

HJ-380IMH

Chip-scale high performance ultra small (5.5mmX6mm) ultra low power
Bluetooth 5.0 module based on Nordic nRF52832

Date Sheet version:V2.221



型号：HJ-380IMH

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1 Overview

1.1 Features

- Power supply: 1.7V~3.6V
- GPIO maximum number: 32
- Built-in high performance antenna(External antenna can also be used)

- Function
 - Support BLE 5.0, embedded Bluetooth low energy protocol stack and GATT service
 - BLE supported master-slave integration(Host and slave work at the same time without affecting each other)
 - Support uart transparent transmission mode, supported WeChat, MiSDK. You also can develop your own firmware and download to the unprogrammed module.

- RF Features
 - Operating Frequency is 2.4GHz, support ISM free Frequency band
 - Transmit Power: -20~+4dBm
 - High Receive sensitivity: -96dBm
 - Peak Current at Transmitting and Receiving <5.4mA
 - On the open land, the wireless signal can spread more than 10 metres and less than 20 metres.

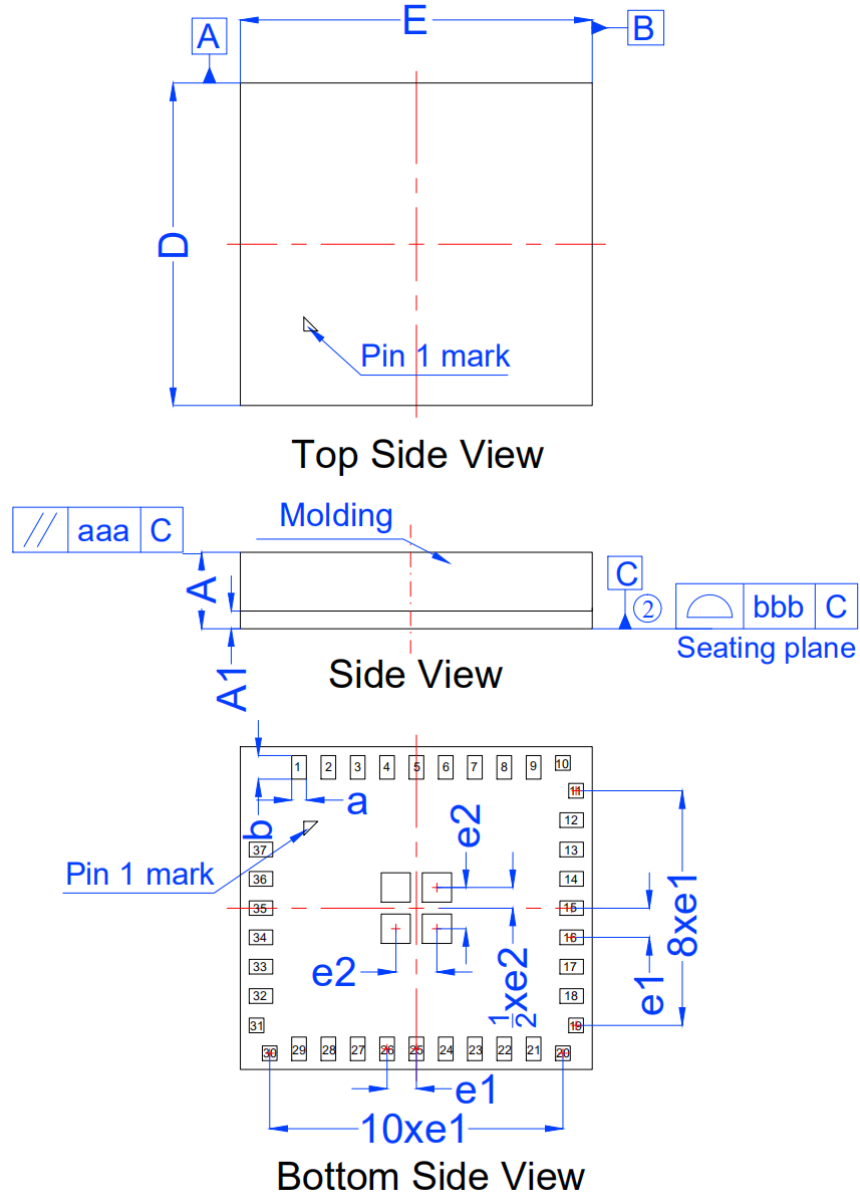
- Low Power Dissipation
 - Dormant current <2uA
 - One second broadcast current: 12.2uA
 - Two second broadcast current: 7uA

