NMCB101C RF Module User Manual

V1.0

Content

内容

Preface

This manual is for WLAN service providers or network administrators to set up a network environment using the IWF series Product line. It contains step-by-step procedures and graphic examples to guide MIS staff or individuals with slight network system knowledge to complete the installation.

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Regulatory Compliance Statements

This section provides the FCC compliance statement for Class B devices and describes how to keep the system CE compliant.

Declaration of Conformity

Federal Communication Commission Interference Statement

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 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 this equipment.

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.

IMPORTANT NOTE:

Radiation Exposure Statement:

This equipment 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.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA

Operation of this device is restricted to indoor use only

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

The antenna must be installed such that 20 cm is maintained between the antenna and users, and

The transmitter module may not be co-located with any other transmitter or antenna,

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.

As long as 3 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 module installed

IMPORTANT NOTE

In the event that these conditions can not 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.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: YHI-EWF3210K".

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 end user manual shall include all required regulatory information/warning as show in this manual.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking.

For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

RoHS Compliance

NEXCOM RoHS Environmental Policy and Status Update

NEXCOM is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm.

In order to meet the RoHS compliant directives, NEXCOM has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard NEXCOM development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NEXCOM are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant.

How to recognize NEXCOM RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix "(LF)" will be added to the compliant product name.

All new product models launched after January 2013 will be RoHS compliant. They will use the usual NEXCOM naming convention.

Safety Information

Before installing and using the device, note the following precautions:

▪▪ Read all instructions carefully.

▪▪ Do not place the unit on an unstable surface, cart, or stand.

▪▪ Follow all warnings and cautions in this manual.

▪▪ When replacing parts, ensure that your service technician uses parts specified by the anufacturer.

▪▪ Avoid using the system near water, in direct sunlight, or near a heating device.

Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction.

Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components.

Most of theprocedures that follow require only a few simple tools, including the following:

▪▪ A Philips screwdriver

▪▪ A flat-tipped screwdriver

▪▪ A grounding strap

▪▪ An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

Safety Precautions

1. Read these safety instructions carefully.

2. Keep this User Manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.

7. The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

9. Place the power cord in a way so that people will not step on it. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.

10. All cautions and warnings on the equipment should be noted.

11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

12. Never pour any liquid into an opening. This may cause fire or electrical shock.

13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

14. If one of the following situations arises, get the equipment checked by service personnel:

    a. The power cord or plug is damaged.

    b. Liquid has penetrated into the equipment.

    c. The equipment has been exposed to moisture.

    d. The equipment does not work well, or you cannot get it to work according to the user's manual.

    e. The equipment has been dropped and damaged.

    f. The equipment has obvious signs of breakage.

15. Do not place heavy objects on the equipment.

16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR

EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE

MANUFACTURER'S INSTRUCTIONS.

Technical Support and Assistance

1. For the most updated information of NEXCOM products, visit NEXCOM's website at www.nexcom.com.

2. For technical issues that require contacting our technical support team or sales representative, please have the

following information ready before calling:

– Product name and serial number

– Detailed information of the peripheral devices

– Detailed information of the installed software (operating system, version, application software, etc.)

– A complete description of the problem

– The exact wordings of the error messages

Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the

chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are

inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out

how you can ensure that your computer meets safety and regulatory requirements.

1. Handling the unit: carry the unit with both hands and handle it with care.

2. Opening the enclosure: disconnect power before working on the unit to prevent electrical shocks.

3. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation.

If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and

attaching it to a metal part of the computer chassis.

Conventions Used in this Manual

Warning: Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.

Caution: Information to avoid damaging components or losing data.

Note: Provides additional information to complete a task easily.

RF Module Overview

Introduction

The NMCB101C RF module is designed for the user to implement cost effective solution to wireless sensor network products. The standard mPCI-e form factor makes it easy to install and fix in the embedded board.

