

Nexis WIFI Module User Manual

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NEXIS

Specifications of
iFi Nexis WIFI
Version V0.3
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User Manual

Version update

Date	Version	update content
5/31/2023	V0.3	Initial document

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Product Introduction

Introduction

iFi Nexis wireless WIFI module is a new WIFI SOC SV32WB06 chip design. It also integrated on-chip MCU, core frequency is 480MHz, built-in 512KB SRAM & 128K ROM. Work on 2.4GHz frequency band, support Wi-Fi standard 802.11b/g/n; supply voltage is 3.3V/5V.

Product Features

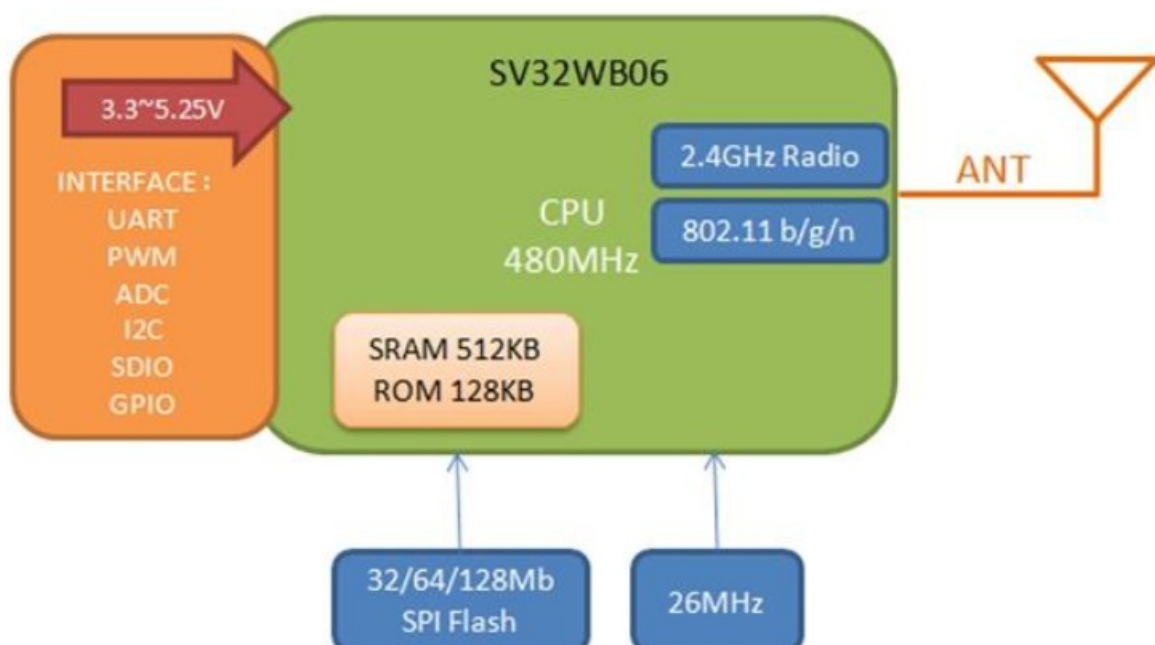
2.1 WLAN Features

- Andes Technology D10F processor (Core freq: 480MHz) 128K ROM & 512KB SRAM for instructions and data, optional plug-in 32/64/128Mbit SPI Flash
- Recommended working voltage:3.3V-5.25V IO voltage 3.3V
- Interface:3*UART,8*ADC,8*PWM,2*I2C,1*SDIO,27*GPIO reusable
- Support Wi-Fi standard: 802.11 b/g/n
- Support: H20/H40
- Support: STA/AP dual mode
- Support WEP WPA/WPA2 safe mode
- Support wireless upgrade (OTA)
- Support PCB onboard antenna ,high compatibility & high performance

Application field

- Smart Home/Home Appliances
- Smart socket/smart light
- Intelligent Building
- Industrial wireless control
- Wireless webcam

