深圳市四季宏胜科技有限公司
SHENZHEN INVINCIBLE FOUR SEASON TECHNOLOGY CO., LTD.

IMB01Module Datasheet

Ver：20210909

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IMB01 is a low-power embedded Wi-Fi module that i4Season has developed. It consists of a highly integrated RF chip (BL2028N), a few peripherals, an embedded Wi-Fi network protocol stack, and rich library functions.

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1 Overview

IMB01 not only supports the AP and STA dual-network-connection manner but sup-ports the Bluetooth LE network connection manner.

It has a 32-bit MCU with a running speed of up to 120 MHz, 2Mbyte flash, and 256-KB RAM, so as to support the multi-cloud connection. The three 32-bit PWM output makes the chip very suitable for high-quality IOT control.

1.1 Features

- Embedded low-power 32-bit CPU, which can also function as an application processor
- The clock rate: 120 MHz
- Operating voltage: 3.0V to 3.6V
- Wi-Fi connectivity
  - 802.11 b/g/n
  - Channels 1-11@2.4GHz
  - Support WEP,WPA/WPA2,WPA/WPA2 PSK (AES) security modes
  - Up to + 16 dBm output power in 802.11b mode
  - Support STA/AP/STA+AP working mode
  - Support SmartConfig and AP network configuration manners for Android and iOS devices
  - Operating temperature：-30℃ to 75℃
- Bluetooth LE connectivity
  - 4 dBm transmit power in bluetooth mode
  - Complete bluetooth coexistence interface

1.2 Applications

- Intelligent building
- Smart household and home appliances
- Smart socket and light
- Industrial wireless control

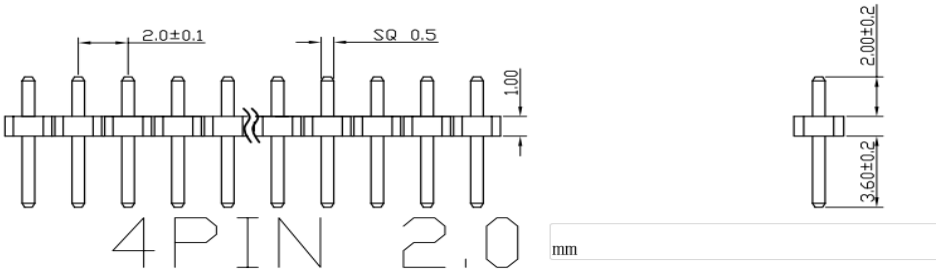
1.3Change history

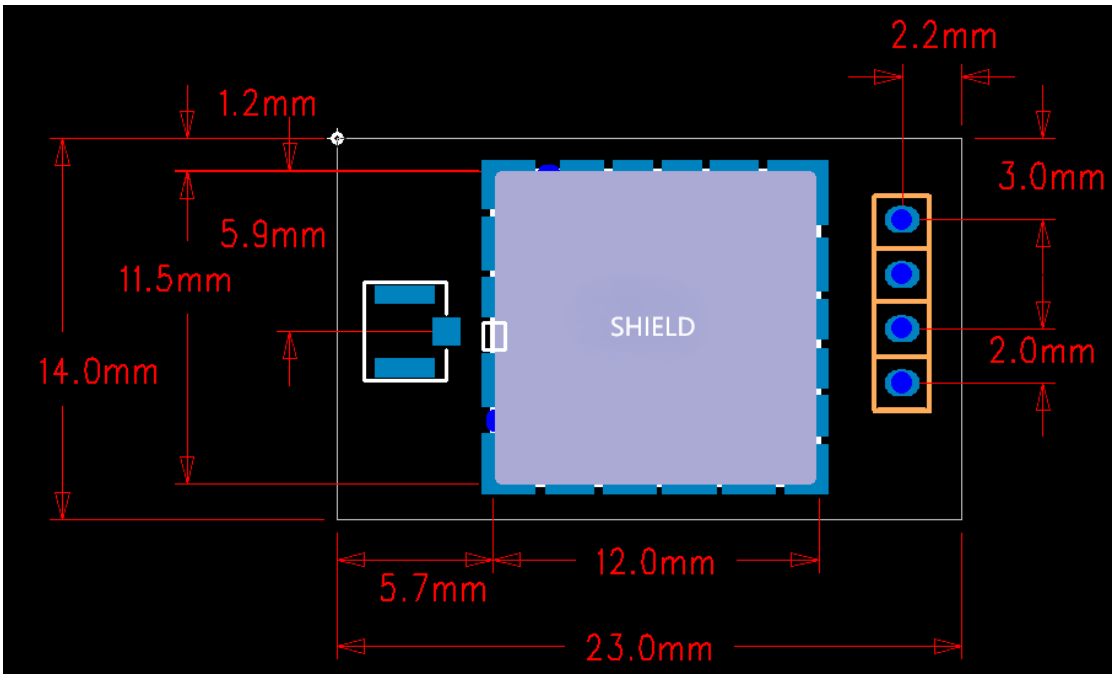
Update date	Updated content	Version after update
20210805	This is the first release	V1.0
20210909	Updated dimension diagram to external antenna	V1.1