- Package: LGA41, Pad spacing: 0.5mm
- Size: 5.5mm*6mm*1.3mm(Built-in antenna inside)
- Weight: 0.15g
- Operating temperature range: -40~+85℃
- RoHS compliant

2 Hardware specification

2.1 Package and Dimensions

The package of HJ-380IMH is LGA41, pad spacing is 0.5mm. Detailed dimensions are shown in the figure 3-1, 3-2, 3-3, 3-4.



DIMENSIONAL REFERENCES Units:mm

SYMBOL	DIMENSIONAL REQMTS			SYMBOL	Tolerance of Form & Position
	MIN	NOM	MAX		
A	1.26	1.30	1.34	aaa	0.10
AI	0.27	0.30	0.33	bbb	0.10
D	5.40	5.50	5.60		
E	5.90	6.00	6.10		
a	0.20	0.25	0.30		
b	0.35	0.40	0.45		
e1	0.50 REF				
e2	0.70 REF				

Note:

1. All dimensions are in mm
- ②. Datum 'C' is the mounting surface, with which the package is in contact

Figure 3-4 Dimensions picture

2.2 Pin Definition

Table 3-1 Pin definition table

Pin	Name	Type	Description	Remarks
1	P0.20	IO	general purposed io port	
2	P0.21/nRESET	IO/Reset Pin	general purposed io port/External reset pin(Active low)	Hardware reset pin, active low
3	P0.18	IO	general purposed io port	As the host connection status pin: when =1, it means it is connected; when =0 means it has disconnected the host
4	P0.16	IO	general purposed io port	As a slave connection status pin: when =1, it means that the phone is connected; when =0, it means that it has been disconnected from the phone.
5	P0.15	IO	general purposed io port	Enable host scan control: When =1, the module enters the active scanning process, scans the

				peripheral devices, and outputs the surrounding device information through the serial port in a certain format; when =0, the module disables the active scanning function.
6	P0.13	IO	general purposed io port	Serial port receiving enable control: When =1, the module serial port receiving is enabled. At this time, external data can be sent to the module for command control and data transmission through the serial port; when =0, the module serial port receiving is closed; (Note: 1. This function does not affect the serial port to send data; 2, this pin can also be used as a low-power control, because when the serial port enables reception, the bus will work at full speed, and the power consumption will increase.)
7	P0.14	IO	general purposed io port	Serial data output synchronization signal: Before the serial port sends data, the first Nms will be sent again, and the IO will be pulled high. After the data is sent, the IO will be pulled low to output the data to send the synchronization signal. Usually keep low.
8	VCC_IN	POWER INPUT	Power input port, supply volrage: DC1.7V ~ 3.6V	

9	P0.12	IO	general purposed io port	BLE module serial port TX
10	P0.10	IO	general purposed io port	
11	P0.09	IO	general purposed io port	
12	P0.07	IO	general purposed io port	BLE module serial port RX
13	P0.04/AIN2	IO/AI	general purposed io port/Analog input 2	Enable APP configuration function (When =1, the module allows the APP to send all parameters of the command configuration module; when =0, the APP configures all parameters of the module. The default input pull-down.)
14	P0.03/AIN1	IO/AI	general purposed io port/Analog input 1	Input Port IN0 (This pin is the input detection IO. When the notification is enabled, the input status of this pin will be reported to the APP by notifying Notify. The default input is pulled down.)
15	P0.02/AIN0	IO/AI	general purposed io port/Analog input 0	Input Port IN1 (This pin is the input detection IO. When the notification is enabled, the input status of this pin will be reported to the APP by notifying Notify. The default input is pulled down.)
16	P0.01/XL2	IO/LF_XO P	general purposed io port/external 32.768KHz crystal input port	
17	P0.00/XL1	IO/LF_XO N	general purposed io port/external 32.768KHz crystal input port	
18	P0.05/AIN3	IO/AI	general purposed io port/Analog input 3	Input Port IN2 (This pin is the input detection IO. When the

