OEM / Integrators Installation Manual

Magifun WIFI Module

MF3310

Wi-Fi 802.11b/g/n+MCU

1. Introduction

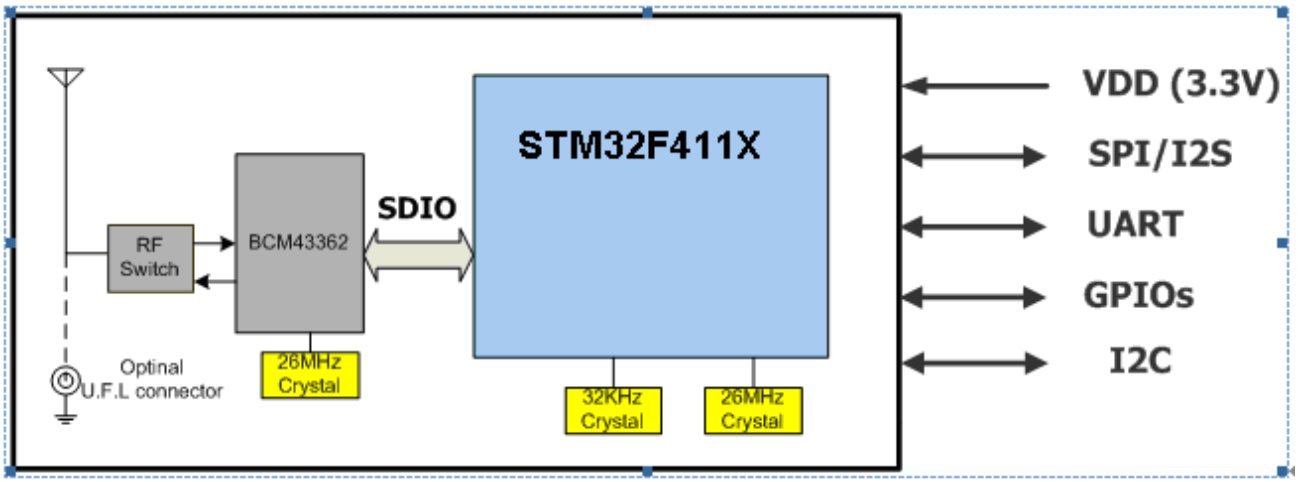
The wireless module complies with IEEE 802.11 b/g/n standard and it can achieve up to a speed of 72.2Mbps with single stream in 802.11n draft 7.0, 54Mbps as specified in IEEE 802.11g, or 11Mbps for IEEE 802.11b to connect to the wireless LAN.

This compact module is a total solution for a combination of Wi-Fi 802.11b/g/n technologies with Microcontroller Processor. The module is specifically developed for embedded system devices.

2. Features

- Single-band 2.4GHz IEEE 802.11b/g/n
- Supports standard interfaces SDIO v2.0
- Integrated ARM Cortex-M3™ CPU with on-chip memory enables running IEEE802.11 firmware that can be field-upgraded with future features.
- Lead-Free / RoHS
- Single power supply voltage 3.3V.
- Security:
    - Hardware WAPI acceleration engine
    - AES and TKIP in hardware for faster data encryption and IEEE 802.11i compatibility
    - WPA™ – and WPA2™ - (Personal) support for powerful encryption and authentication

A simplified block diagram of the module is depicted in the figure below.



3. General Specification

3.1 General Specification

Model Name	MF3310
Product Description	Wi-Fi 802.11b/g/n + MCU Module
Dimension	16 mm x 32 mm x 3.1mm ±0.5mm
Module Interface	SPI/JTAG/UART/USB/I2C/I2S
Operating temperature	-10°C to 55°C
Storage temperature	-40°C to 85°C
Humidity	Operating Humidity 10% to 95%

