User Manual

MM32W0xxB

32-bit Bluetooth low power chip based on ARM® Cortex® M0

Ver：1.2

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1 Summary

Summary

MM32W0xxB Bluetooth module is designed by Shanghai MindMotion Microelectronics Co., Ltd. for intelligent wireless data transmission, following BLE V4.2 Bluetooth specification. It supports Bluetooth SPP protocol, can send and receive data with phones based all Android versions, can be paired with IOS devices supporting BLE without additional authorization fees, and supports the resident operation of background programs; it supports AT command, and users can change parameters such as serial port baud rate, device name, pairing password, etc. to meet their needs, so it is flexible to use.

This module supports UART interface, I2C interface and USB interface. The module is optimized for low-power wireless communication and excellent radio sensitivity for transceiver; and the module only need a few peripheral components based small PCB board size and it can realize its low cost target.

2 Characteristic

Characteristic

Bluetooth protocol: Bluetooth specification v4.2 BLE, which has a longer communication distance than traditional Bluetooth.

Working frequency: 2.4GHz ISM band

Modulation mode: GFSK (Gaussian frequency shift keying)

Sensitivity: ≤ - 80dbm at 0.1% BER

Transmission rate:

asynchronous: 1Mbps

synchronous: 1Mbps

Security features:

authentication and encryption;AES encryption support; 128/192/256 bits

Support services: Central & peripheral UUID FFE0, FFE1

Power supply: + 3.3VDC 50mA

Energy consumption characteristics: support SLEEP, STOP and STANDBY low power consumption mode Appearance size: 26mm x 13mm x 1mm

3 Application fields

Application fields

This module is mainly used for short distance data wireless transmission. It can communicate with mobile phone by point-to-point interconnection; and It also can communicate with PC’s Bluetooth devices, and both modules can communicate with each other. It can avoid expensive cable and replace serial port cable directly.

- Bluetooth GPS;
- Bluetooth wireless data transmission;
- Industrial remote control and telemetry;
- POS system, scanner;
- Traffic, underground positioning and alarm;
- Automatic data acquisition system;
- Wireless data transmission; banking system;
- Wireless data acquisition; building automation, security, computer room equipment wireless monitoring, access control system;
- Smart home, industrial control;
- Automobile testing equipment;
- Interactive program voting equipment of TV station;
- Government street lamp energy saving equipment;
- Wireless LED display system;
- Bluetooth joystick, Bluetooth game handle;
- Bluetooth printer;
- Bluetooth remote control toys;
- LED light control;

4 Physical characteristics

Physical characteristics

Table 1. 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, users do not need to debug the antenna
Memory Size	Up to 128K bytes of flash, 110k for user application
SRAM	Up to 20K bytes of SRAM, 16K for user application
Dimension	26mm (L) x 13 (W) mm x 1mm (H)

5 Electrical characteristics

Electrical characteristics

Table 2. Absolute Maximum Ratings

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

Table 3. Operating Conditions

Recommended Operating Conditions		
Operating Condition	**Min**	**Max**
Operatingtemperature range	-40°C	+85°C
Guaranteed RF performance range	-40°C	+85°C
Supply voltage: VBAT	2.3V	3.9V

6 Pin function description

Pin function description

Table 4. Alternate functions for port B

Pin number	Pin name	Pin function	Pin description
1	PA9	UART_TX	Transmit data
2	PA10	UART_RX	Receive data
3	PA11	CTS/USBDM	UART sending permission/USBDM
4	PA12	RTS/USBDP	UART send request/USBDM
5	PA7	ADC/TIMX	ADC channel/PWM input and output
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	Download data interface
10	PA14	GPIO	Download line clock
11	NRST	NRST	Reset pin
12	VDD	电源 V3.3	Power pin
13	GND	GND	Earthing
14	NC	NC	Suspended
15	PB7	I2C_SDA/GPIO	I2C clock port
16	PA15	SPI1_NSS	SPI chip selection signal
17	PB5	SPI1_MOSI	SPI bus main output/slave input
18	PB4	SPI1_MISO	SPI bus main input/slave output
19	PB3	SPI1_SCK	SPI clock line
20	PB6	I2C_SCL/GPIO	I2C data port
21	NC	NC	Suspended
22	NC	NC	Suspended
23	NC	NC	Suspended
24	NC	NC	Suspended
25	NC	NC	Suspended
26	NC	NC	Suspended
27	NC	NC	Suspended
28	NC	NC	Suspended
29	IRQ	GPIO	RF module low power control pin
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

Pin number	Pin name	Pin function	Pin description
34	PA8	GPIO	PWM input and output