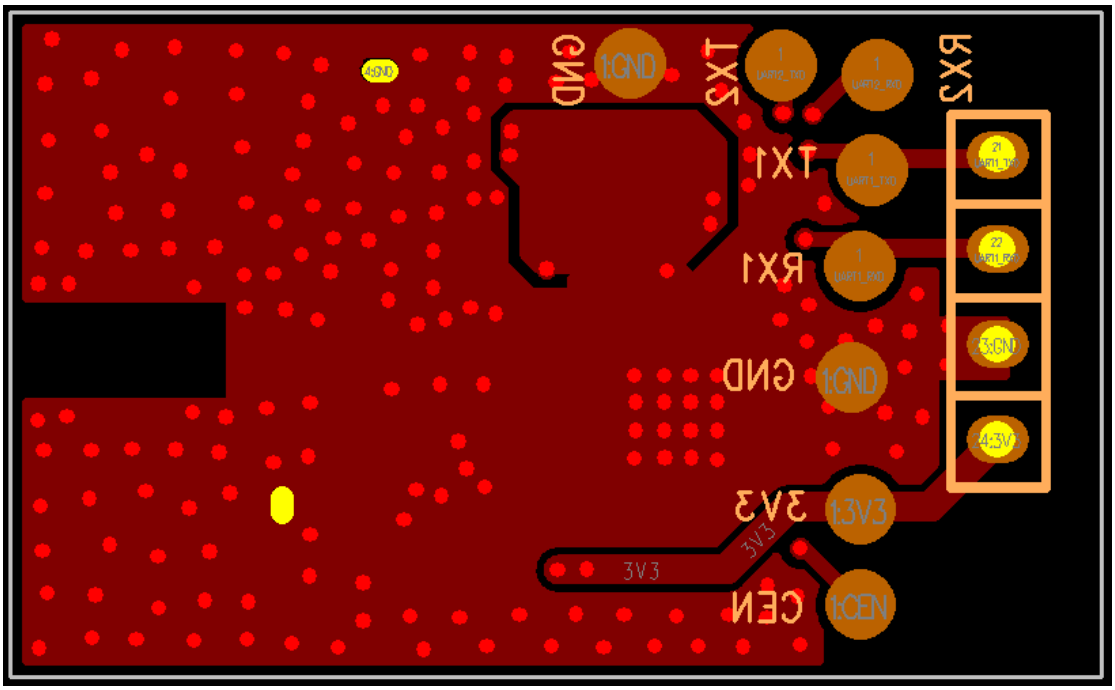
2 Module interfaces

2.1 Dimensions and package

The IMB01 dimensions are: 14±0.35mm (W)×23±0.35mm (L) ×4.5±0.15mm (H)(plastic+PCBA)。







2.2 Pin definition

Pin number	Symbol	I/O type	Function
1	TX1	I/O	UART1_TX
2	RX1	I/O	UART1_RX
3	GND	P	Ground pin
4	3V3	P	Power supply pin
5	CEN	I	RST PIN
6	TX2	I/O	UART2_TX
7	RX2	I/O	UART2_RX

3 Electrical parameters

3.1 Absolute electrical parameters

Parameter	Description	Minimum value	Maximum value	Unit
TS	Storage temperature	-40	85	℃
VCC	Power supply voltage	-0.3	3.9	V

3.2 Normal working conditions

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
TA	Operating temperature	-30		75	℃
VCC	Power supply voltage	3	3.3	3.6	V
VOL	I/O low level output	VSS		VSS+0.3	V
VOH	I/O high level output	VCC-0.3		VCC	V
Imax	I/O drive current		6	20	mA

3.3 RF power consumption

Working status	conditions	MIN	Typ	Max	Unit
Transmit	17 dBm, 802.11b 11 Mbps		210		mA
Transmit	15 dBm, 802.11g 54 Mbps		170		mA
Receive	-10 dBm Input、802.11b 11 Mbps		50		mA
Receive	-10 dBm Input、802.11g 54 Mbps		60		mA
Normal standby current	The MCU stops running and the Modem is powered off. Procedure		30		uA
Low voltage standby current	MCU stops and enters low voltage		10		uA
Deep sleep current	All main logic is powered off, only AON counter is active		5		uA
Shut off the current	CEN=0		1		uA
Note: All measurements are made at room temperature and 3.3V voltage					

