Bweetech zigbee3.0&BLE module

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1. Overview

BWMZB06 is a low-power embedded zigbee3.0&BLE module developed by BWEETECH Electronic Technology (Shanghai) Co., Ltd. It consists of a highly integrated radio frequency chip EFR32MG21A020F1024IM32and a small number of peripheral devices. It has a built-in zigbee3.0 network protocol stack and a wealth of intelligent lighting dimming algorithm library functions. BWMZB06 embedded low-power Cortex-M33 32-bit CPU, 1024Kbyte Flash, 64KB SRAM and abundant peripheral resources.

BWMZB06 is an RTOS platform that integrates all the function libraries of the zigbee3.0 protocol stack. Users can develop embedded zigbee3.0 products that meet their needs based on these.

The functional diagram of BWMZB06 is shown in Figure 1:

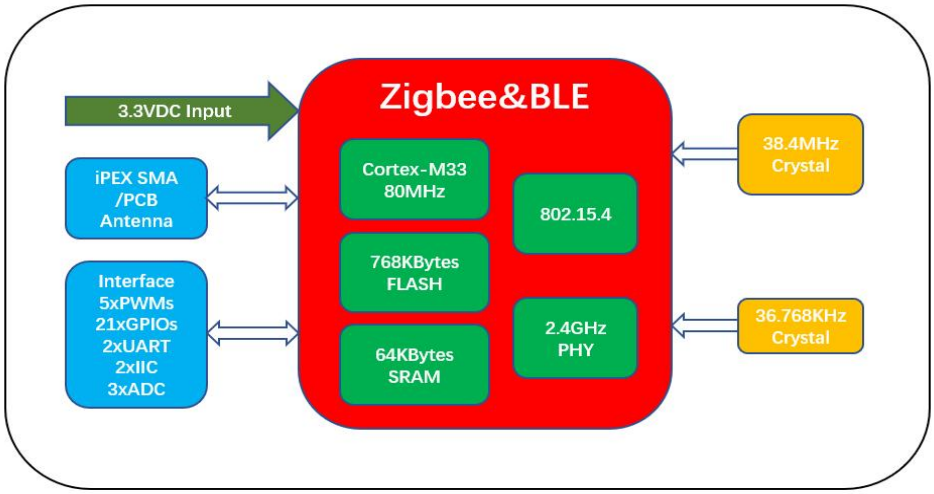


Figure 1BWMZB06Functional Diagram

1.1 Features

Key Specs *768 Flash (kB)*

MCU Core	ARM Cortex-M33	Core Frequency (MHz)	80	Flash (kB)	768
RAM (kB)	64	Secure Vault	—	Max Output Power	20
GPIO	20	Temperature (Min)	-40	Temperature (Max)	125
Package Type	QFN32	Zigbee Capable	Yes	Thread Capable	Yes
Bluetooth Low Energy Capable	Yes	2.4 GHz Capable	No	Sub-GHz Capable	No

1.2 Main application areas

Intelligent building、 Intelligent lighting
Smart home
Consumer electronics
Industrial wireless control

2.Interfaces

2.1 Size package

BWMZB06 is a surface mount package, and the pin pitch is 1.27mm.

BWMZB06 size: 15mm (W)×19mm (L) ×1.5mm (H)