7 AT instruction set

AT instruction set

Table 5. AT+HELP

AT+HELP	**Query module version and supported commands**
Execute instruction: AT+HELP	Responses: IND:<version info> AT+*** AT+### ……
	Parameter Description: <version info> module version information ***/### Different commands supported by the module
	Examples: AT+ HELP IND:OK IND:Ver1.0 AT+SETNAME= AT+SETINTERVAL= AT+LOWPOWER=

Table 6. AT+MINFO

AT+MINFO	**Query module version and connection status**
Execute instruction:AT+MINFO	Responses: IND:OK IND:<version info> IND:CON=<status>
	Parameter Description: <version info> module version information <status> 0-disconnected, 1-connected
	Examples: AT+MINFO IND:OK IND:Ver1.0 IND:CON=0

Table 7. AT+SETNAME

AT+SETNAME	**Set module device name**
Execute instruction: AT+SETNAME=<name>	Responses: IND:OK
	Parameter Description: < name > Bluetooth device name, ascii string
	Examples: AT+SETNAME=Macrogiga IND:OK

Table 8. AT+SETINTERVAL

AT+SETINTERVAL	**Set broadcast interval**
Execute instruction: AT+SETINTERVAL=<time>	Responses: IND:OK
	Parameter Description: < time > broadcast interval, unit: 0.625ms, maximum value: 3200, i.e. 2S
	Examples: Set broadcasting interval to 100ms AT+SETINTERVAL=160 IND:OK

Table 9. AT+HEBLESENDLP

AT+BLESEND	**Send transparent data**
Execute instruction: AT+BLESEND=<datalen>, 0x<data>	Responses: IND:OK
	Parameter Description: < datalen > length of data to be sent, ASCII characters, maximum length 17 bytes < data > data to be sent in hexadecimal format
	Examples: AT+BLESEND=9,0x4D6163726F67696761 IND:O

Table 10. AT+LOWPOWER

AT+LOWPOWER	**Set low power level of the module**
Execute instruction: AT+LOWPOWER=<level>	Responses: IND:OK
	Parameter Description: <level> low power level, 0 does not enter low power mode, 1Enter light sleep mode, 2 deep sleep mode
	Examples: When entering deep sleep mode, the current is the minimum. At this time,UART needs hardware flow control AT+LOWPOWER=2

Table 11. AT+SETBAUD

AT+SETBAUD	**Set baud rate**
Execute instruction: AT+SETBAUD=<baud>	Responses: IND:OK
	Parameter Description: < baud > baud rate, ASCII characters
	Examples: Baud rate set to 9600 BPS AT+SETBAUD=9600 IND:OK

Table 12. AT+SETADVFLAG

AT+SETADVFLAG	**Bluetooth broadcast switch**
Execute instruction: AT+SETADVFLAG=<onoff>	Responses: IND:OK
	Parameter Description: < on-off > 0 turn off Bluetooth broadcast, 1 turn on Bluetooth broadcast
	Examples: Turn off broadcasting, cannot be searched by other devices, cannot be connected AT+SETADVFLAG=0 IND:OK

Table 13. AT+DISCON

AT+DISCON	**Active disconnect from Bluetooth**
Execute instruction:AT+DISCON	Responses:(if the command format is correct,it will be executed. Even if there is no Bluetooth connection at that time, it will return OK.) IND:OK
	Parameter Description: No
	Examples: Disconnect AT+DISCON IND:OK