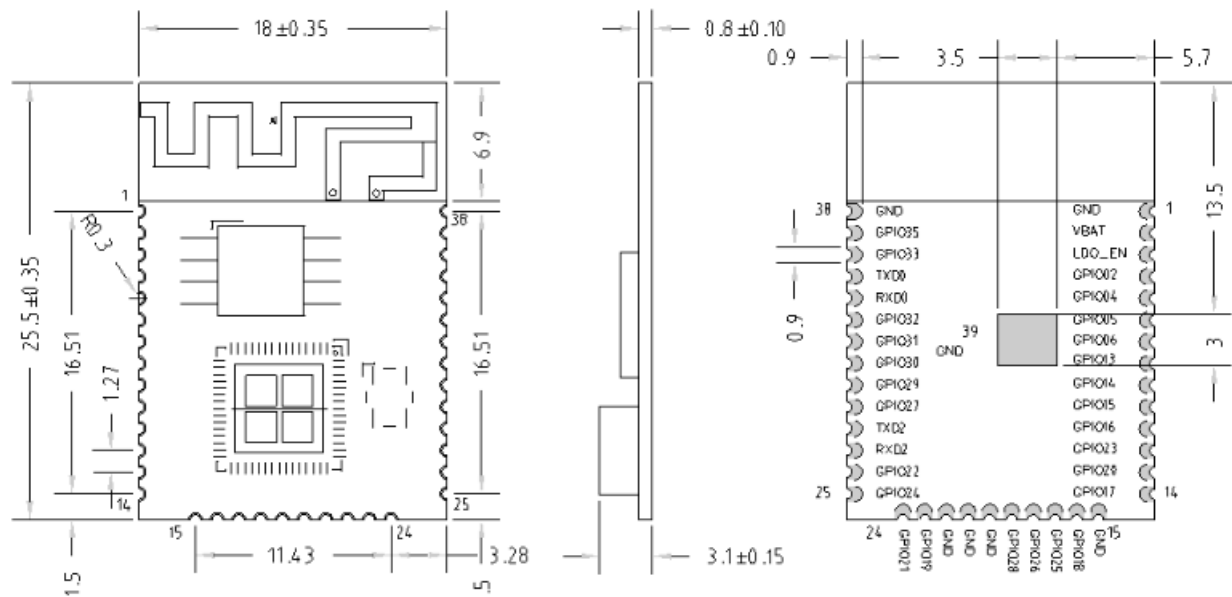
Functional block diagram



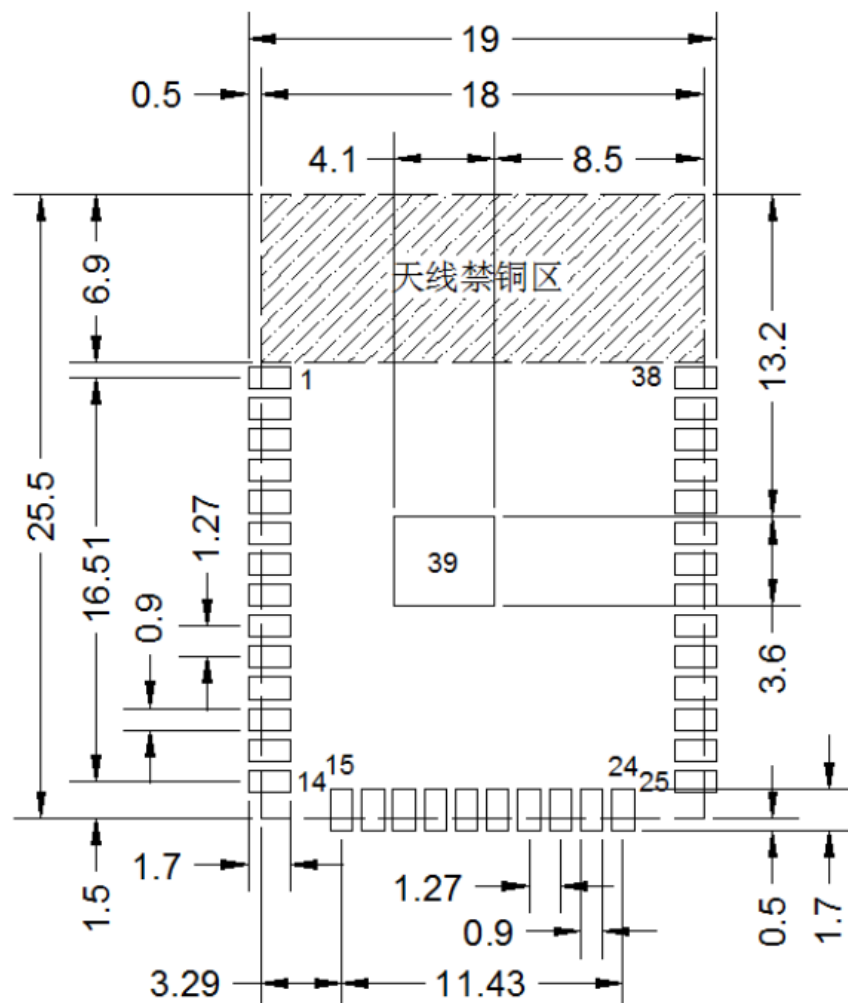
Size of package and definition of connection

5.1 Dimensions

Size (mm) 18mm*25.5mm*3.2mm PCB thickness: 0.8mm, size of deviation less than 0.1mm