				notification is enabled, the input status of this pin will be reported to the APP by notifying Notify. The default input is pulled down.)
19	P0.06	IO	general purposed io port	Output Port OUT0 (APP can control the IO output state, the default is output low.)
20	P0.08	IO	general purposed io port	Output Port OUT1 (APP can control the IO output state, the default is output low.)
21	P0.31/AIN7	IO/AI	general purposed io port/Analog input 7	Output Port OUT2 (APP can control the IO output state, the default is output low.)
22	P0.27	IO	general purposed io port	Disconnect all slaves (The IO defaults to the input pull-down, which disconnects all slaves when the rising edge is input.)
23	P0.30/AIN6	IO/AI	general purposed io port/Analog input 6	Analog Input 0 (Direct input analog voltage 0-3.3V)
24	P0.29/AIN5	IO/AI	general purposed io port/Analog input 5	Analog Input 1 (Direct input analog voltage 0-3.3V)
25	P0.28/AIN4	IO/AI	general purposed io port/Analog input 4	Analog Input 2 (Direct input analog voltage 0-3.3V)
26	P0.17	IO	general purposed io port	Disconnect All Hosts (The IO defaults to the input pull-down, which disconnects all clerk connections when the rising edge is entered.)
27	P0.11	IO	general purposed io port	Turn Off Broadcast Control (The default pull-down input, when the input is

				high, stops broadcasting; when the input is low, the broadcast is normal.)
28	P0.25	IO	general purposed io port	
29	P0.26	IO	general purposed io port	
30	P0.19	IO	general purposed io port	
31	SWDCLK	Debug Port	Clock Line of SWD Interface	
32	P0.24	IO	general purposed io port	
33	P0.23	IO	general purposed io port	
34	P0.22	IO	general purposed io port	
35	SWDIO	Debug Port	Input and Output Ports of SWD Interface	
36	EXT_ANT	EXT ANT RF OUTPUT	Interface of External Antenna, it can realize the output of radio frequency signal.	
37	OB-ANT	Onboard ANT	On-board antenna input port	If you want to use the onboard antenna, short the 36 and 37 feet directly.
38	GND	Ground	power ground	

2.3 Design Tips

A. The module should not be placed in a metal-based enclosure. If a metal enclosure is required, the antenna must be taken out.

B. Among the products that need to install this wireless module, some metal materials such as screws, inductors, etc. should be kept away from the RF antenna part of the wireless module.

C. On the wireless module antenna, Do not place other components. Because other components can degrade wireless performance.

D. The wireless module should be placed on the four sides of the motherboard as much as possible. The antenna part should be close to the side or corner of the motherboard. The motherboard PCB under the module antenna should be hollowed out with the keepout layer. If the request cannot be hollowed out, no copper or trace is allowed under the antenna. Otherwise it will affect RF performance.

E. Please pay attention to the pin diagram for all pins. Please pay attention to the IO mode and status of the IO connected to it.

F. GND must be sound grounding.

G. It is recommended that magnetic beads or inductance filters be applied to the input power supply.

3 Electrical Parameters

3.1 Absolute Maximum Ratings

Table 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	+125	°C

3.2 Recommended Operating Conditions

Table 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

3.3 I/O DC Characteristics

Table 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

3.4 RF Features

Table 4-4 RF Features

Attribute	Value	Remarks
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	Onboard PCB Antenna	External antenna can be used

3.5 Power Dissipation

Table 4-5 Power Dissipation

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

4 Welding Method

Reflow soldering is recommended for welding.

HJ-380IMH 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 5-1.