3.2 Voltages

3.2.1 Absolute Maximum Ratings

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

3.2.2 Recommended Operating Ratings

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

4. WiFi RF Specification

4.1 RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11b/g/n, WiFi compliant
Frequency Range	2412 MHz ~ 2462 MHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz：Ch1 ~ Ch11
Modulation	802.11b : CCK, DQPSK, DBPSK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK
Output Power	802.11b /11Mbps : 15 dBm , typical @ EVM ≤ -9dB
	802.11g /54Mbps : 13 dBm , typical @ EVM ≤ -25dB
	802.11n /65Mbps : 12 dBm , typical @ EVM ≤ -28dB
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -85dBm, typical
	- MCS=1 PER @ -84dBm, typical
	- MCS=2 PER @ -82dBm, typical
	- MCS=3 PER @ -80dBm, typical
	- MCS=4 PER @ -77Bm, typical
	- MCS=5 PER @ -73 dBm, typical
	- MCS=6 PER @ -71 dBm, typical
	- MCS=7 PER @ -69 dBm, typical
Receive Sensitivity (11g) @10% PER	- 6Mbps PER @ -86Bm, typical
	- 9Mbps PER @ -85dBm, typical
	- 12Mbps PER @ -85dBm, typical
	- 18Mbps PER @ -83dBm, typical
	- 24Mbps PER @ -81dBm, typical
	- 36Mbps PER @ -78Bm, typical
	- 48Mbps PER @ -73dBm, typical
	- 54Mbps PER @ -72dBm, typical
Receive Sensitivity (11b) @8% PER	- 1Mbps PER @ -90dBm, typical
	- 2Mbps PER @ -89Bm, typical
	- 5.5Mbps PER @ -88 dBm, typical
	- 11Mbps PER @ -85 dBm, typical
Data Rate	802.11b : 1, 2, 5.5, 11Mbps
	802.11g : 6, 9, 12, 18, 24, 36, 48, 54Mbps

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
Maximum Input Level	802.11b : -10 dBm
	802.11g/n : -20 dBm
Antenna Reference	On board ANT :Small antennas with 0~2 dBi peak gain

4.2 Power Consumption

Conditions: VDD=3V3 ; Temp:25°C (TBD)

Mode	Description	Min.	Typ.	Max.	Unit
802.11B	TX 11Mbps @ 15 dBm		300		mA
	RX 11Mbps @ -85dBm		90		mA
802.11G	TX 54Mbps @ 13 dBm		230		mA
	RX 54Mbps @ -72dBm		90		mA
802.11N	TX 65Mbps @ 12 dBm		220		mA
	RX 65Mbps @ -69dBm		90		mA
Low power consumption					
Mode					
OFF(WL_REG_ON=Low)					
Sleep Mode					
IEEE PS @ DTIM = 100ms					
Beacon reception					

5. Pin Assignments

5.1 Pin Description

This is original define. More Alternate function mapping reference to table 1

No	Name	Type	Description
1	NC	I/O	No function
2	PB2	I/O	GPIO PIN
3	NC	I/O	No function
4	SPI1_MOSI/PA7	I/O	SPI_MOSI
5	SPI1_SSN/PA15	I/O	SPI_SSN
6	SPI1_SCK/PB3	I/O	SPI_SCK
7	SPI1_MISO/PB4	I/O	SPI_MISO
8	PA2	I/O	GPIO PIN
9	PA1	I/O	GPIO PIN
10	VBAT	I	MCU operating voltage input (power supply for RTC, external clock, 32 kHz oscillator and backup registers (through power switch) when VDD is not present.)
11	NC	I/O	No function
12	PA3	I/O	GPIO PIN
13	MICRO_RST_N	I/O	MCU Reset
14	WAKE_UP	I/O	Wake up
15	NC	I/O	No function
16	PC13	I/O	GPIO PIN
17	I2C2_SCL/PB10	I/O	I2C_SCL
18	I2C2_SDA/PB9	I/O	I2C_SDA
19	I2C2_SMBA/PB12	I/O	I2C_SMBA
20	GND	—	Ground
21	GND	—	Ground
22	JTAG_TDO/PB3	I/O	JTAG_TDO
23	JTAG_TDI/PA15	I/O	JTAG_TDI
24	JTAG_TRST_L/PB4	I/O	JTAG_TRST_L
25	JTAG_TCK/PA14	I/O	JTAG_TCK
26	JTAG_TMS/PA13	I/O	JTAG_TMS

27	USART1_RTS/PA12	I/O	HCI UART request to send
28	NC	I/O	No function
29	USART1_RX/PA10	I/O	HCI UART receive input
30	USART1_TX/PB6	I/O	HCI UART transmit output
31	PB8	I/O	GPIO PIN
32	NC	I/O	No function
33	PB13	I/O	GPIO PIN
34	PA5	I/O	GPIO PIN
35	USART1_CTS/PA11	I/O	HCI UART clear to send
36	PB1	I/O	GPIO PIN
37	PB0	I/O	GPIO PIN
38	PA4	I/O	GPIO PIN
39	VDD_3V3	V	Power supply input
40	VDD_3V3	V	Power supply input
41	ANT	O	RF OUTPUT(option)