Key Features:

- Integrate an ARM Cortex M4 MCU with on chip memory.
- Support GPIO, UART, I2C, I2S and SPI buses.
- Firmware down load through SWD.
- Low power consumption.
- Hardware WAPI acceleration engine.
- AES and TKIP in hardware for faster data encryption and IEEE 802.11i compatibility
- WPATM - and WPA2TM - (Personal) support for powerful encryption and authentication.

RF module form factor

Mini PCIe pin definition

Logical symbol of RF module
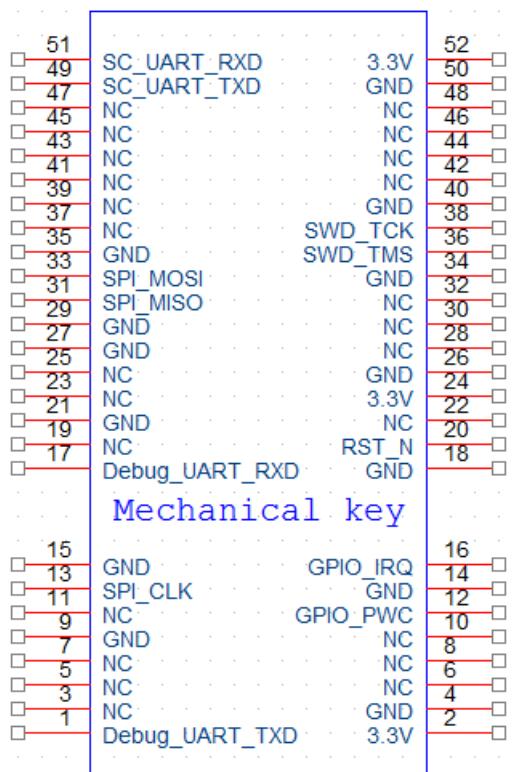
Pin description

PIN	Definition	PIN	Definition
1	Debug UART TXD	2	V3P3
3	NC	4	GND
5	NC	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	CPIO Power control
13	SPI_SCK	14	GND
15	GND	16	GPIO_IRQ
17	Debut UART RXD	18	GND
19	NC	20	RST_N
21	GND	22	NC
23	NC	24	V3P3
25	NC	26	GND

27	GND	28	NC
29	GND	30	NC
31	SPI_MISO	32	NC
33	SPI_MOSI	34	GND
35	GND	36	SWD_TMS
37	NC	38	SWD_TCK
39	NC	40	GND
41	NC	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	NC
49	Smart Command UART TXD	50	GND
51	Smart Command UART RXD	52	V3P3