5.2 Recommended package



Pin#	Name	ALT1	ALT2	ALT3	ALT4	ALT5	ALT6	ALT7
1	GND							
2	VBAT							
3	LDO_EN							
4	GPIO02	GPIO02	ADC2			SPISLV0 SCLK	SPIMASO SCLK	
5	GPIO04	GPIO04	I2C0 SCL					
6	GPIO05	GPIO05				SPISLV0 CSN	SPIMASO CSN	
7	GPIO06	GPIO06	I2C0 SDA	PSRAM SPI CSN				
8	GPIO13	GPIO13						
9	GPIO14	GPIO14			PDMTXO DOUT0	PDMRX0 CLK	I2S0 WS	
10	GPIO15	GPIO15			PDMTXO DOUT1	PDMRX0 DIN	I2S0 SDI	
11	GPIO16	GPIO16				PDMRX1 CLK	I2S0 SDO	
12	GPIO23	GPIO23		UART2 TXD	I2C1 SCL			

13	GPIO20	GPIO20	SD CLK		DATASPI SLAVE SCLK	SPISLV1 MISO	SPIMAS1 MISO	
14	GPIO17	GPIO17	SD DATA2	UART2 NCTS		PDMRX1 DIN	I2S0 SCK	
15	GND							
16	GPIO18	GPIO18	SD DATA3		DATASPI SLAVE CSN	SPISLV1 CSN	SPIMAS1 CSN	
17	GPIO25	GPIO25	WIFI TX	RTC RC32K EXT		UART2 TXD		
18	GPIO26	GPIO26	BT IN PROCESS		12S0 MCLK	UART2 RXD	SPIMAS2 CSN	
19	GPIO28	GPIO28					I2S0 MCLK	
20	GND							
21	GND							

22	GND							
23	GPIO 19	GPIO1 9	SD CMD		DATASPI SLAVE MOSI	SPISLV1 MOSI	SPIMAS1 MOSI	
24	GPIO 21	GPIO2 1	SD DATA0		DATASPI SLAVE MISO	SPISLV1 SCLK	SPIMAS1_SCLK	
25	GPIO 24	GPIO2 4		UART2 RXD	12C1 SDA			
26	GPIO 22	GPIO2 2	SD DATA1	UART2 NR TS		I2S0 MCLK		
27	RXD2	GPIO3 6	ADC6	12C0 SCL	UART2 RXD	SPIMAS2 CSN	BT IN PROCESS	BT SW
28	TXD2	GPIO3 7	ADC7	12C0 SDA	UART2 TXD		BT PTI3	WIFI TX SW
29	GPIO 27	GPIO2 7		UART1 NR TS	PDMRXO CLK		12S1 Ws	
30	GPIO 29	GPIO2 9	ADC3	UART1 NR TS	PDMRXO DIN	UART1 RXD	12S1 SDI	
31	GPIO 30	GPIO3 0	ADC4	UART1 RXD	PDMRX1 CLK	PDMTXO D OUT0	12S1 SDO	
32	GPIO 31	GPIO3 1	ADC5	UART1 TXD	PDMRXI DIN	PDMTXO D OUT1	12S1 SCK	
33	GPIO 32	GPIO3 2	BT PTI3		SPIMAS2 SCLK			
34	RXD0	GPIO0 0	ADC0	BT SW	UART0 RXD	SPISLV0_MOS	SPIMAS0 MOSI	
35	TXD0	GPIO0 1	ADC1	WIFI_TX SW	UART0 TXD	SPISLV0 MISO	SPIMAS0 MISO	
36	GPIO 33	GPIO3 3			SPIMAS2 MOSI	UART1 TXD	WIFITX	
37	GPIO 35	GPIO3 5			SPIMAS2 MISO			
38	GND							

Note:

1. LDO_EN pin can be turned on normally when it is suspended in the air pull down to reset don't pull up otherwise it may not turn on
2. GPIO13 internal pull down normal startup when suspended connect 3.3V then enter the burning mode other features are not recommended
3. SPI Flash interface SPI_HOLD SPI_WP SPI_CS SPI_CLK, SPI, SDO, SPI, SDI, that GPIO07~12 provide flash