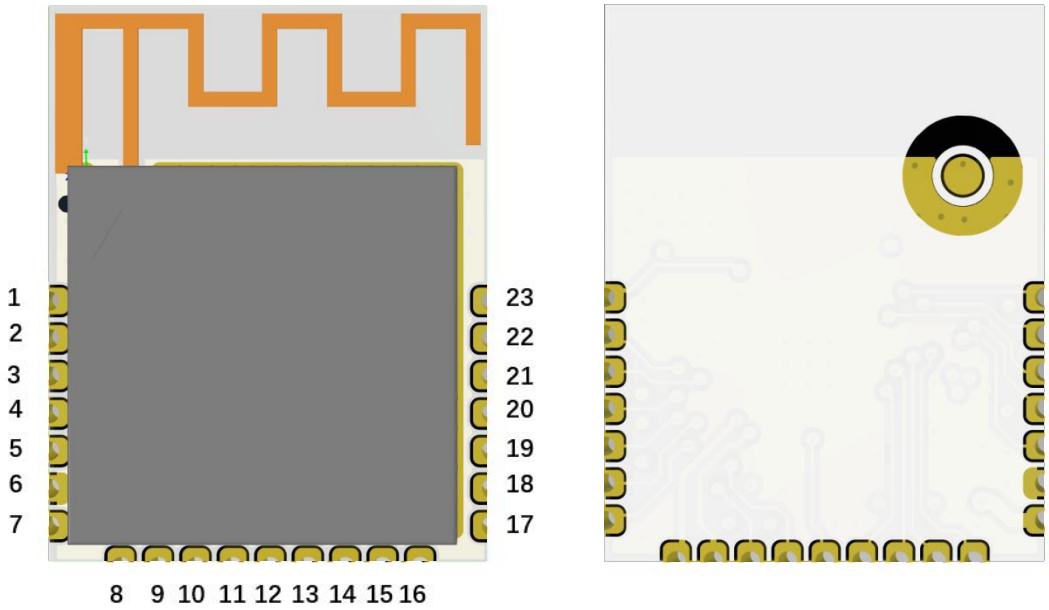


Figure 2 BWMZB06Overview

2.2 PIN definition

Table 1 shows BWMZB06 PIN interface definition.

Table 1 BWMZB06 PIN interface definition

No.	IO	Function	Description
1	PB01	I/O	
2	PB00	I/O	
3	PA00	I/O	
4	PA01	I/O	SWCLK
5	PA02	I/O	SWDIO
6	GND	P	Power reference ground
7	VCC	P	Power（3.3V）
8	PA03	I/O	SWO
9	PA04	I/O	
10	PA05	I/O	VCOM_TX
11	PA06	I/O	VCOM_RX
12	PD04	I/O	
13	PD03	I/O	
14	PD02	I/O	
15	PD01	I/O	LFXTAL_O
16	PD00	I/O	LFXTAL_I

17	PC00	I/O	
18	PC01	I/O	
19	PC02	I/O	
20	PC03	I/O	
21	PC04	I/O	PTI_DATA
22	PC05	I/O	PTI_FRAME
23	RESETn	I	RESETn

3. Electrical parameters

3.1 Absolute electrical parameter

Table 2 Absolute parameters

Parameters	Descriptions	Min	Max	Unit
Ts	Storage temperature	-20	105	℃
VCC	Supply voltage	-0.3	3.6	V
Electrostatic discharge voltage (human body model)	TAMB-25℃	-	2	KV
Electrostatic discharge voltage (machine model)	TAMB-25℃	-	0.5	KV

3.2 Operating conditions

Table 3 Normal operating conditions

Parameters	Descriptions	Min	Typical	Max	Unit
Ta	Operating temperature	-40	-	125	℃
VCC	Operating Voltage	1.9	3.3	3.6	V
V_{IL}	IO low voltage input	-0.3	-	VCC*0.25	V
V_{IH}	IO high voltage input	VCC*0.75	-	VCC	V
V_{OL}	IO low voltage output	-	-	VCC*0.1	V
V_{OH}	IO high voltage output	VCC*0.8	-	VCC	V
Imax	IO drive current	-	-	5	mA

3.3 Transmit power consumption in Zigbee

Table 4 Power consumption during continuous transmission

Symbol	Parameters			Typical	Unit
	Pattern	Data rate	Tx power		
I_{RF}	Tone	250kbps	+20dBm	105	mA
I_{RF}	Tone	250kbps	+10dBm	20	mA
I_{RF}	Tone	250kbps	+0dBm	6	mA