4 RF parameters

4.1 Basic RF features

Parameter	Description
Working frequency	2.412~2.462GHz
Wi-Fi standard	IEEE 802.11b/g/n(1-11 Channels)
Data transmission rate	11b:1,2,5.5,11(Mbps) 11g: 6, 9, 12, 18, 24, 36, 48, 56(Mbps) 11n:HT20 MCS0~MCS7
Antenna type	FPC antenna

4.2 Wi-Fi transmission performance

Parameter	MIN	TYP	MAX	Unit
802.11B 1M		17		dBm
802.11B 5.5M		17		dBm
802.11B 11M		17		dBm
802.11G 6M		15		dBm
802.11G 24M		14		dBm
802.11G 54M		14		dBm
802.11N MCS0		14		dBm
802.11N MCS4		13		dBm
802.11N MCS7		13		dBm
EVM@11Mbps,802.11b		-24	-22	dB
EVM@54Mbps,802.11g		-31	-28	dB
EVM@HT20,MCS7,802.11n		-33	-30	dB
The frequency error	-15		15	ppm

4.3 Wi-Fi receiving performance

Parameter	MIN	TYP	MAX	Unit
PER≤5%@802.11B 11M		-85		dBm
PER≤5%802.11G 54M		-73		dBm
PER≤5%802.11N MCS7		-69		dBm
LE_Receiver_Sensitivity		-92		dBm

4.4 Bluetooth transmission performance

Parameter	MIN	TYP	MAX	Unit

Working frequency	2402		2480	MHz
Air rate		1		Mbps
Frequency error	-150		150	KHz

4.5 Bluetooth receiving performance

Parameter	MIN	TYP	MAX	Unit
RX sensitivity		-96		dBm
Maximum RF signal input	-10			dBm
Inter-modulation			-23	dBm
Co-channel suppression ratio		10		db

5 Antenna

5.1 Antenna type

IMB01 Design for external antenna parameters as follows

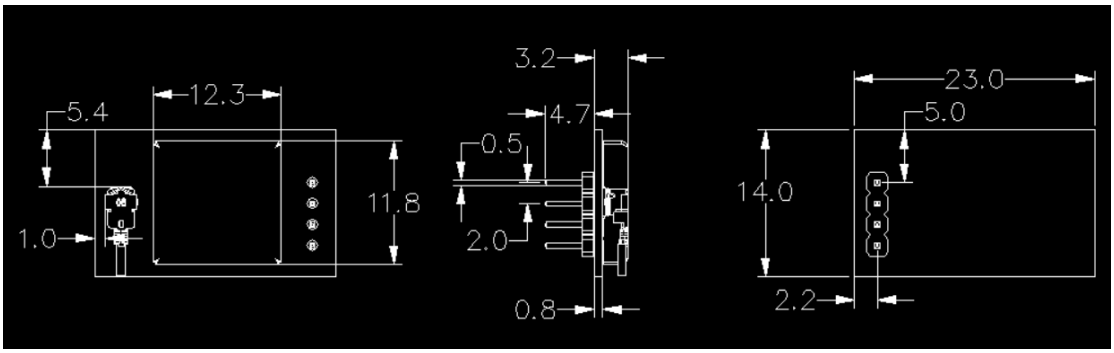
Parameter	MIN	TYP	MAX	Unit
Frequency	2400		2500	MHz
Impedance		50		Ω
VSWR			1.9	
Gain	2.57dBi			
Efficiency	55%-65%			

5.2 Antenna interference reduction

To ensure optimal Wi-Fi performance, it is recommended that the antenna be at least 15 mm away from other metal parts. To prevent an adverse impact on the antenna radiation performance, avoid copper or traces within the antenna area.

6 Packaging information and production instructions

6.1 Mechanical dimensions



6.2 Production guide

1. It is recommended to use wave soldering equipment for welding of the outgoing direct insert modules, and only use manual welding when wave welding equipment cannot be used for welding. After unpacking, welding is recommended to be completed within 24 hours, otherwise, it should be placed in a drying cabinet with humidity less than 10%RH, or vacuum packaging should be conducted again and the exposure time should be recorded. The total exposure time should not exceed 168 h.

