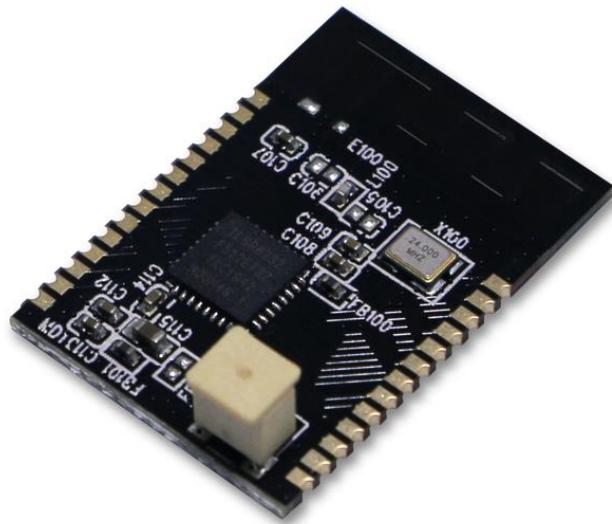


Bluetooth Low Energy (BLE) Module

SPECIFICATION

Model No.: M-B14001

Version: V1.0



Note: The purpose of this document is to introduce the M-B14001 BLE module and the various hardware interfaces in its application. To help customers quickly understand the hardware interface specifications, mechanical specifications and other related information of the M-B14001 BLE module.

Before using this module, please read this document carefully, and pay attention to the following important matters:

This module is an electrostatic sensitive product. Please operate it on an anti-static workbench during installation and testing.

The module is integrated with all RF related devices and has PCB onboard antenna, so excellent RF performance can be obtained without additional antenna configuration. Please do not use metal case above the antenna, otherwise it will lead to serious attenuation of radio frequency signals, which will affect the effective use of distance.

Metal objects and wires should be kept away from the antenna as much as possible.

When installing the module, nearby objects should be kept at a sufficient safety distance from the module to prevent short circuit damage.

This module should be used in a dry environment. Please do not make any liquid substance come into this module.

Please use an independent voltage regulator circuit to supply power to this module, and avoid sharing with other circuits. The tolerance of the power supply should not be less than 5%.

Limitations:

This module is intended to be embedded in the customer's terminal product application, and does not provide a casing itself. It is not recommended that the customer directly resell this module as a final product without permission.

This series of modules are in accordance with commonly used international standards. If there is any special certification needed, we can adjust certain indicators according to your needs.

This module cannot be applied to life rescue, life-support systems, or any occasion where personal injury or life threatening may caused by equipment failure. Any organization or individual carrying out the above-mentioned applications shall bear all risks at their own.

We will not be responsible for any direct or indirect damage, injury or loss of profits caused by products that use this module.

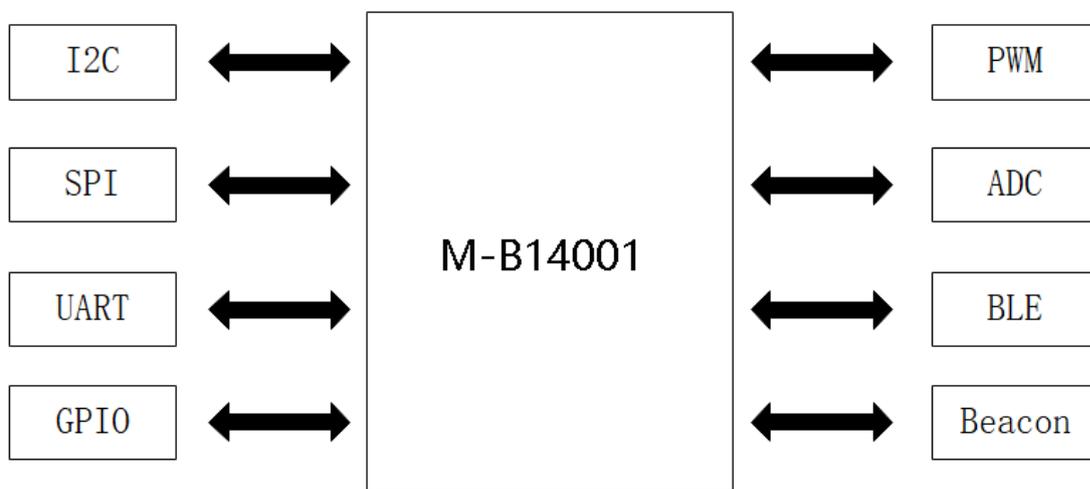
File version & update management

DATE	Software Version	Remarks
2019-06-15	V1.0	Standardized Bluetooth BLE module

1. Module introduction

1.1 Brief introduction

M-B14001 BLE module is a compact size, high performance, low-power consumption, long range Bluetooth Module. This BLE module uses an on-board antenna, which can save your cost and debugging time, and maximizes the transmission distance. This BLE Module has a variety of external interfaces, and users can quickly redevelop on the basis. It uses the two-in-one mode of Transparent Transmission and Beacon, and combines with APP to seamlessly locate indoors, it can be also upgraded over the air. This BLE Module can achieve positioning accuracy of about 0.5m with the help of APP, which can be widely used in various wireless communication fields of the IoT.



