

**HJ-528IMH Based on NRF52832 High Performance
Ultra-small (12mmX16.6mm including antenna)
Ultra-low Power BLE 5.4 Module Data Sheet
V1.2**

Module type: HJ-528IMH

Revision record

No.	Version	Date	Description
1	V1.0	2020-5-5	First Version
2	V1.1	2021-2-22	Update package size
3	V1.2	2024-4-23	Page layout update

Contents

1、Module Characteristics	1
2、Supply Information	2
3、Internal Structure	3
4、Electrical Parameters	4
4.1 Absolute Maximum Ratings	4
4.2 Recommended Operating Conditions	4
4.3 I/O DC Characteristics	4
4.4 RF Features	4
4.5 Power Dissipation	5
5、Hardware specification	6
5.1 Interface type	6
5.2 Pin size marking drawing (scale 1:1, unit:mm)	6
5.3 Pin Definition	7
6、Hardware Design Notes	10
7、Soldering Recommendations	11
8、Packaging method	12
9、Notices for Ultrasound Welding	13

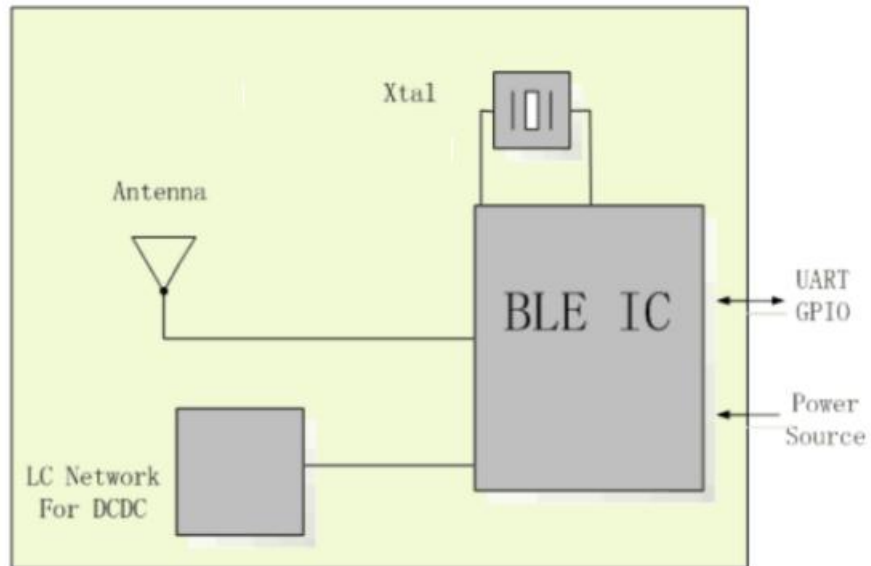
1、Module Characteristics

- Operating Frequency: 2.4GHz, Support ISM free Frequency band
- Support BLE 5.4, embedded Bluetooth low energy protocol stack and GATT service
- High Receive sensitivity:-96dBm
- Peak Current at Transmitting and Receiving < 5.4mA
- Built-in high performance antenna(External antenna can also be used)
- Power supply:1.7V-3.6V
- BLE supported master-slave integration
- Low Power Dissipation:
 - ✓ Dormant current < 1uA
 - ✓ One second broadcast current: 12.2uA
 - ✓ Two second broadcast current:7uA
- GPIO maximum number:32
- Wireless transmission range of external antenna in open area::30-100 meters
- Expandable external antenna
- Package size : 12mm *16.6mm (Includes onboard high performance antenna) ,Weight:2.8g, Comply with ROHS standards
- Available in 0.85mm half-hole pad pitch package
- Operating temperature range:-40 - +85°C
- Support transparent transmission, wechat, Mi MiSDK, or no program module for customers to develop firmware

2、 Supply Information

Type	Model	Description
Custom version	HJ-528IMH_CUSv2	This version supports customer customized firmware, customers according to product needs to propose functions, we will customize a special version of the firmware module for customer supply.
Customer development version	HJ-528IMH_EMP	This version has no program firmware module, and users can develop their own firmware to meet their own products according to Nordic official chip data and support documents, and only provide firmware for us to burn or burn.