use only Burning interface, Not recommended for other functions

4. Burning interface RXD0/TXD0

5. All GPIO ports can be used as PWM but only choose up to 8

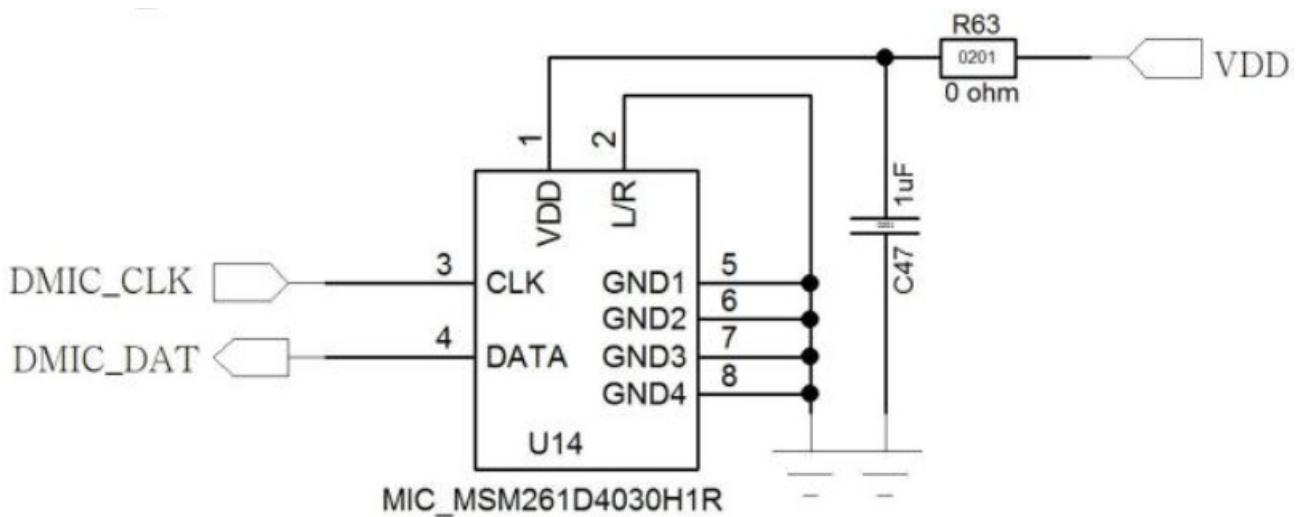
Audio input and output

6.1 MIC input

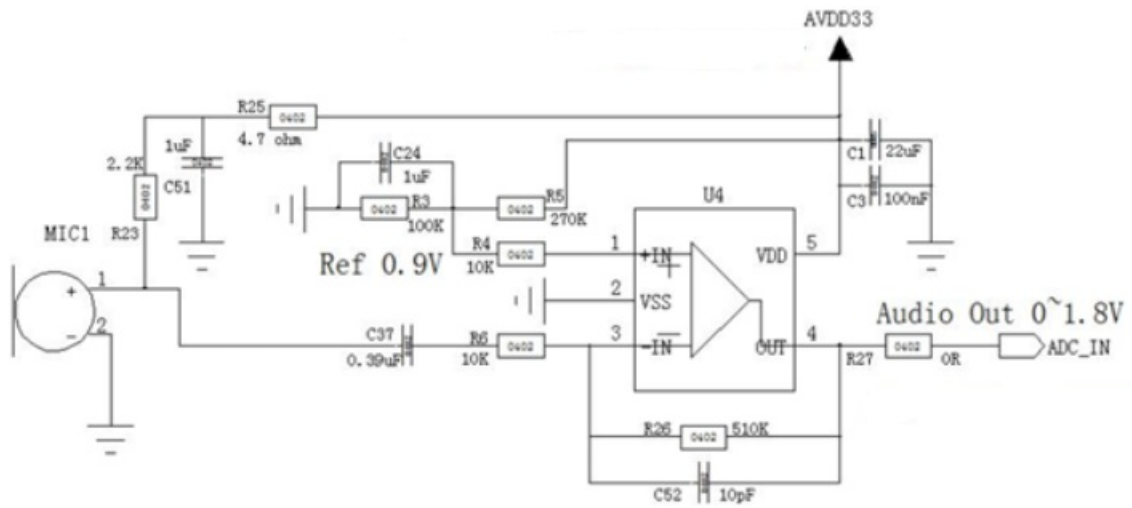
The module supports digital mic input, the pins can be selected that according to the actual application.

GPIO	ALT3	ALT4	Notice
GPIO14		PDMRX0_CLK	
GPIO15		PDMRX0_DIN	
GPIO16		PDMRX1_CLK	
GPIO17		PDMRX1_DIN	
GPIO27	PDMRX0_CLK		
GPIO29	PDMRX0_DIN		
GPIO30	PDMRX1_CLK		
GPIO31	PDMRX1_DIN		

The reference circuit is as follows:



The module is based on 12bit ADC interface, support analog MIC input, Applications that require no changes for audio input, can use this scheme, and the reference circuit is as follows

