

IMB-019 Module Datasheet

Ver: 20210909

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IMB-019 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.

1 Overview

IMB-019 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 [1-13@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°C to 75°C
- Bluetooth LE connectivity
 - 6 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

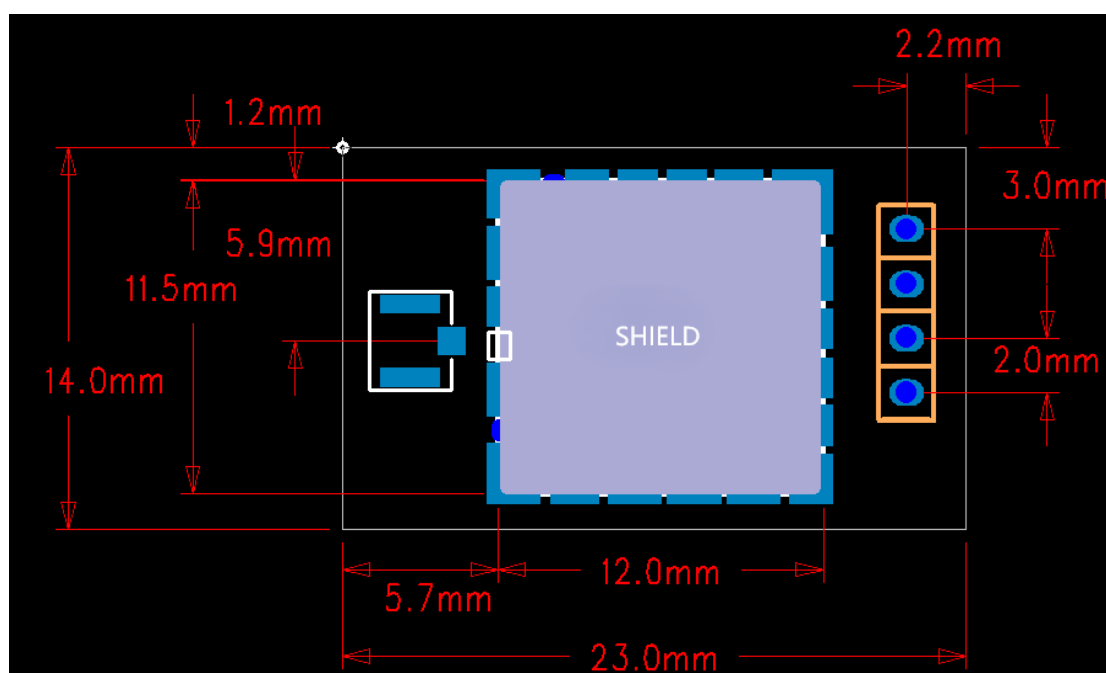
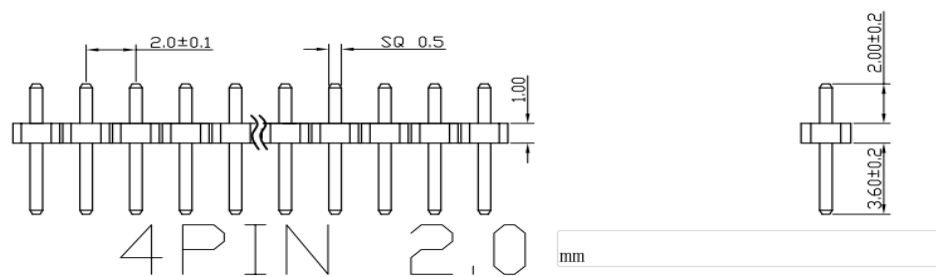
1.3Change history

