

# **BLE Module MBP00**

## **User Manual**

## Version History

Revision	Amendment	Date	Author
V1.0	Initial version	2022.10.17	Pan Binbin

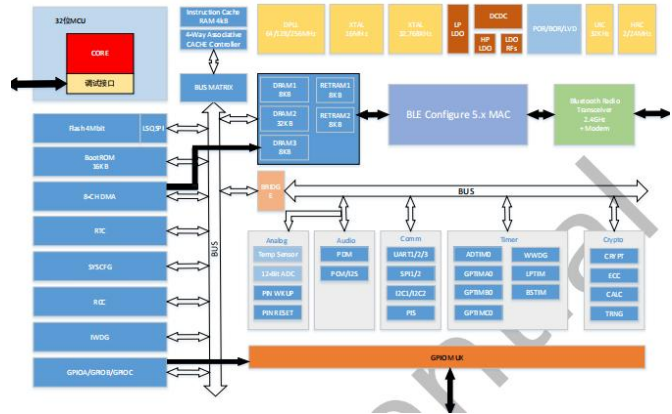
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# 1. Description

## 1.1 Overview

This is UART to BLE 5.0/5.1 module. It is composed of a highly wireless chip with Arm Cortex-M0, internal 512 KB Flash and 64KB SRAM. The antenna is build-in PCB with 2dbi gain. It has high stability and ultra-low sleep power consumption, about 1.1uA in deep sleep model. For the ice water meter, the module supports the low power management, it can work over 10 years with battery.



The module supports point-to-point and the multi-slave connection function binding 5 to 15 slave devices directly. With the BLE mesh, it can build the network over 200 nodes.

## 1.2 RF Feature

- Bluetooth 5.0/5.1 Compliant, 125Kbps, 500Kbps, 1Mbps and 2Mbps.
- Bluetooth SIG Mesh and private Mesh.
- Rx Sensitivity: 99.7 dBm @1Mbps, 97 dBm @2Mbps, 105dBm @125kbps.
- Tx Output Power: up to 12 dBm.

## 1.3 Feature Of Power Management Module

- Power Supply: 1.8V ~ 3.6V, Type 3.3V
- RX Power Consumption: 4.3 mA Peak
- TX Power Consumption: 4.5 mA @0dBm Peak
- Ultra-low Sleep Power Consumption: 1.1 uA (RTC + GPIO Wake Up)

- Shutdown Power Consumption: 700 nA (GPIO Wake Up)

## 1.4 Security

- AES Security Module (64/128/192)
- Elliptical Curve Cryptography (256)
- Triple Data Encryption Standard (T/DES)
- True Random Number Generator (RNG)
- Application layer Security via App