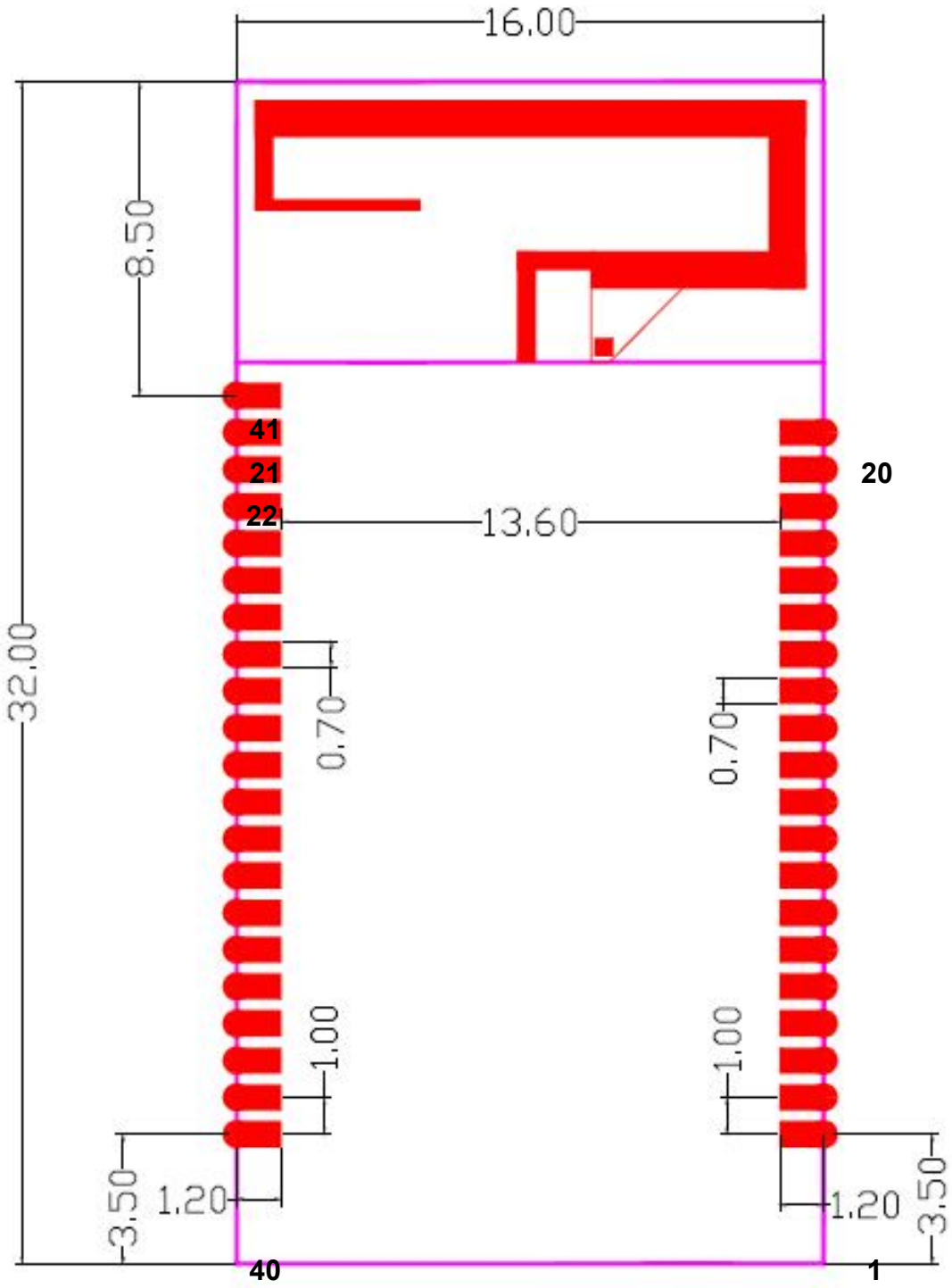
Alternate function Table 1

733 pin number	JTAG	I2C2/I2C3	SPI1/I2S1/I2S3	I2S3/SPI4/I2S4/SPI5/I2S5	I2S3/USART1/ USART2	USART6	USB
2							
4			SPI1_MOSI/I2S1_SD				
5&23	JTDI		SPI1_NSS/I2S1_WS	I2S3_WS	USART1_TX		
6&22	JTDO-SWO	I2C2_SDA	SPI1_SCK/I2S1_CK	I2S3_CK	USART1_RX		
7&24	JTRST	I2C3_SDA	SPI1_MISO		I2S3ext_SD		
8			I2S2_CKIN		USART2_TX		
9			SPI4_MOSI/I2S4_SD		USART2_RTS		
10							
12			I2S2_MCK		USART2_RX		
16							
17		I2C2_SCL	I2S2_CK	I2S3_MCK			
18		I2C2_SDA	I2S2_WS				
19		I2C2_SMBA	I2S2_WS	SPI4_NSS/I2S4_WS	I2S3_CK		
20							
21							
25	JTCK-SWCLK						
26	JTMS-SWDIO						
27		I2C3_SMBA		SPI5_MISO	USART1_RTS	USART6_RX	USB_FS_DP
29				SPI5_MOSI/I2S5_SD	USART1_RX		USB_FS_ID
30					USART1_TX		
31		I2C3_SDA		SPI5_MOSI/I2S5_SD			
33			I2S2_CK	SPI4_SCK/I2S4_CK			
34			SPI1_SCK/I2S1_CK				
35		I2C3_SCL		SPI4_MISO	USART1_CTS	USART6_TX	USB_FS_DM
36				SPI5_NSS/I2S5_WS			
37				SPI5_SCK/I2S5_CK			
38			SPI1_NSS/I2S1_WS	I2S3_WS	USART2_CK		