3、 Internal Structure



4、Electrical Parameters

4.1 Absolute Maximum Ratings

Parameter	MIN	MAX	Unit
Power Supply Voltage (VCC)	1.7	3.6	V
IO Supply Voltage	0	VCC	V
Operating Temperature	-40	+85	°C
Storage Temperature	-40	+85	°C

4.2 Recommended Operating Conditions

Parameter	MIN	TYP	MAX	Unit
Power Supply Voltage (VCC)	1.8	3.3	3.6	V
IO Supply Voltage	0	3.3	VCC	V
Dormant working current		<2.0		uA
Maximum Operating Current		6.0		mA
Operating Temperature	-40	+25	+85	°C

4.3 I/O DC Characteristics

I/O Pin	Driving Capability	MIN	MAX	Unit
Input low voltage		0	0.4	V
Input high voltage		0.7	VCC	V
Output low voltage	5mA	0	0.6	V
Output high voltage	5mA	3.3	VCC	V

4.4 RF Features

Modulation	GFSK	
Frequency range	2.402 - 2.480GHz	Bandwidth: 2MHz
Number of channels	40	
Air speed	1Mbps、2Mbps	
RF Port Impedance	50Ω	
Transmit Power	MAX: +4dBm	
TX Current consumption	TYP: 5.3mA	
RX Current consumption	TYP: 5.4mA	
Receive sensitivity	TYP: -95dBm,MAX:-96dBm	
Antenna	Internal Antenna	External antenna can be used

4.5 Power Dissipation

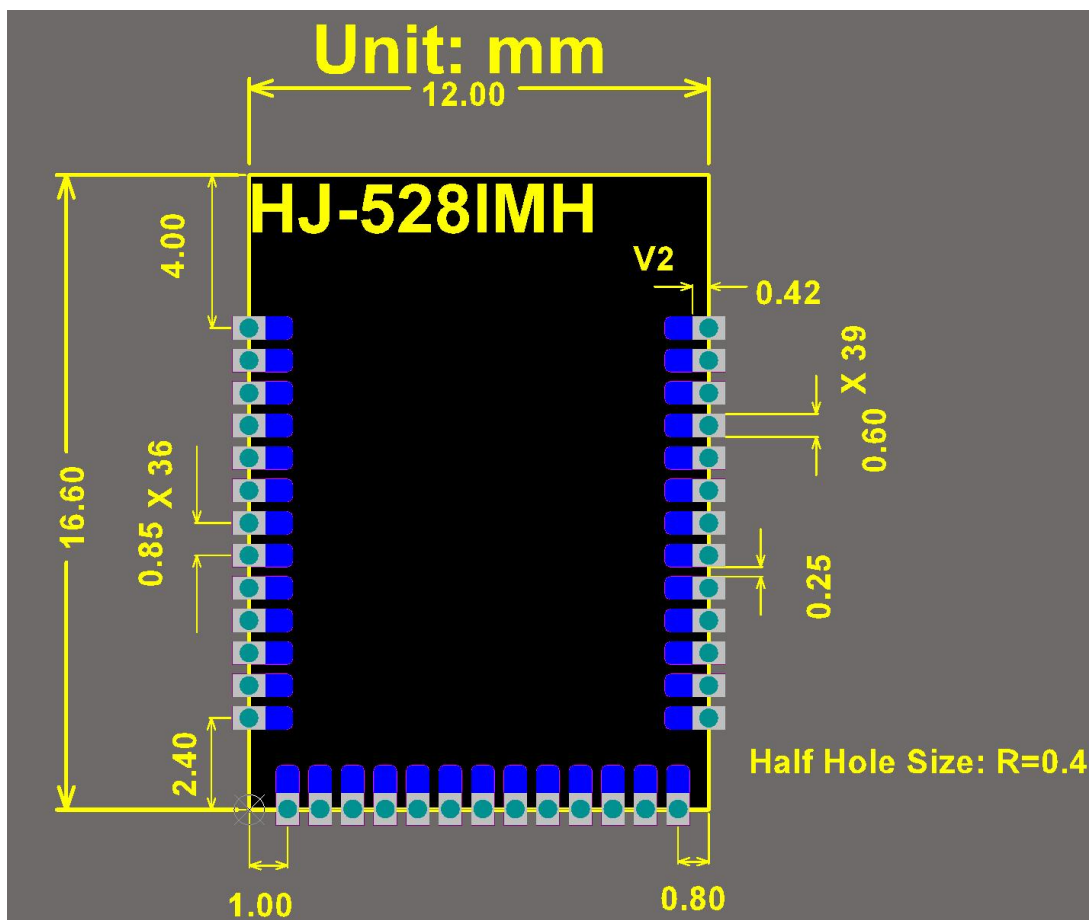
Test conditions	TYP	Unit
Dormancy mode	2.0	uA
20ms Interval Broadcasting in Slave Mode	55	uA
1S Interval Broadcasting in Slave Mode	12.2	uA
20ms Connection Gap Holding Connection in Slave Mode	190	uA
Scanning in Host Mode	4.5	mA
20ms Connection Gap Holding Connection in Host Mode	180	uA