1.2 Main Features:

Operating voltage: 1.9V-3.6V

Bluetooth version: BLE 4.2 and BLE 5.0 both available

Transmitting power: Max 8 ± 1 dBm

Receive sensitivity: -92dBm @ 1Mbps mode

Maximum distance: 150 meters (in open air)

Low power consumption:

Receiving current < 14mA,

Sleeping current < 10uA (Timer wakeup);

1.3 Typical Applications

Beacon positioning, Intelligent Control, Smart Wearing, Smart Home, Asset Management

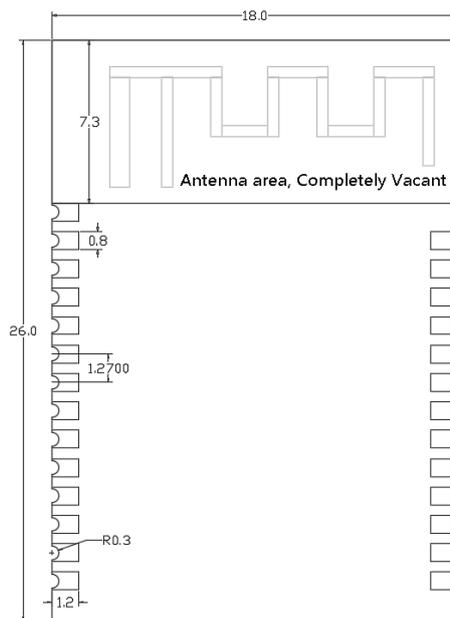
Smart Sensing, Cold-chain Logistics

2. Technical Parameter (Operating @+25°C):

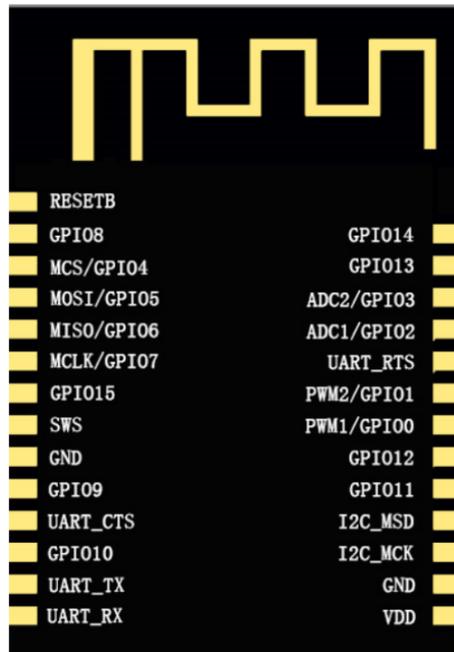
Description		Parameter			Remark
		Min.	Typi.	Max.	
Working Voltage (V)		1.9	3.3	3.6	/
Working Temperature (°C)		-40°C	/	80°C	/
Working Humidity		10		90	No condensation
Working Frequency (MHz)			2.4G		/
Power consumption	Transmitting state (mA)	≤15mA			0dBm
	Receiving state (mA)	≤14mA			
	Sleeping state (uA)	≤10uA			Timer wakeup
Transmitting power (dBm)		0			Programmable (user-defined)
Receiving sensitivity (dBm)		-92			
Modulation		GMSK			/
Interface Type		UART/GPIO/I2C/ADC/SPI			/
communication protocol		BLE/Beacon			/
communication distance		Max 150m			In an open air
Dimension (mm)		18×26×2			PCB on-board antenna

3. Hardware Layout and Pins Description

3.1 Module Size:



3.2 Pin Definitions



The pin function description is as follows:

Pin	Interface Name	Function
1	RESETB	Reset, low level effective
2	GPIO8	I/O port
3	MCS/GPIO4	Default I/O port, multiplex SPI CS
4	MOSI/GPIO5	Default I/O port, multiplex SPI MOSI
5	MISO/GPIO6	Default I/O port, multiplex SPI MISO
6	MCLK/GPIO7	Default I/O port, multiplex SPI CLK
7	GPIO15	I/O port
8	SWS	Burner, NC (not connected)
9	GND	Grounding
10	GPIO9	I/O port
11	UART_CTS	UART_CTS
12	GPIO10	I/O port
13	UART_TX	Serial transmitting pin
14	UART_RX	Serial receiving pin
15	VDD	Power supply, 1.9V~3.6V
16	GND	Grounding

17	I2C_MCK	I2C CLK Pin
18	I2C_MSD	I2C Data Pin
19	GPIO11	I/O port
20	GPIO12	I/O port
21	PWM1/GPIO0	Default I/O port, multiplex PWM
22	PWM2/GPIO1	Default I/O port, multiplex PWM
23	UART_RTS	UART_RTS
24	ADC1/GPIO2	Default I/O port, multiplex ADC
25	ADC2/GPIO3	Default I/O port, multiplex ADC
26	GPIO13	I/O port
27	GPIO14	I/O port

4. Basic Operations

Connect the PCBA of the welded module to the main board, and use AT command or APP to control module communication, through the BLE serial port of the module for evaluation and test.