6. Dimensions

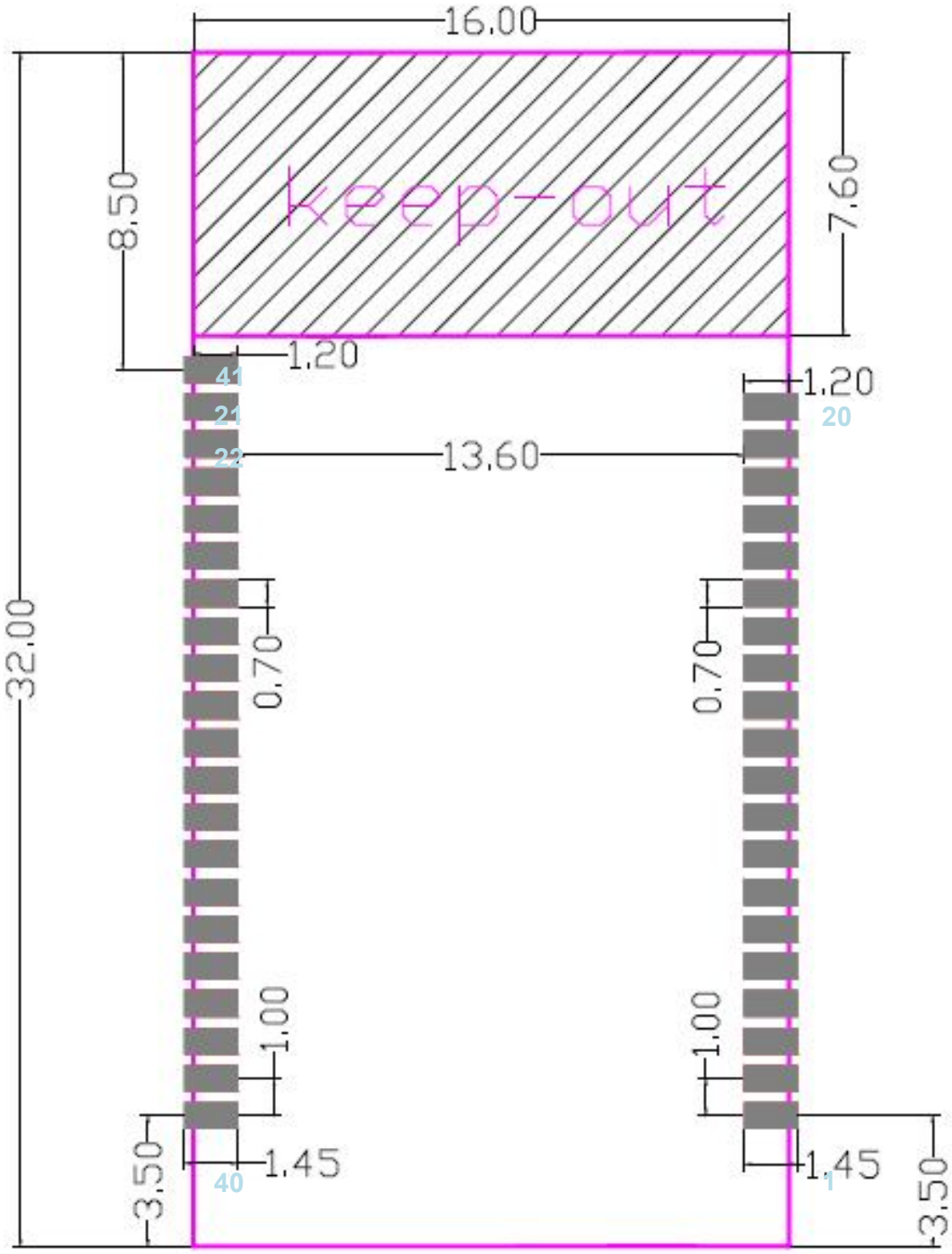
6.1 Physical Dimensions

(TOP View) Unit:mm



6.2 Layout Recommendation

(TOP View) Unit:mm

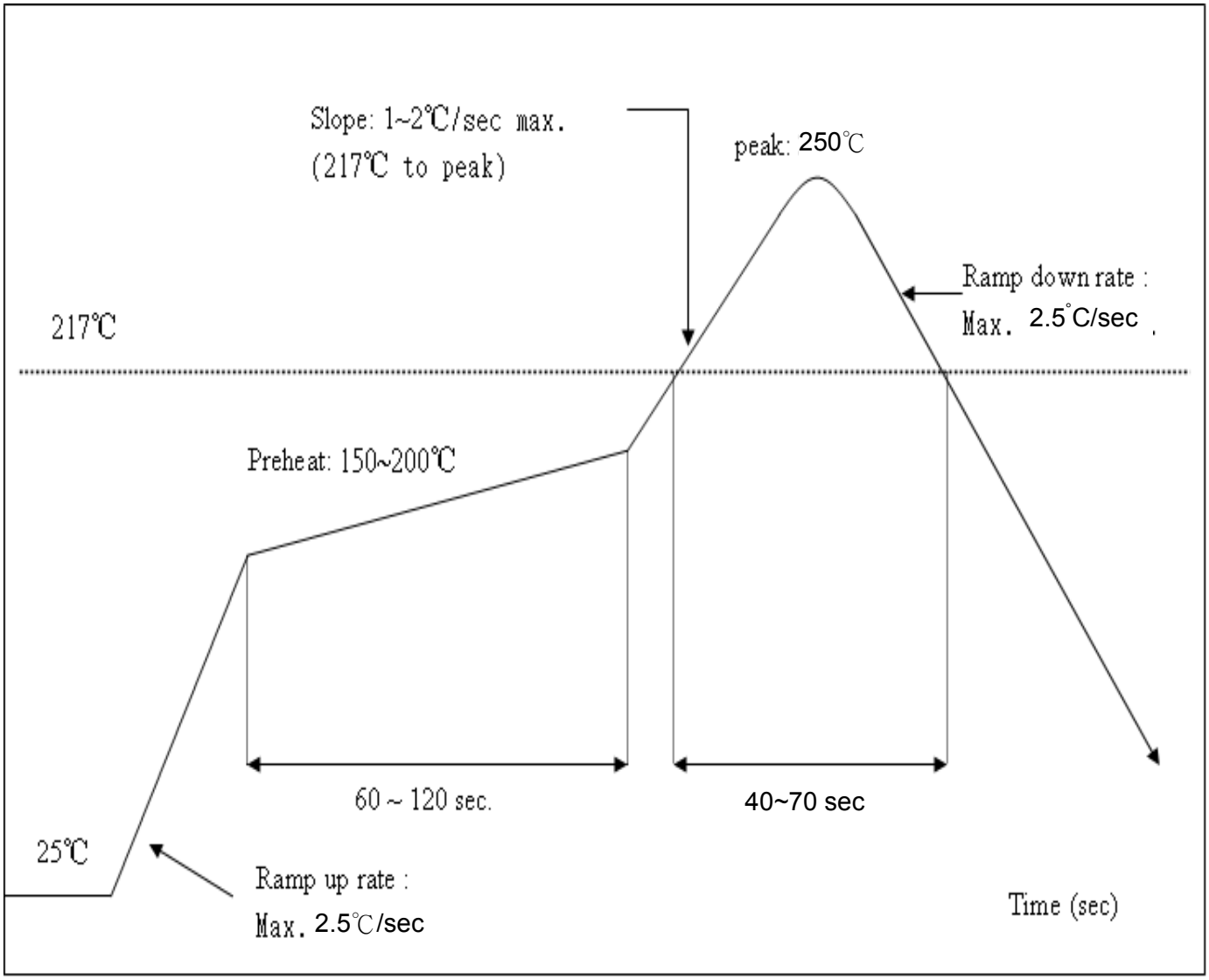


7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



8. RF path setting and Antenna configuration

8.1 RF path setting

MF3310 remains R12/R14 & R16 to switch the U.FL connector/internal ANT and board pin 41.