3.4 Receive power consumption in Zigbee

Table 5 Power consumption during continuous receive

Symbol	Pattern	Data rate	Typical	unit
I_{RF}	Normal	250kbps	6	mA

3.5 Transmit power consumption in Bluetooth

Table 6 Power consumption during continuous transmission

Symbol	Parameters			Typical	Unit
	Pattern	Data rate	Tx power		
I_{RF}	Tone	1Mbps	+20dBm	105	mA
I_{RF}	Tone	1Mbps	+10dBm	20	mA
I_{RF}	Tone	1Mbps	+0dBm	6	mA

3.6 Receive power consumption in Bluetooth

Table 7 Power consumption during continuous receive

Symbol	Pattern	Data rate	Typical	unit
I_{RF}	Normal	1Mbps	6	mA

3.7 Normal power consumption

Table 8 Working current in BWMZB06

Operation pattern	Working status, Ta=25℃	Average	Max	Unit
Form network	Scan the channel and join network	25	35	mA
Router	As router in network, forwarding messages	20	25	mA
Receive status	In receive work status	6	10	mA

4. Radio frequency characteristics

4.1 Basic radio frequency characteristics

Table 9 Basic radio frequency characteristics in zigee

Parameters	Descriptions
working frequency	2.405~2.485GHz
Zigbee	IEEE 802.15.4 (channel: 11-26)
Data rate	250kpbs
Antenna type	Onboard PCB antenna

Table 10 Basic radio frequency characteristics in Bluetooth

Parameters	Descriptions
working frequency	2.402~2.4835GHz
Bluetooth	Ble4.2(channel:0-39)
Data rate	1Mpbs
Antenna type	Onboard PCB antenna

4.2 Tx power in Zigbee

Table 11 Continuous transmission power in Zigbee

Parameters		Min	Peak	Max	unit
Average RF output power in CSMA Mode	250kbps	-	10	-	dBm
Frequency deviation		-10	-	10	ppm

4.3 Receiving sensitivity in Zigbee

Table 12 Receiving sensitivity in Zigbee

Parameters		Min	Typical	Max	unit
RX sensitivity in PER<5% IEEE802.15.4 CSMA	250k bps	-	-102	-	dBm

4.4 Tx power in Bluetooth

Table 13 Continuous transmission power in Bluetooth

Parameters		Min	Peak	Max	unit
Average RF output power	1Mbps	-	8	-	dBm
Frequency deviation		-10	-	10	ppm

4.5 Receiving sensitivity in Bluetooth

Table 14 Receiving sensitivity in Bluetooth

Parameters		Min	Typical	Max	unit
RX sensitivity in PER<5%	1M bps	-	-102	-	dBm

5. Antenna information

5.1 Antenna type

PCB onboard antenna Or via iPEX connector to external antenna

5.2 Reducing antenna interference

It is recommended that the antenna part should be kept at least 15mm away from other metal parts, to ensure RF performance.

PCB board should not cover the trace, even copper in the antenna area to avoid affecting the antenna performance.

PCB onboard antenna area of the module refer to Figure 3 BWMZB06 Mechanical Dimensions.