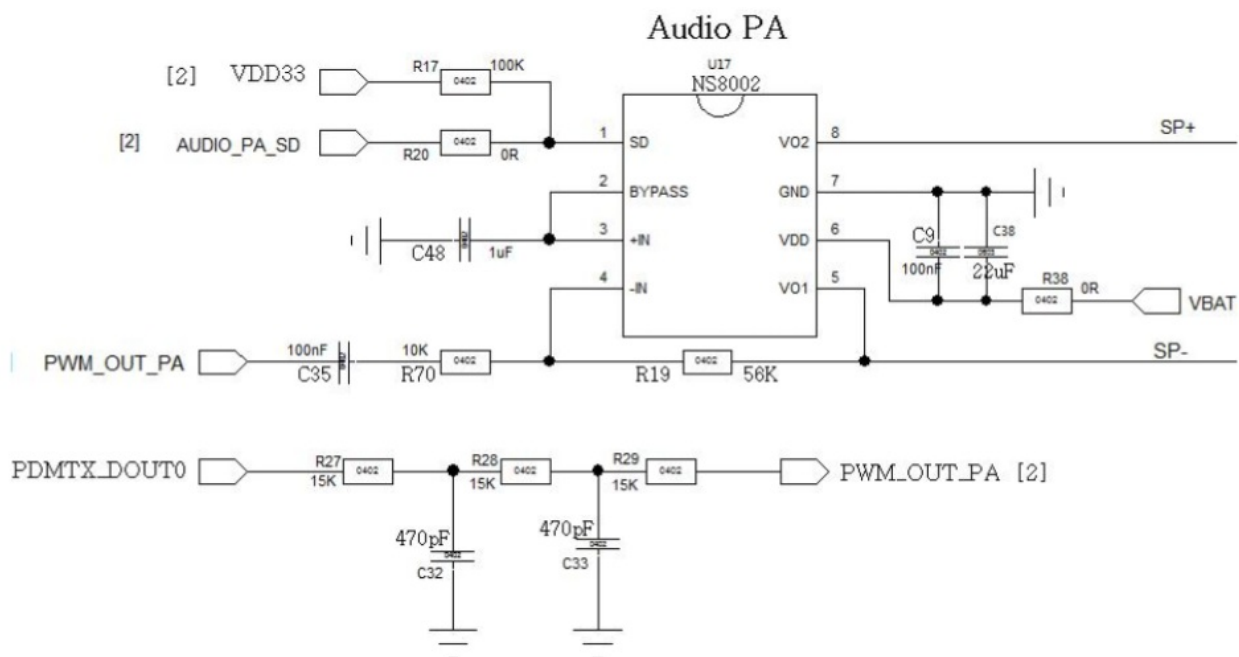


6.2 Audio output

The module chip supports PDM audio output that can be ellipsis DAC code, Directly connected to PA amplifier output through RC filter circuit. The pin can be selected that according to the actual application, and it supports two-channel stereo output

GPIO	ALT3	ALT4	Notice
GPIO14	PDMTX0_DOUT0		
GPIO15	PDMTX0_DOUT1		
GPIO30		PDMTX0_DOUT0	
GPIO31		PDMTX0_DOUT1	

Taking mono as an example, the reference circuit is as follows:



The capacitance of the RC filter circuit can be adjusted that according to the actual situation. If the volume is too low, the ground capacitance can be reduced.

Electrical parameters

7.1 Parameters

Parameters	Describe	Min	Normal	Max	Unit
TS	Storage temperature	-40	–	85	°C
VI	Supply voltage	-0.3	–	3.3	V
ESD voltage (Mannequin	-25°C	–	–	4	KV
Static discharge voltage (Machine model	-25°C	–	–	0.5	KV
TA	Operating temperature	-20	25	105	°C

VBAT	Operating temperature	3.3	3.3	5.25	V
Iin	Operating current 3.3V	10	–	220	mA
VIH	IO Voltage In High	2	–	3.6	V
VIL	IO Voltage In Low	-0.3	–	0.8	V
VOH	IO Voltage Out High	2.4	–	3.3	V
VOL	IO Voltage Out Low	–	–	0.4	V
I _{max}	IO Driving current	–	–	12	mA

7.2 Power consumption

	Mode	Power dBm	Typical value	Units
WIFI continuous emission	11b 11M	17	TBD	mA
	11g 54M	15	TBD	mA
	11n20 MCS7	15	TBD	mA
	11n40 MCS7	15	TBD	mA
WIFI continuous receive	11b 11M	N/A	TBD	mA
	11g 54M	N/A	TBD	mA
	11n20 MCS7	N/A	TBD	mA
	11n40 MCS7	N/A	TBD	mA
BLE emission		3	TBD	mA
BLE receive		N/A	TBD	mA

8. RF performance

This specification is based on conduction test results environment 0°C + 25°C + 40°C voltage 3.3V
The channel 12, 13 only available in European and Japanese countries.
IEEE802.11b

Items	Contents			
Specification	IEEE802.11b			
Mode	DBPSK, DQPSK and CCK and DSSS			
Channel	CH1 to CH13			
Data rate	1, 2, 5.5, 11Mbps			
TX Characteristics	Min	Typ	Max	Unit Remark
1. Power Levels				