2. Equipment and materials required for welding

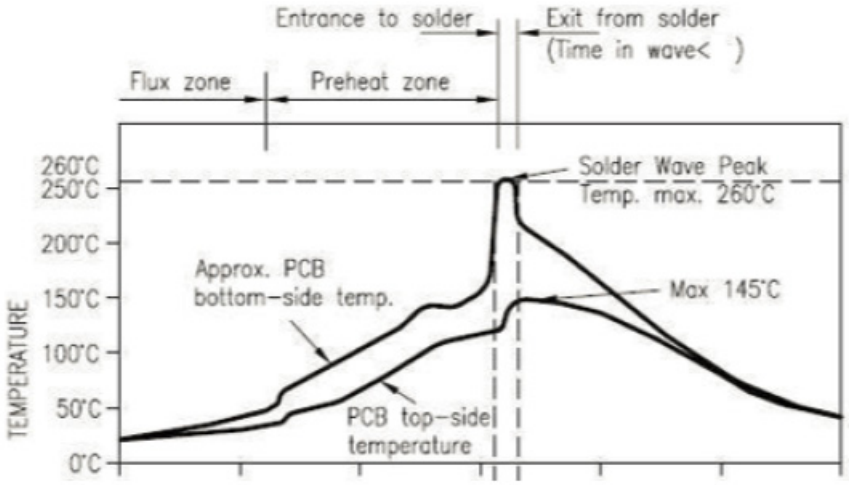
- Wave soldering equipment
- Wave soldering fixture
- Thermostat soldering iron
- Tin strip, tin wire, flux
- Furnace temperature tester

Instruments or equipment needed for baking

- Cabinet type baking box
- Anti-static high temperature tray
- Esd gloves and high temperature gloves

6.3 **Recommended furnace temperature curves and temperature recommendations**

DIP Type Product Pass Wavesolder Graph

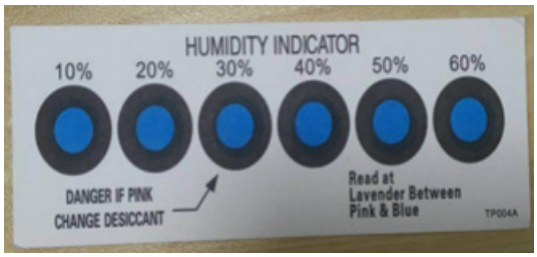


6.4 Storage conditions

• Moisture-proof bag vacuum packaging stored in the temperature < 40 ° C, humidity < 90%RH environment.

• The shelf life of dry-packed products is 12 months from the date of sealing of the package.

• Humidity indicator card in sealed package:



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7 Module and packaging information

1Modular packaging

Product model	Each Box number (pcs)	Shipping packing method	Number of disks stored in each disk	Number of packing plates per carton
IMB01	1600	Blister tray	80	20

2 External antenna packaging mode:

Bags:100pcs/bag; 16bags/Carton 1600pcs

2.2 List of applicable FCC rules

FCC Part 15.247,

2.3 Specific operational use conditions

This product is a Single-modular transmitter policy independent of any host. Not applicable.

2.4 Limited module procedures

This product is a Single-modular transmitter. It is not a limited module. Not applicable.

2.5 Trace antenna designs

This product has a external antennas. Not applicable.

2.6 RF exposure considerations

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

2.7 Antennas

This product has two external antennas. 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.

No.	Antenna Type	Frequency Range	Gain	Impedance
1	FPC antenna	2402-2480MHz 2412-2462MHz	2.57dBi	50ohm

2.8 Label and compliance information

Remind end customers to add "Contain FCC ID: 2BNDKIMB01"

2.9 Information on test modes and additional testing requirements

Contact Shenzhen Invincible Four Season Technology Co., Ltd will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

2.10 Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, Shenzhen Invincible Four Season Technology Co., Ltd shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

FCC Warning

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 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.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: Additional testing and certification may be necessary when multiple modules are used.

Note 4: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.

Note 5: To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed

and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, Shenzhen Invincible Four Season Technology Co., Ltd shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

Note 6: FCC ID label on the final system must be labeled with "Contains FCC ID: 2BNDKIMB01" or "Contains transmitter module FCC ID: 2BNDKIMB01".

Note 7: For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

IC WARNING

This device contains licence-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter [IC: 33466-IMB01] has been approved by Innovation, Science and Economic Development Canada 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.

No.	Antenna Type	Gain	Impedance
1	FPC antenna	2.57dBi	50ohm

IC Radiation Exposure Statement:

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This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures. Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

This equipment complies with IC RSS-102 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.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.

This module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products. Additional testing and certification may be necessary when multiple modules are used.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

The final end product must be labeled in a visible area with the following " Contains IC: 33466-IMB01".