8 Boundary dimension

Boundary dimension

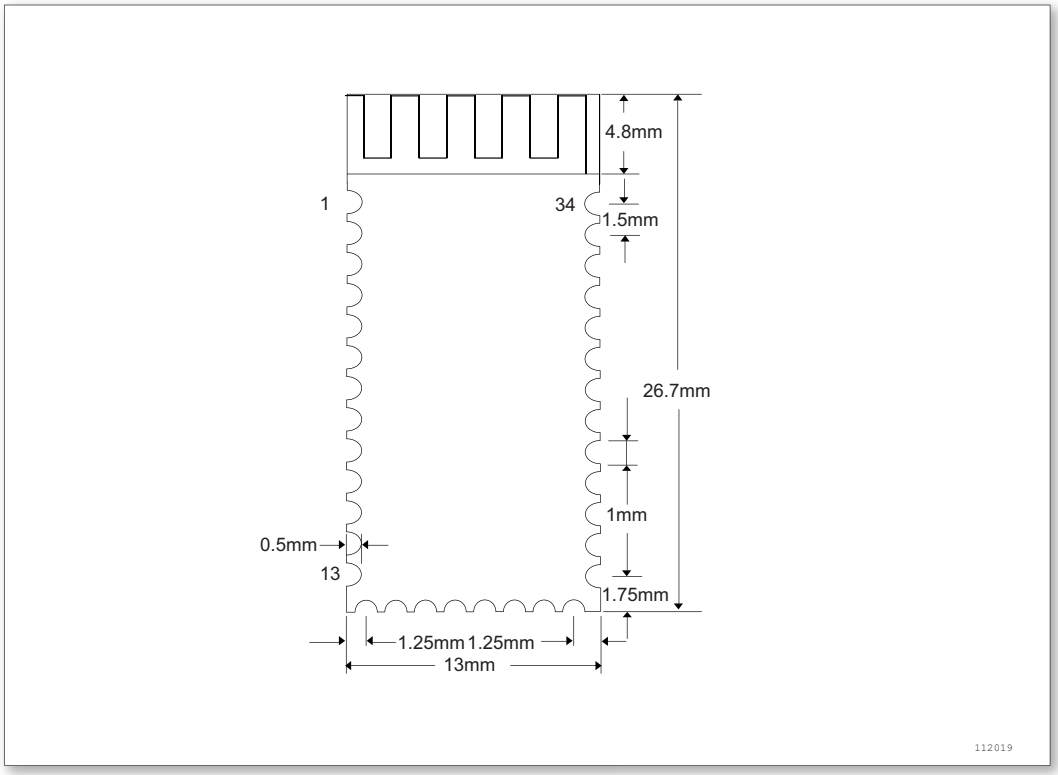

Figure 1. Boundary dimension

Note: the antenna package is different, but the external dimension of the module is the same.

9 Typical application block diagram

Typical application block diagram

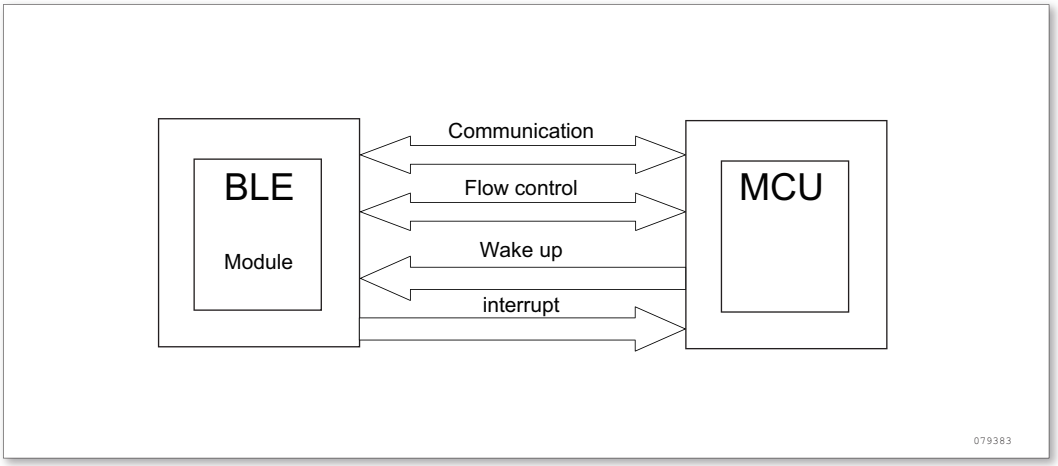

Figure 2. Typical application block diagram

Note:

1. Communication interfaces include I2C, UART, USB and SPI.
2. The wake-up source can be from the mobile app, and it can control the wake-up of the module.

10 LAYOUT Precautions

LAYOUT Precautions

The MM32W0xxB Bluetooth 4.0 module works in the 2.4G wireless frequency band. It should try to avoid the influence of various factors on wireless transceiver. Pay attention to the following points:

1. Avoid using metal for the product shell surrounding the Bluetooth module. When using part of the metal shell, try to keep the antenna part of the module away from the metal part.
2. The metal connecting wires or screws inside the product shall be kept away from the antenna part of the module as far as possible.
3. The antenna part of the module shall be placed around the PCB of the carrier plate, not allowed to be placed in the board, and the carrier plate under the antenna shall be milled empty, parallel to the antenna, not allowed to lay copper or wire. It is also a good choice to directly expose the antenna part to the carrier plate.
4. Lay large GND under the module, and extend the wiring to the periphery as far as possible.
5. It is recommended to use insulating materials to isolate the module mounting position on the base plate, for example, to place a whole silk screen at this position (Top OverLay).

11 Contact us

Contact us

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