1) 17dBm Target (For Each antenna port) @11Mbps	22.491	17	23.899	dBm
2. Spectrum Mask @ Target Power				
1) fc +/-11MHz to +/-22MHz	—	—	-30	dBr
2) at fc +/-20MHz	—	—	-50	dBr
3. Constellation Error(EVM) @ Target Power				
1) 1Mbps	—	-30	-16.5	dB
2) 2Mbps	—	—	-16.5	dB
3) 5.5Mbps	—	—	-16.5	dB
4) 11Mbps	—	-28	-16.5	dB
4. Frequency Error				
1) IEEE802.11b	-10	—	10	ppm
RX Characteristics	Min	Typ	Max	Unit Remark
5. Minimum Input Level Sensitivity(each chain)				
1) 1Mbps (FER \leq 8%)	—	-95	-83	dBm
2) 2Mbps (FER \leq 8%)	—	—	-80	dBm
3) 5.5Mbps (FER \leq 8%)	—	—	-77	dBm
4) 11Mbps (FER \leq 8%)	—	-86	-76	dBm
6. Maximum Input Level (PER \leq10%)				
1) IEEE802.11b	-10	10	—	dBm

IEEE802.11g

Items	Contents			
Specification	IEEE802.11g			
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM			
Channel	CH1 to CH13			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
TX Characteristics	Min	Typ	Max	Unit Remark
1. Power Levels				
1) 15dBm Target (For Each antenna port @ 11g/54M	20.434	15	21.790	dBm
2. Spectrum Mask @ Target Power				
1) at fc +/-11MHz	–	–	-20	dBr
2) at fc +/-20MHz	–	–	-28	dBr
3) at fc > +/-30MHz	–	–	-40	dBr
3. Constellation Error(EVM) @ Target Power				
1) 6Mbps	–	-28	-5	dB
2) 9Mbps	–	–	-8	dB
3) 12Mbps	–	–	-10	dB
4) 18Mbps	–	–	-13	dB
4) 18Mbps	–	–	-13	dB

5) 24Mbps	—	-30	-16	dB
6) 36Mbps	—	—	-19	dB
7) 48Mbps	—	—	-22	dB
8) 54Mbps	—	-29	-27	dB
4. Frequency Error				
1) IEEE802.11g	-10	—	10	ppm
RX Characteristics	Min	Typ	Max	Unit Remark
5. Minimum Input Level Sensitivity(each chain)				
1) 6Mbps (PER $\leq 10\%$)	—	-88	-82	dBm
2) 9Mbps (PER $\leq 10\%$)	—	—	-80	dBm
3) 12Mbps (PER $\leq 10\%$)	—	—	-79	dBm
4) 18Mbps (PER $\leq 10\%$)	—	—	-77	dBm
5) 24Mbps (PER $\leq 10\%$)	—	—	-75	dBm
6) 36Mbps (PER $\leq 10\%$)	—	—	-72	dBm
7) 48Mbps (PER $\leq 10\%$)	—	—	-68	dBm
8) 54Mbps (PER $\leq 10\%$)	—	-72	-65	dBm
6. Maximum Input Level (PER $\leq 10\%$)				
1) IEEE802.11g	-20	-4	—	dBm

IEEE802.11n 20

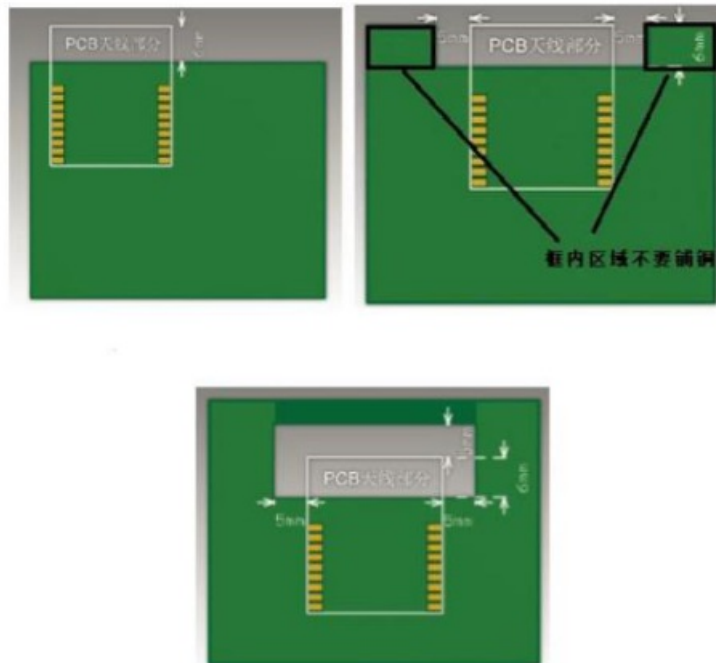
Items	Contents			
Specification	IEEE802.11n 20			
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM			
Channel	CH1 to CH13			
Data rate	MCS0/1/2/3/4/5/6/7			
TX Characteristics	Min	Typ	Max	Unit Remark
1. Power Levels				
1) 14dBm Target (For Each antenna port) @ 2.4G/ MCS7	20.372	15	21.611	dBm
2. Spectrum Mask @ Target Power				
1) at fc +/-11MHz	–	–	-20	dBr
2) at fc +/-20MHz	–	–	-28	dBr
3) at fc > +/-30MHz	–	–	-45	dBr
3. Constellation Error(EVM) @ Target Power				
1) MCS0	–	-28	-5	dB
2) MCS1	–	–	-10	dB
3) MCS2	–	–	-13	dB
4) MCS3	–	-29	-16	dB
5) MCS4	–	–	-19	dB
6) MCS5	–	–	-22	dB
7) MCS6	–	–	-25	dB