6. Packaging information and production guidance

6.1 Mechanical Dimensions

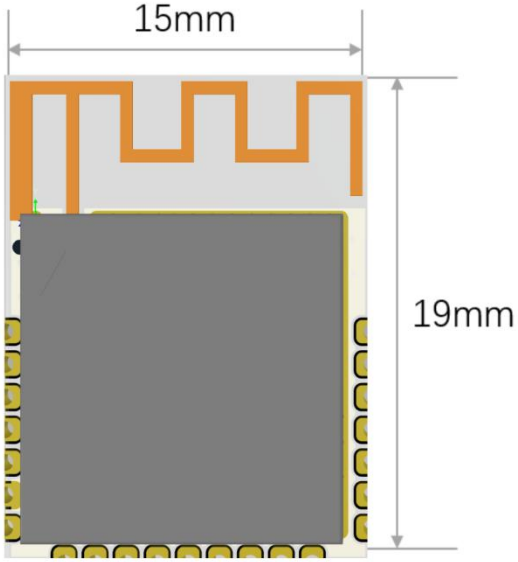


Figure 3 BWMZB06 Mechanical Dimensions

6.2 PCB Recommended package

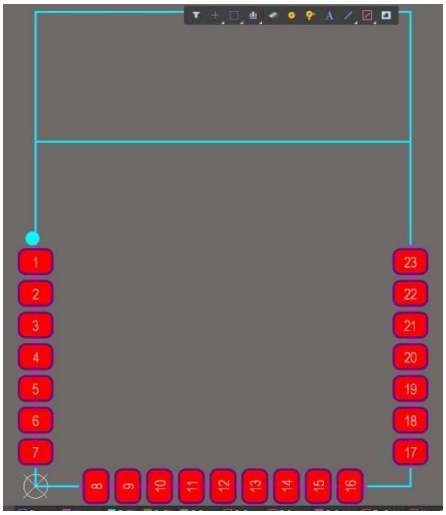


Figure 4 BWMZB06 PCB Package Figure

Remarks: Please contact for package library file

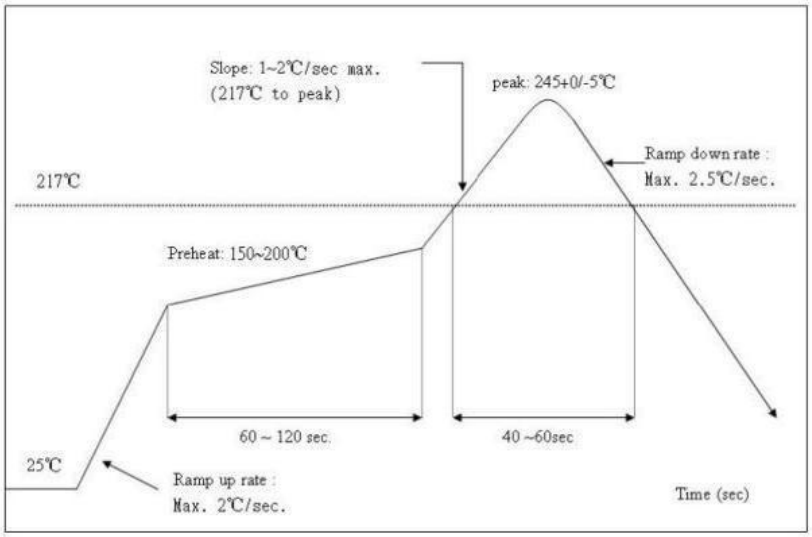
6.3 Production guide

The module storage conditions are as follows：

1. Moisture-proof bag must be stored with temperature <30 ° C & humidity <85%RH
2. The shelf life of dry-packed products should be 6 months from sealing package.
3. In the whole process of production, every operator must wear an electrostatic ring.
4. When operating, prevent the module from getting wet or dirty

6.4 Recommended furnace temperature curve

Refer to IPC/JEDEC standard ; Peak Temperature : <250°C ; Number of Times: ≤2 times ;



FCC Statement

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.

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, 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 important announcement

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrator under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH0 to CH39 for BLE(CH11 to CH26 for Zigbee)by supplied firmware programming tool. OEM shall not supply any tool or info to the end-userregarding to Regulatory Domain change.

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following"

Contains FCC ID: **2BCNC-BWMZB06** "

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2.7 Antennas

This radio transmitter **FCC ID:2BCNC-BWMZB06** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
Bluetooth	/	PCB Antenna	1.15	2402-2480MHz
Zigbee	/	PCB Antenna	1.15	2405-2480MHz

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains **FCC ID:2BCNC-BWMZB06**".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

2.11 Note EMI Considerations

Host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.