System block diagram
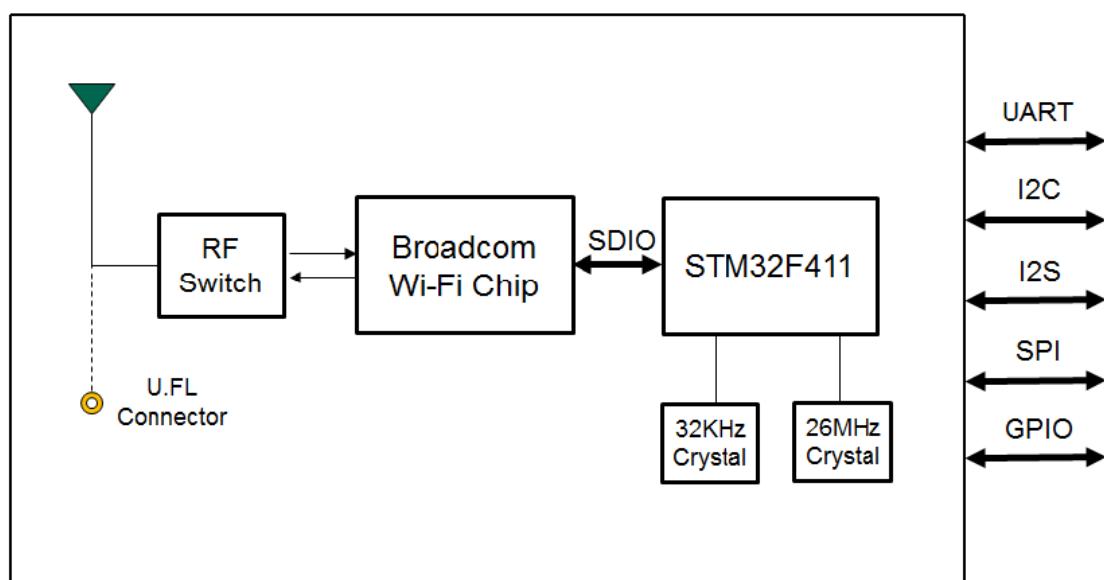
Installation

The installation of RF module is very easy. Just follow the steps below and you can complete the installation:
Insert the radio module into mini PCIe slot in the PCBA.
Screw up to fasten the module tightly inside PCBA.

Note: The mini PCIe pin definition is different from standard mini PCIe module in other Wi-Fi application. The embedded PCBA should follow the mini PCIe pin definition to design the pin assignment to connect this radio module.

Product specification

WLAN Standard	IEEE 802.11b/g/n, Wi-Fi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz：Ch1 ~ Ch14
Modulation	802.11b : CCK,DQPSK, DBPSK

802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK

Output Power 802.11b /11Mbps : 15dBm, typical@ EVM≦-9dB

802.11g /54Mbps: 13dBm , typical@ EVM≦-25dB

802.11n/65Mbps : 12dBm, typical@ EVM ≦-28dB

Receive Sensitivity	-MCS=0PER @ -85dBm, typical
(11n,20MHz)	-MCS=1PER @ -84dBm, typical

@10% PER	-MCS=2PER @ -82dBm, typical
	-MCS=3PER @ -80dBm, typical
	-MCS=4PER @ -77Bm, typical
	-MCS=5PER @ -73dBm, typical
	-MCS=6PER @ -71dBm,typical
	-MCS=7PER @ -69dBm, typical

Receive Sensitivity (11g)	-6MbpsPER @ -86Bm, typical
@10% PER	-9Mbps PER @ -85dBm, typical
	-12MbpsPER @ -85dBm, typical
	-18MbpsPER @ -83dBm, typical
	-24MbpsPER @ -81dBm, typical
	-36MbpsPER @ -78Bm, typical
	-48MbpsPER @ -73dBm, typical
	-54Mbps PER @ -72dBm, typical
	802.11g/n: -20 dBm

Receive Sensitivity (11b)	-1MbpsPER @ -90dBm, typical
@8% PER	-2MbpsPER @ -89Bm, typical
	-5.5MbpsPER @ -88dBm, typical
	-11MbpsPER @ -85dBm, typical
	802.11n: 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65,72.2Mbps
	802.11b :-10 dBm

| **Data Rate** | |
| **(20MHz ,Long GI,800ns)** | 802.11n: 6.5, 13, 19.5, 26, 39, 52, 58.5,65Mbps |

| **Data Rate** | |
| **(20MHz ,short GI,400ns)** | 802.11n: 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65,72.2Mbps |

Power Consumption (Conditions: VDD=3V3 ; Temp:25℃)

Mode	Description	Min.	Typ.	Max.	Unit
802.11B	TX 11Mbps @ 15 dBm		300		mA
	RX 11Mbps @ -85dBm		108		mA
802.11G	TX 54Mbps @ 13 dBm		230		mA
	RX 54Mbps @ -72dBm		108		mA
802.11N	TX 65Mbps @ 12 dBm		220		mA
	RX 65Mbps @ -69dBm		108		mA
Low power consumption					
MCU(SLEEP),DTIM 1		30mA			
MCU(SLEEP),DTIM 3		27mA			
MCU(SLEEP),No connection		26.5mA			
POWER SAVE MODE		2.5mA			
MCU(STANDBY), OFF		0.55mA			

Voltages (Absolute Maximum Ratings)

Symbol	Description	Min.	Max.	Unit
VDD_3V3	Power supply for SIP Module	-0.4	3.7	V

Recommended Operating Ratings

Symbol	Min.	Typ.	Max.	Unit
VDD_3V3	3.0	3.3	3.6	V