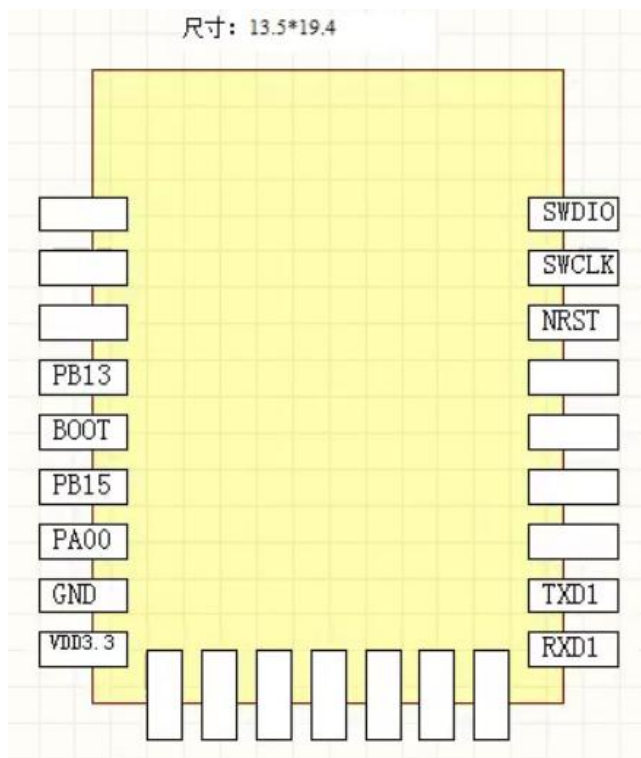
## 1.5 User Interface

- UART\*1
- SWD\*1
- GPIO\*6



## 2.Pin Description

### 2.1Pin Diagram



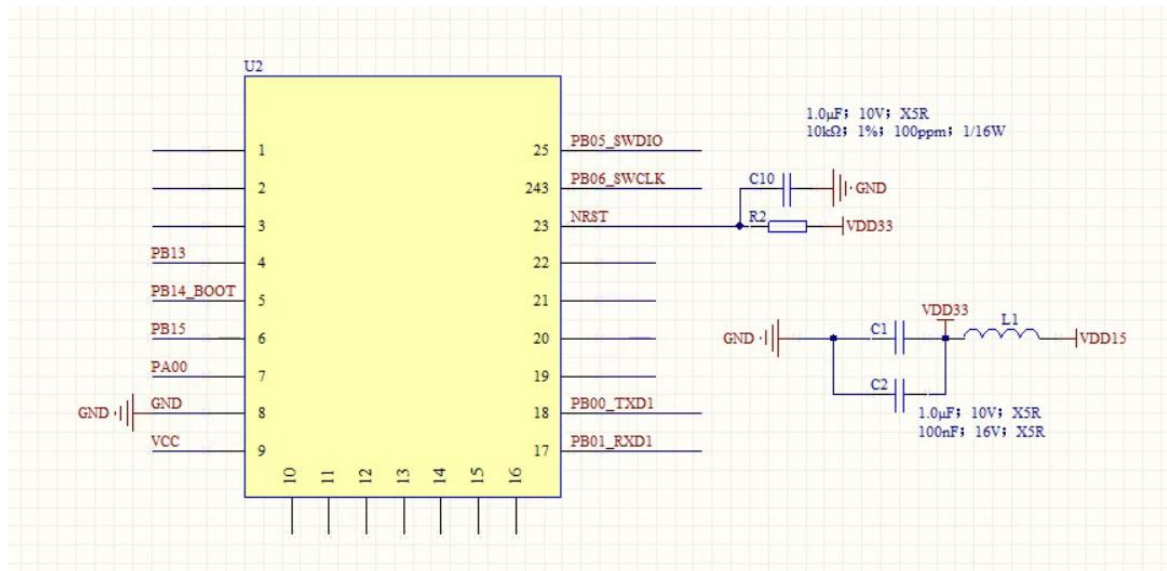
### 2.2Pin Definition

No.	Pin name	Description
1	/	/
2	/	/
3	/	/
4	PB13	GPIO/ADC Channel 1
5	PB14/BOOT	GPIO/BOOT Control
6	PB15	GPIO/Wake Up
7	PA00	GPIO/ADC Channel 4/Wake Up
8	GND	GND
9	3V3	Chipset 3.3V Supply

10	/	/
11	/	/
12	/	/
13	/	/
14	/	/
15	/	/
16	/	/
17	PB01_RX1	GPIO/UART1_RXD
18	PB00_TX1	GPIO/UART1_TXD
19	/	/
20	/	/
21	/	/
22	/	/
23	RST	RST
24	PB06/SWCLK	SWD-SWCK
25	PB05/SWDIO	SWD-SWIO

\* Support SWD and UART programming. Push the Boot pin high, and then do the Uart programming.

### 3.Reference Design



#### Notes:

- 3.3V stable, minimum ripple wave with DC-DC or LDO power supply
- Maximum distance between BLE model and power/high-freq layout.
- Avoid high- freq signal lines/power lines close or beneath the MPB00 model.
- Place the antenna on clearance area without any components.
- UAR default power is 3.3V TTL.



## FCC Requirement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

Note: This equipment has been tested and found to comply with the limits 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.

RF exposure considerations This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

RF Exposure - This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the module and the user's body must be maintained at all times.

A label must be affixed to the outside of final commercial product with the following statements:

This device contains FCC ID:2AWSF-MBP00

Consistent with §2.909(a), the following text must be included within the user's manual or operator instruction guide for the final commercial product.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the module and the user's body must be maintained at all times.

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device. The FCC Part 15 Statement shall be included in the user manual of final commercial product if applicable.

**CAUTION:** Any changes or modifications not expressly approved could void the user ' s authority to operate the equipment.

#### **For limited modular approval**

The module is limited to use in the host.

the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval. The limited module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module

#### **Antenna**

The antenna gain of a new antenna should be of the same type as the originally approved antenna and the antenna gain should not be higher than the antenna gain of the originally tested antenna . The list of originally approved PCB antennas is the following

-Type of antenna: PCB antenna;peak gain: 4.18 dBi

It is required that the final product using the module must provide adequate shielding to the radio frequency circuitry and supply power to this module with regulated power, to ensure the final product complies with Part 15 of FCC rules.