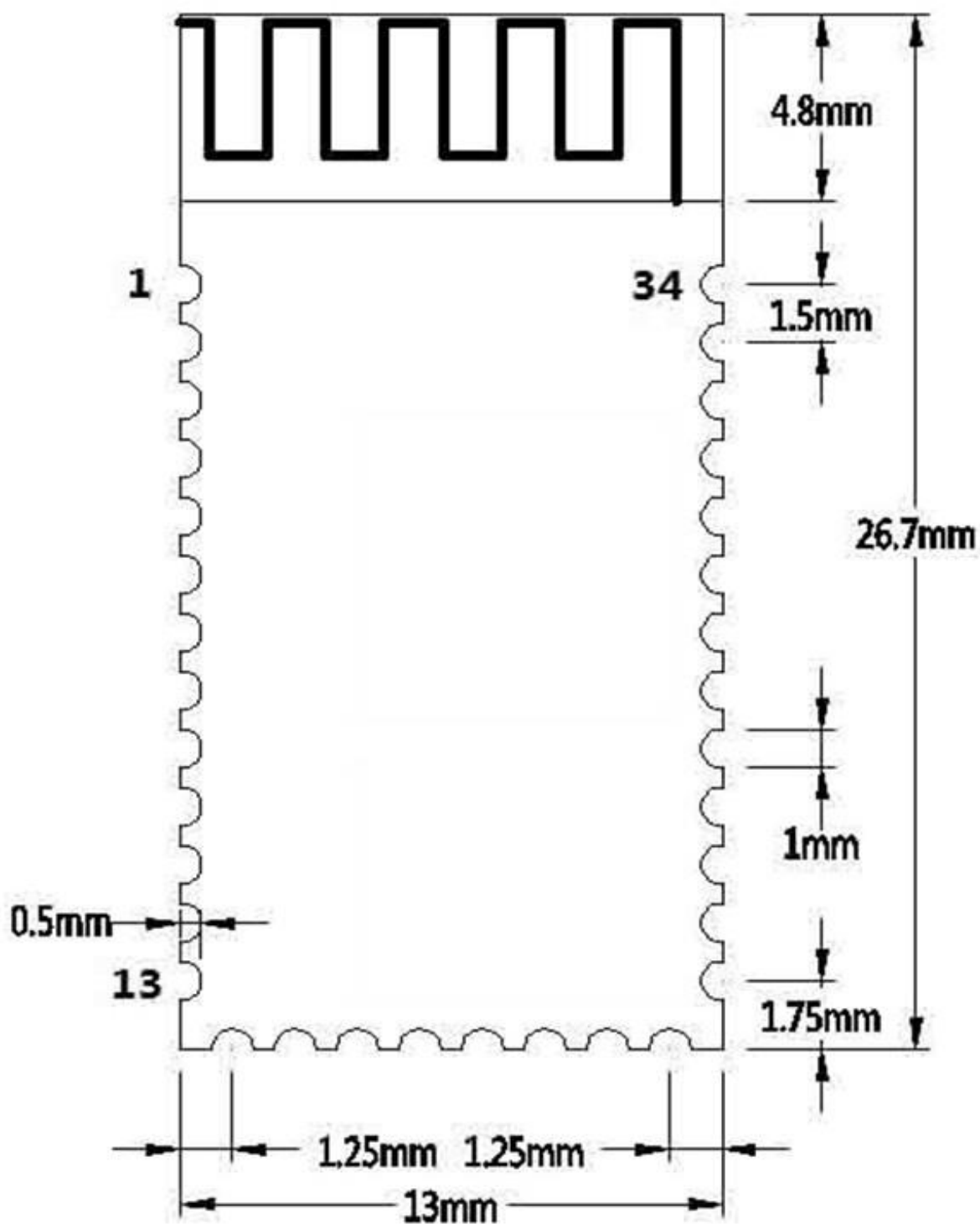
Execution command AT+SETADVFLAG=<onoff>	Response: IND:OK
	Parameters: <onoff> 0: turn off Bluetooth broadcast, 1: turn on Bluetooth broadcast
	Example: Turn off the broadcast. Unable to be searched by other devices. Unable to be connected. AT+SETADVFLAG=0 IND:OK

AT+DISCON

Actively disconnect the Bluetooth connection

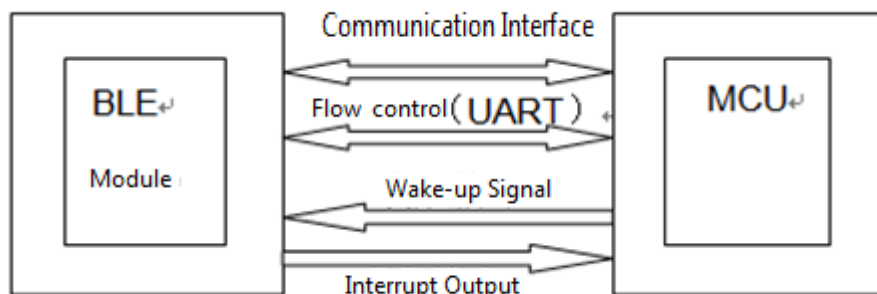
Execution command AT+DISCON	Response: (The command can be executed if the format is correct. The module will return OK even when there is no Bluetooth connection.) IND:OK
	Parameters: None.
	Example: Disconnect the Bluetooth. AT+DISCON IND:OK

8. Dimension:



Note: although antennas are encapsulated in different ways, the size of the module is unchanged.

9. Typical Application Diagram



Note: 1. Communication interfaces are I2C, UART, USB, and SPI interfaces.

2. The wake-up source can be mobile APP or control module.

10. Layout Notes:

The operating frequency band of MM32W0x2xxB BLE 4.0 Module is 2.4G. The influence of various factors on wireless transmission should be avoided. Please note the following:

- (1) Do not use a metal product case to encapsulate the Bluetooth module. If a part of the product case contains metal, try to keep the antenna area of the module away from the metal part.
- (2) The metal connection lines or metal screws inside the product should be kept far away from the antenna area of the module.
- (3) The antenna of the module shall be placed around the PCB of the support plate, not in the middle of the PCB. The support plate under the antenna should be milled. Copper pour or routing is not allowed in the parallel direction of the antenna. We also recommend to expose the antenna area directly out of the support plate.
- (4) Lay a large plot of GND under the module to the greatest extent. Extend the routing to the periphery as far as possible.
- (5) We recommend that the module mounting position on the substrate should be isolated with insulation materials; for example, putting a whole piece of overlayer on that position (TopOverLay).

11. Contact

Us:



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