Table 5-1 Reflow soldering parameters

Parameter	Value
Features	Lead-free process
Average ramp up rate($T_{S\text{MAX}}$ to T_p)	3°C/sec. max
Temperature Min($T_{S\text{min}}$)	150°C
Temperature Max($T_{S\text{max}}$)	200°C
Preheat time (Min to Max) (tS)	80~100secs.
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

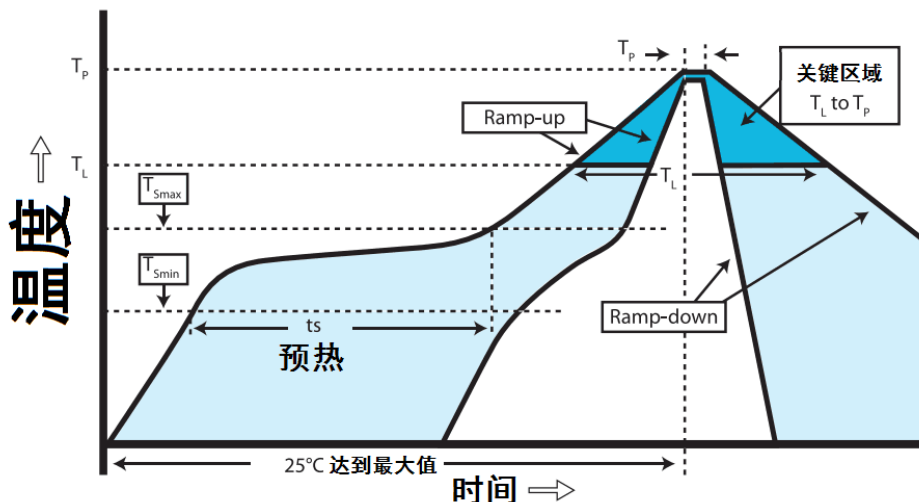


Figure 5-1 Temperature Curve of Reflow Welding

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.

5 Supply Information

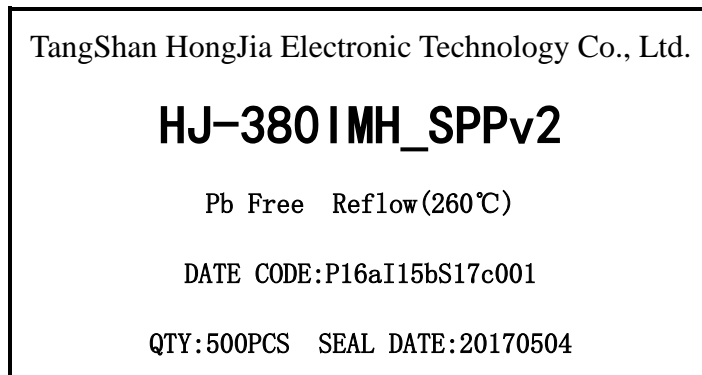
Packaging method

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 6-1.



Figure 6-1 External Packing Image

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.

Figure 6-2 Label Sample Diagram

6 FCC Warning

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.107) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating. Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end user of the final host device.

The final host device, into which this RF Module is integrated" has to be labelled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2AGPMHJ-380IMH". 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.

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.

Module Statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.

- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
 - 3) The module contains power supply regulation on the module.
 - 4) The module contains a permanently attached antenna.
 - 5) The module demonstrates compliance in a stand-alone configuration.
 - 6) The module is labeled with its permanently affixed FCC ID label
 - 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
 - 8) The module complies with RF exposure requirements.
- This transmitter/module must not be collocated or operating in conjunction with any other antenna or transmitter.

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 Specific operational use conditions

This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

2.4 Limited module procedures

not applicable

2.5 Trace antenna designs

not applicable

2.6 RF exposure considerations

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This compliance to FCC radiation exposure limits for an uncontrolled environment, and minimum of 20mm separation between antenna and body.

The host product manufacturer would provide the above information to end users in their end-product manuals.

2.7 Antennas

Integral Antenna; 2.8dBi; 2.402 GHz~2.480GHz

2.8 Label and compliance information

The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2AGPMHJ-380IMH".

2.9 Information on test modes and additional testing requirements

For more information on testing, please contact the manufacturer.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.