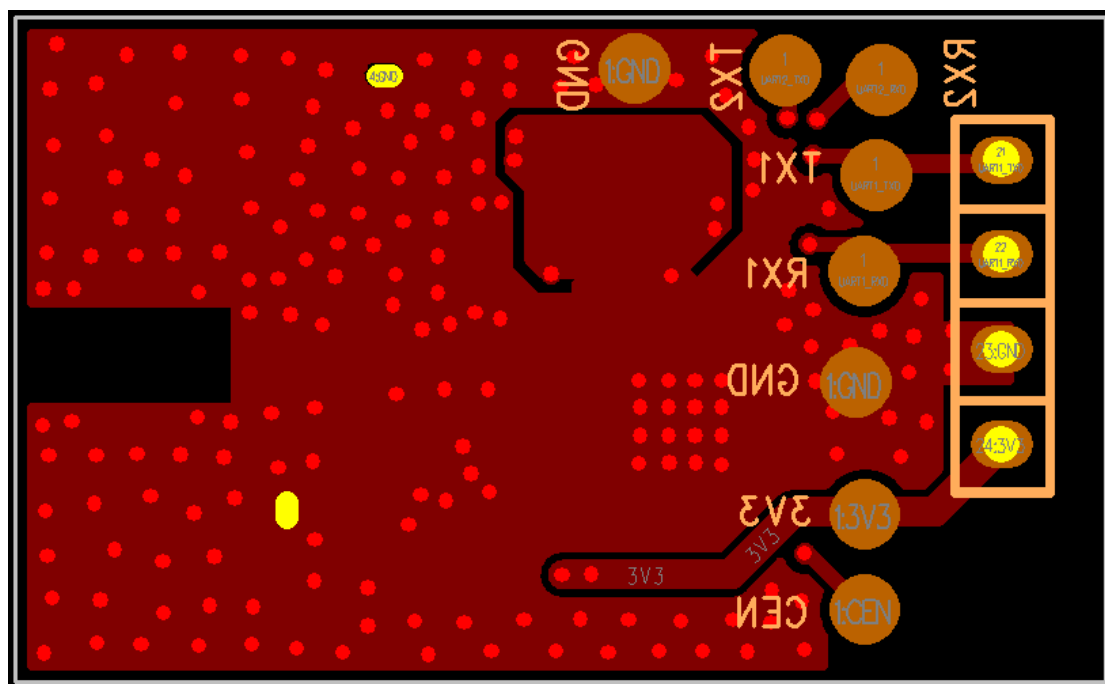
Update date	Updated content	Version after update
20210805	This is the first release	V1.0
20210909	Updated dimension diagram to external antenna	V1.1

2 Module interfaces

2.1 Dimensions and package

The IMB-019 dimensions are: $14 \pm 0.35\text{mm}$ (W) $\times$ $23 \pm 0.35\text{mm}$ (L) $\times$ $4.5 \pm 0.15\text{mm}$ (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	-40	85	℃

VCC	Power supply	-0.3	3.9	V

3.2 Normal working conditions

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
TA	Operating temperature	-30		75	°C
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
I _{max}	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	2402-2480MHz, 2412-2462MHz
Wi-Fi standard	IEEE 802.11b/g/n (1-11 通道)
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

IMB-019 Design for external antenna parameters as follows

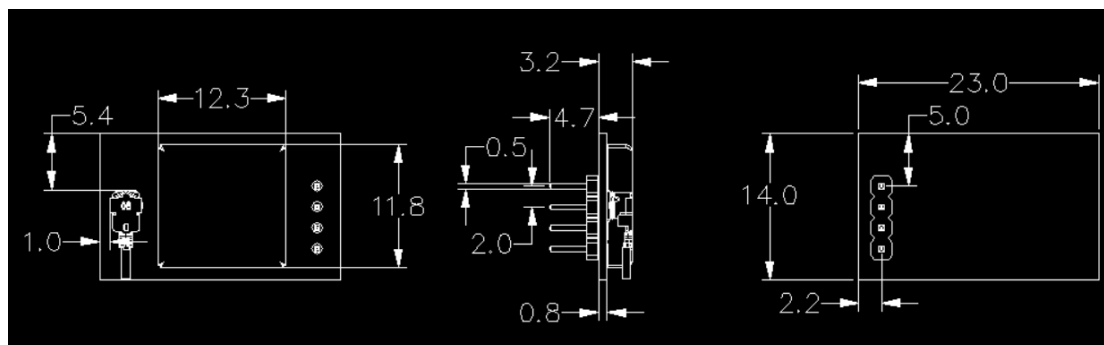
Parameter	MIN	TYP	MAX	Unit
Frequency	2400		2500	MHz
Impedance		50		Ω
VSWR			1.9	
Gain	6.19dBi			
Efficiency	55%-65%			