5、 Hardware specification

5.1 Interface type

Interface type	Half-hole pad
spacing	0.85mm

5.2 Pin size marking drawing (scale 1:1, unit:mm)



5.3 Pin Definition

Pin	Name	Type	Description	Remark
1	EXT_ANT	EXT ANT RF OUTPUT	Interface of External Antenna, it can realize the output of radio frequency signal.	
2	GND	Ground	power ground	
3	P0.24	IO	general purposed io port	
4	P0.23	IO	general purposed io port	
5	P0.22	IO	general purposed io port	
6	P0.25	IO	general purposed io port	
7	P0.26	IO	general purposed io port	
8	P0.27	IO	general purposed io port	
9	P0.28	IO	general purposed io port	
10	P0.29	IO	general purposed io port	
11	P0.30	IO	general purposed io port	
12	P0.31	IO	general purposed io port	
13	VCC_IN	POWER INPUT	Power input port, supply volrage:DC1.7V ~ 3.6V	
14	GND	Ground	power ground	
15	P0.00/XL1	IO/LF_XO N	general purposed io port/external 32.768KHz crystal input port	Note: <i>There is no</i>

16	P0.01/XL2	IO/LF_XO P	general purposed io port/external 32.768KHz crystal input port	onboard 32.768KHzcrystal oscillator on the module , If you do not require the accuracy of the APP TIMER, use the internal RC; If you need external connection 32.768KHZ, please contact our FAE, thank you!
17	P0.02	IO	general purposed io port	
18	P0.03	IO	general purposed io port	
19	P0.04	IO	general purposed io port	
20	P0.05	IO	general purposed io port	
21	P0.06	IO	general purposed io port	
22	P0.07	IO	general purposed io port	
23	P0.08	IO	general purposed io port	
24	P0.09/NFC1	IO	general purposed input port	Note: cannot be used as output IO
25	P0.10/NFC2	IO	general purposed input port	Note: cannot be used as output IO
26	GND	Ground	power ground	
27	P0.11	IO	general purposed io port	
28	P0.12	IO	general purposed io port	
29	P0.13	IO	general purposed io port	
30	P0.14	IO	general purposed io port	
31	P0.15	IO	general purposed io port	

32	P0.16	IO	general purposed io port	
33	P0.17	IO	general purposed io port	
34	P0.18	IO	general purposed io port	
35	P0.19	IO	general purposed io port	
36	P0.20	IO	general purposed io port	
37	P0.21/nRESET	IO/Reset Pin	general purposed io port/External reset pin(Active low)	If reset is required, this pin needs to be kept at least 10 ms low.
38	SWDCLK	Debug Port	Clock Line of SWD Interface	
39	SWDIO	Debug Port	Input and Output Ports of SWD Interface	