8) MCS7	–	-29	-27	dB
4. Frequency Error				
1) IEEE802.11n 20	-10	–	10	ppm
RX Characteristics	Min	Typ	Max	Unit Remark
5. Minimum Input Level Sensitivity(each chain)				
1) MCS0 (PER $\leq 10\%$)	–	-89	-82	dBm
2) MCS1 (PER $\leq 10\%$)	–	–	-80	dBm
3) MCS2 (PER $\leq 10\%$)	–	–	-79	dBm
4) MCS3 (PER $\leq 10\%$)	–	–	-77	dBm
5) MCS4 (PER $\leq 10\%$)	–	–	-75	dBm
6) MCS5 (PER $\leq 10\%$)	–	–	-72	dBm
7) MCS6 (PER $\leq 10\%$)	–	–	-68	dBm
8) MCS7 (PER $\leq 10\%$)	–	-70	-64	dBm
6. Maximum Input Level (PER $\leq 10\%$)				
1) IEEE802.11n 20	-20	-4	–	dBm

Antenna Design Considerations

The module is an onboard antenna, and the following precautions need to be observed:

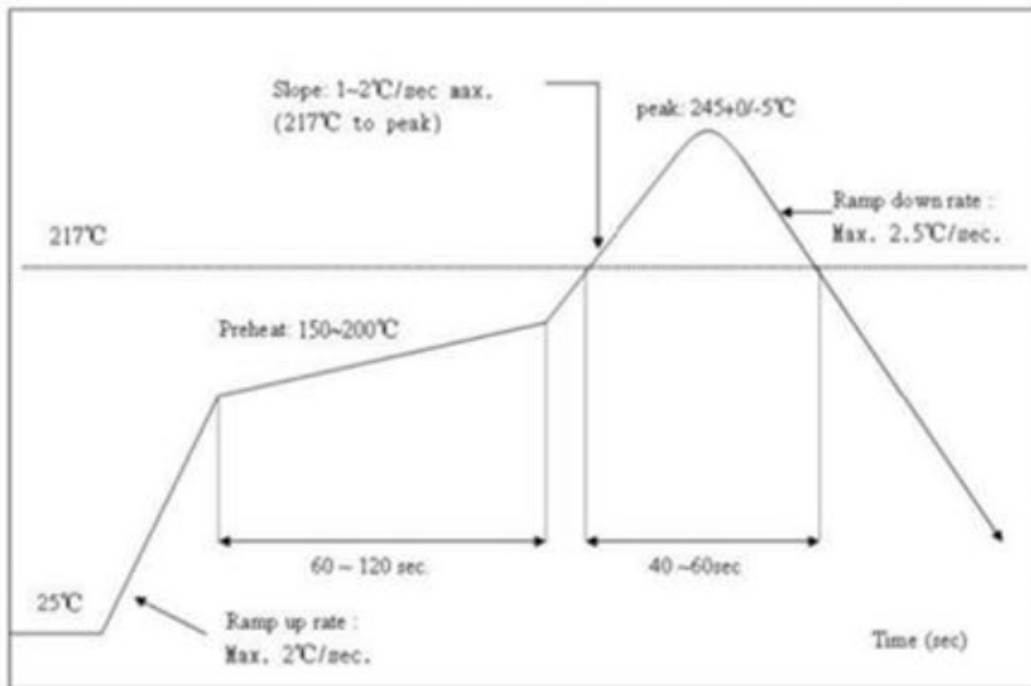
- WIFI module adopts PCB onboard antenna, To ensuring Optimum Antenna Performance, keep 15mm between the metal parts and the antenna. Do not cover copper on the board in the antenna area.
- Make sure that there is no substrate medium directly below or directly above the printed antenna; ensure that the surrounding of the printed antenna is away from the metal copper skin, so as to ensure the radiation effect of the antenna to the greatest extent.