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

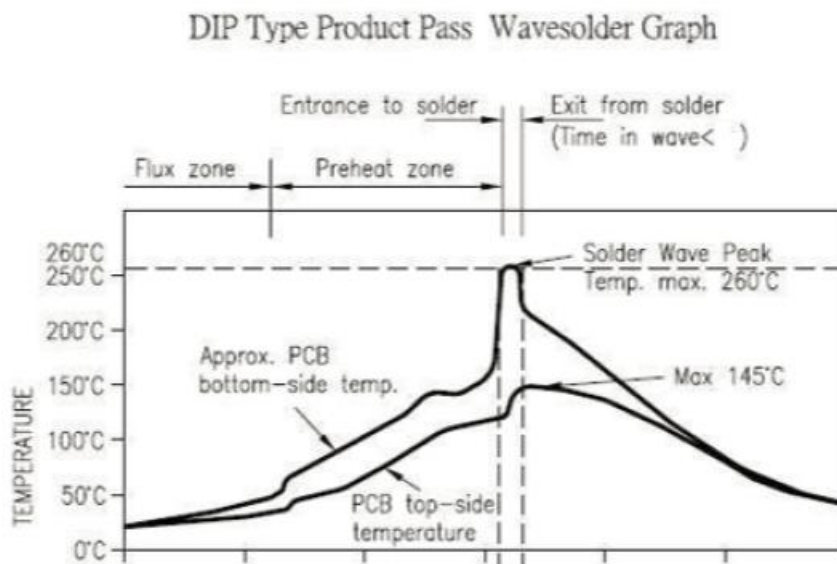
Instruments or equipment needed for baking

- Cabinet type baking box
- Anti-static high

temperature tray

- ESD gloves and
- high temperature
- gloves

6.3 Recommended furnace temperature curves and temperature recommendations



6.4 Storage conditions

- Moisture-proof bag vacuum packaging stored in the temperature $< 40^{\circ}\text{C}$, 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:



	Caution This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL 3	If blank, see adjacent bar code label
1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)			
2. Peak package body temperature: <u>260</u> °C If blank, see adjacent bar code label			
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be			
a) Mounted within: <u>168</u> hours of factory conditions If blank, see adjacent bar code label ≤30°C/60% RH, or			
b) Stored per J-STD-033			
4. Devices require bake, before mounting, if:			
a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at 23 ± 5°C			
b) 3a or 3b are not met			
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure			
See Production Date			
Bag Seal Date: _____ If blank, see adjacent bar code label			
Note: Level and body temperature defined by IPC/JEDEC J-STD-020			

7 Module and packaging information

1 Modular packaging

Product model	Each Box number (pcs)	Shipping packing method	Number of disks stored in each disk	Number of packing plates per carton
IMB-019	1600	Blister tray	80	20

2 External antenna packaging mode:

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

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.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 and Subpart F has been investigated. It is applicable to the modular transmitter

2.3 Specific Operational Use Conditions - Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

- The antenna must be installed such that 20cm is maintained between the antenna and users,
- The transmitter module may not be co-located with any other transmitter or antenna.

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.

2.4 Limited Module Procedures

Not applicable

2.5 Trace Antenna Designs

Not applicable

2.6 RF Exposure Considerations

This device 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 Antenna Type and Gain

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

Antenna Type	Antenna Model No.	Maximum Antenna Gain (dBi)	Frequency Range
FPC Antenna	DR-HDHO01S	6.62	2400 – 2500 MHz

2.8 End Product Labelling Compliance Information

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: **2A3SYIMB-019**”. The FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on Test Modes and Additional Testing Requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new FCC authorization.

Host manufacturer installed this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C, 15.209, 15.207 requirement, only if the test result comply with FCC part 15C, 15.209, 15.207 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B Disclaimer

This transmitter modular is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rules requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rules requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance

requirements required with this modular installed.

2.11 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 host integrator must follow the integration instructions provided in this document and ensure that the composite system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB Publication 996369.

OEM/Host Manufacturer Responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and RF Exposure essential requirements of the FCC rules.

2.12 How to Make Changes - 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.