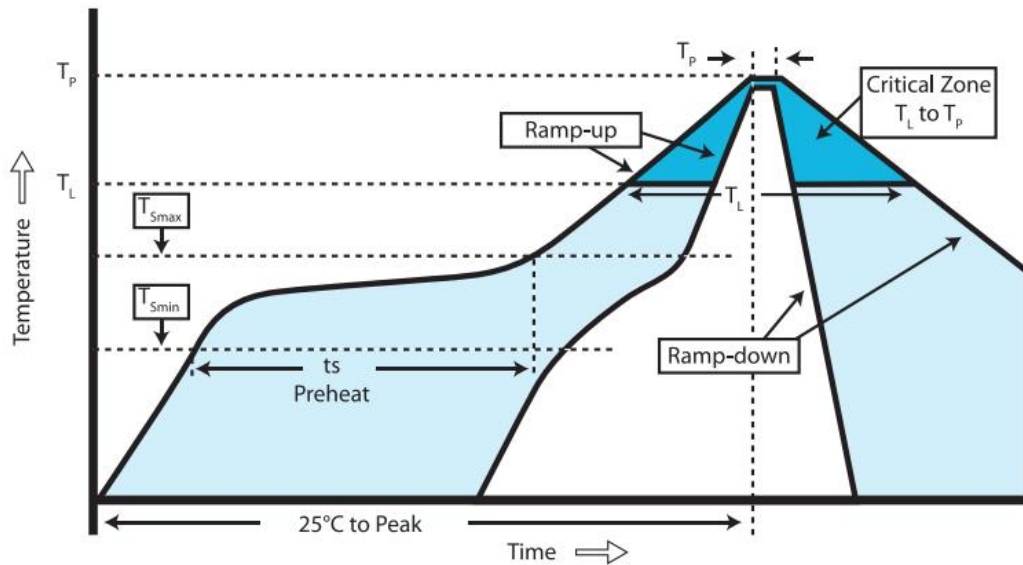
6、 Hardware Design Notes

- 1、 Modules should not be placed in metal housings, and if metal housings must be used, an external antenna must be attached.
- 2、 In the product that needs to install the wireless module, some metal parts, such as screws, inductors, etc., should be kept away from the radio frequency antenna part of the wireless module.
- 3、 In the Bluetooth module near the antenna and on the back, try not to place other components, and can not be wired. If the device or trace is placed, the Bluetooth performance will be affected.
- 4、 The wireless module should be placed on the edge area of the motherboard as far as possible, and the antenna part is close to the edge or corner of the motherboard. The motherboard PCB under the module antenna should be hollowed out with keepout layer. If the requirement cannot be hollowed out, copper or wiring is not allowed under the antenna, otherwise the RF performance will be affected.
- 5、 Note all pins Look at the pin diagram and the IO connected to it note the IO mode and status.
- 6、 GND must be well grounded.
- 7、 Magnetic bead or inductive filtering is recommended for the input power supply.

7、 Soldering Recommendations

module use high temperature resistant materials, manufacturing by Lead-free Process. The maximum temperature resistance is 265°C. Ten continuous reflow soldering has no effect on properties and strength. Specific parameters as shown in Table :

Parameter	Value
Features	Lead-free process
Average ramp up rate(T_{SMAX} to T_p)	3°C/sec. max
Temperature Min(T_{Smin})	150°C
Temperature Max(T_{Smax})	200°C
Preheat time (Min to Max) (tS)	80~100sec
Peak Temperature (T_p)	250±5°C
Ramp-down Rate	6°C/sec. max
Time 25°C to Peak Temp (T_p)	8 min. max



8、Packaging method

(Packaging with tapes and reel. Sealed with chip-level anti-static aluminum foil bag, each bag contains desiccant, use industrial grade vacuum machine to ensure airtight, moisture-proof, waterproof and dustproof (IP65). The actual packing effect is shown in Figure.



All packages will be labeled with goods information. All packages will be marked with the cargo information, including ROHS and anti-static signs. The production batch information in the item number is 15 bits.



Remarks: P16a I15b S17c001 represents PCB production in January 2016, IC production in February 2015, and SMT patch in the first time in March 2017.

9、 Notices for Ultrasound Welding

Warning: Please carefully consider using ultrasonic welding technology. If it is necessary to use ultrasonic welding technology, please use 40KHz high frequency ultrasound welding technology. Keep the module away from the ultrasonic soldering line and the fixing column during the design method to prevent damage to the module!

For specific ultrasonic welding matters, please contact our company for technical consultation.

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 to this unit 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.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

The device has been evaluated to meet general RF exposure requirement. in portable exposure condition without restriction.

**Integration instructions for host product manufacturers according to KDB 996369 D03
OEM Manual v01**

2.2 List of applicable FCC rules

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

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

The device has been evaluated to meet general RF exposure requirement. in portable exposure condition without restriction.

2.7 Antennas

This radio transmitter FCC ID: **2AGPMHJ-528IMH** 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.

Internal Identification	Antenna Description	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 1	/	PCB Antenna	2400 ~ 2500 MHz	2.26 dBi

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID: **2AGPMHJ-528IMH**"

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.