Production recommended furnace temperature curve

When perform SMT placement, please according to the reflow soldering curve, peak temperature 245°C, the reflow soldering temperature curve is shown in the figure below:

Refer to IPC/JEDEC standard ; Peak Temperature : $<245^{\circ}\text{C}$; Number of Times: ≤ 2 times ;



Method of Packaging and shipping

The assembled module must be placed by the SMT machine, when unpacking and burning the firmware, it must finish the assembled for the PCBA within 24 hours. Those remaining shall Re-vacuum the package, and bake the module before patching. Baking time 2 hours The rest should be re-vacuum-packed, re-assembled those rest of module, proceed to bake. Baking time 2 hours.

11.1 The storage conditions of the module are as follows:

Moisture-proof bags must be stored in an environment with a temperature $<30^{\circ}\text{C}$ and a humidity $<70\%\text{RH}$.

Products in dry packaging have a shelf life of 6 months from the date the package is sealed.

1. Direction of Product placement, position of label sticking, and packaging are carried out according to the listed diagram
2. 600 products in each roll, 1 roll in each small box, a total of 5 small boxes in a large box, a total of 3000 products/box;
3. Carton size 375mm*285mm*365mm size of small box 355mm*355mm*55mm;
4. Put 2 bags of 2g desiccant in the vacuum bag, and 1 piece of 6-color humidity card;
5. Other unfinished matters shall be carried out that according to the customer's packaging requirements



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- 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.

Warning: Changes or modifications to this unit not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

RF Exposure

This device has been evaluated and shown compliant with the FCC RF Exposure limits under fixed exposure conditions (antennas are greater than 20cm from a person's body) when installed in certain specific OEM configurations.

2.2 LIST OF APPLICABLE FCC RULES:

Compliance with §15.247 regulation

2.3 SPECIFIC OPERATIONAL USE CONDITIONS:

The module is typically use in industrial, household and general office / ITE and audio & video, EV charging system

end-products. The product must not be co-located or operating in conjunction with any other antenna or transmitters.

2.4 LIMIT MODULE PROCEDURES:

Not applicable as this radio module meets the Single-Modular transmitter requirements.

2.5 TRACE ANTENNA DESIGNS:

The module was designed with the fixed PCB print antenna and the maximum gain is about -1.05dBi between 2400-2500MHz, any changes or modifications by the OEM integrator will require additional testing and evaluation.

2.6 RF EXPOSURE CONSIDERATIONS:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body .OEM integrator shall equipped the antenna to compliance with antenna requirement part 15.203& 15.204 and must not be co-located or operating in conjunction with any other antenna or transmitters ,otherwise, a Class II Permissive Change (C2PC) must be filed with the FCC and/or a new FCC authorization must be applied.

2.7 ANTENNAS:

The antenna of the module was designed as PCB printed on the PCBA board and the best gain is about -1.05dBi between 2400-2500MHz. Modification the antenna design may need additional testing and evaluation.

2.8 LABELING AND USER INFORMATION REQUIREMENTS OF THE END PRODUCT:

The final end product must be labelled in a visible area with the following "Contains TX

FCC ID: 2A5QJ-IFINEXUS or "Contains Transmitter Module FCC ID: 2A5QJ-IFINEXUS. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users' manual: 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.

A user's manual for the finished product should include one of the following statements:- For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

The User's Manual for The finished product should include the following statements:

Any changes or modifications to this equipment not expressly approved by the OEM/Integrator may cause harmful interference and void the user's authority to operate this equipment.

2.9 INFORMATION ON TEST MODES AND ADDITIONAL TESTING REQUIREMENTS:

Data transfer module demo board can control the EUT work in RF test mode at specified conditions. This radio module must not be installed to co-locate and operating simultaneously with other radios in the host system except in accordance with FCC multi-transmitter product procedures. Additional testing and equipment authorization may be required operate simultaneously with other radio.

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

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

As long as the 2 conditions above are met, further transmitter tests 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.

2.10 ADDITIONAL TESTING, PART 15 SUBPART B DISCLAIMER:

The host product manufacturer is responsible for compliance with 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.

General Statements

The module is limited to OEM installation only.

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

OEM integrator shall not modify and change the fixed designed PCB print antenna, and must not be co-located or operating in conjunction with any other antenna or transmitters, otherwise, a Class II Permissive Change (C2PC) must be filed with the FCC and/or a new FCC authorization must be applied.

NEXIS

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ifi Nexis WIFI
Version: 1.0.1
Release Date: 2023-05-31

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2A5QJ-IFINEXIS, 2A5QJIFINEXIS, Nexis WIFI Module, Nexis, WIFI Module, Module, Nexis WI
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