5. Design Instructions

5.1 Power Supply

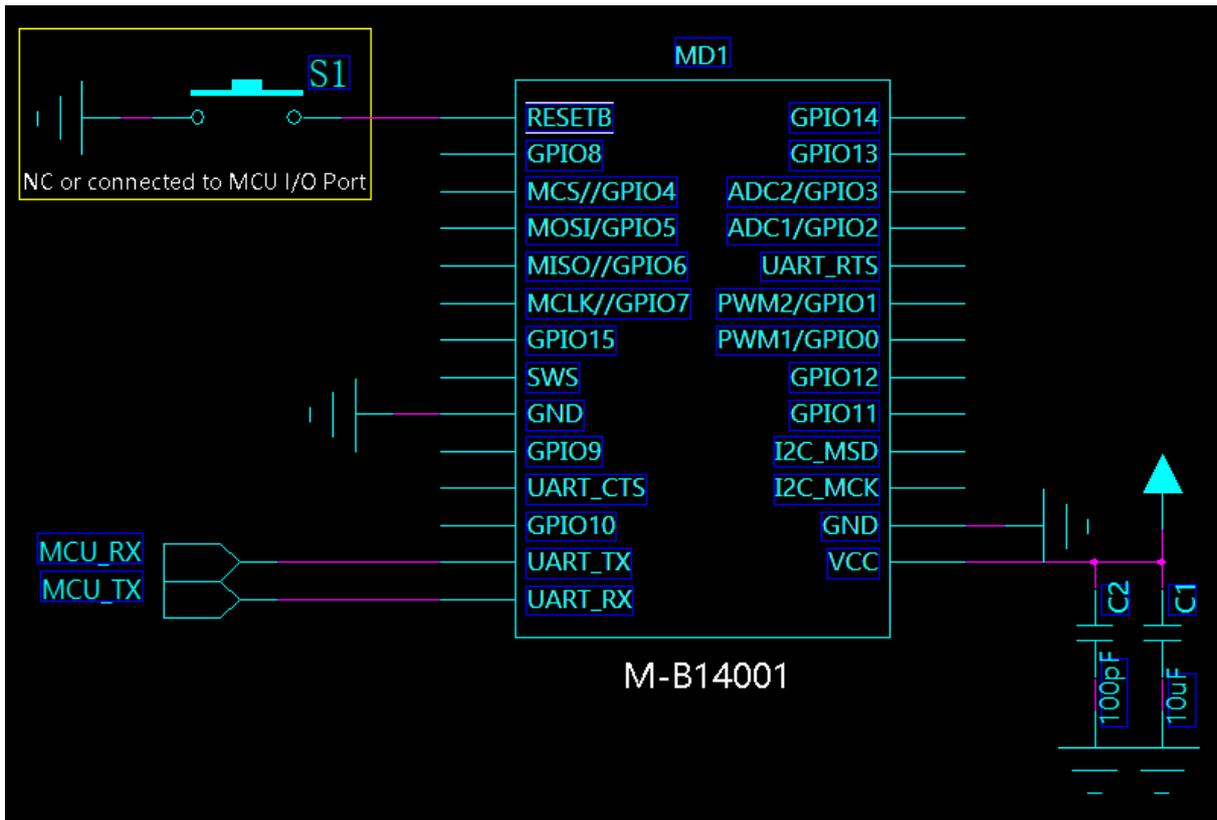
It is recommended to use DC regulator power supply to supply power to the module. The power ripple is controlled at +/-50mV, and the module needs reliable grounding.

1uF/16V capacitive filter is recommended before power on the module.

5.2 PCB Layout Routing

Please do not deploy the signal line under the module, especially the clock signal. The module layout should be far away from the high radiation circuits, such as switching power supply, MOSFET, inductance, etc. The recommended module layout is close to the edge of the motherboard, the antenna area needs to be vacant, and copper cannot be paved under the PCB.

5.3 Typical Application Circuits



6. Instructions for use

- ① The module antenna defaults to the PCB on-board antenna, and the impedance is tested base on bare board. The matching degree of the module will be affected by different applications, by its placement and the structure of the shell, as well as other internal components of the product. Please provide a complete prototype, if you need to optimize the antenna impedance;
- ② When the RF chip is in the pure receiving state, the power consumption is the receiving current. It is normal, if different power consumption level and chip specification been found, after secondary development (re-loaded with software)
- ③ If you want to minimize the power consumption, please try to attenuate its output power, according to the actual application scenario, and wireless transmission distance, which can effectively reduce the average power consumption of the system.
- ④ This BLE module is a high-precision radio frequency communication component. The diameter of the half-hole immersion gold process is extremely thin. The crystal is in the smallest package. And the capacitors we use are all well-known brands such as Murata and Samsung. Please make

sure ESD protection is executed, and strictly follow the standard temperature curve for reflow soldering; during future production, please try to avoid manual welding & direct human contact. We will not accept product return or exchange, due to appearance damage or ESD damage caused by secondary processing.

7. Contact us

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★ Data collection, Smart home, Internet of Things applications, Wireless remote control technology, Remote active RFID, Antennas ★

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