If user wants to connect the U.FL connector to equipment or external antenna, need to put on R12 but R14/R16 off. Looks like left of figure2.

Or, put on R14 but R12/R16 off is route path to internal ANT. Just like right of figure2.

Otherwise, put on R16 but R12/R16 off is route path to board pin 41. Just like right of figure2.

R12/R14&R16 are 0ohm

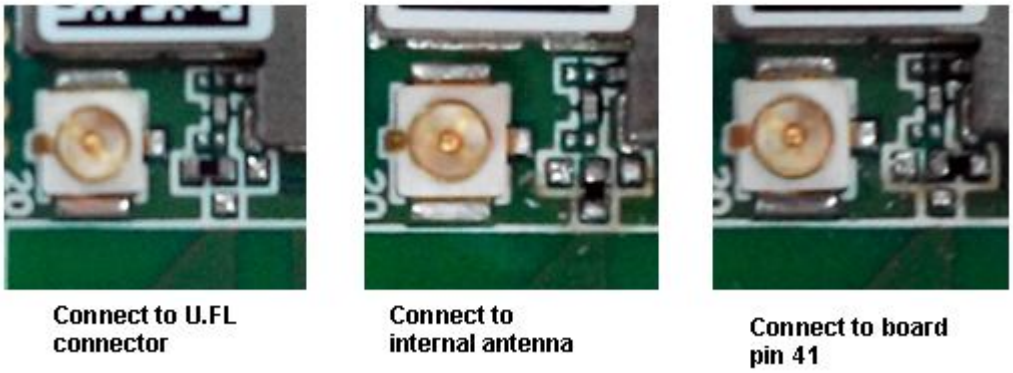
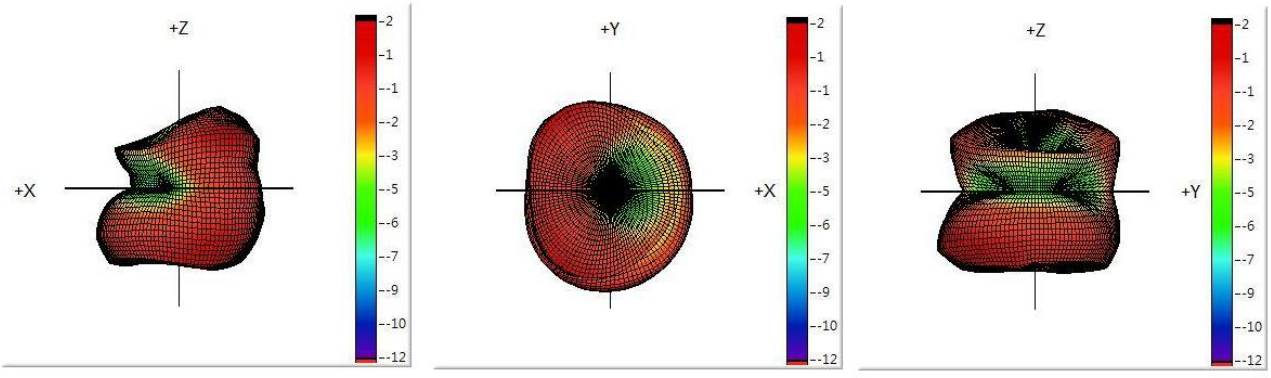


Figure2. R12/R14&R16 tie direction

8.2 Antenna configuration



3D Peak Gain: 2.0 dBi

- RF exposure information: The Maximum Permissible Exposure (MPE) level has been calculated based on a distance of d=20 cm between the device and the human body. To maintain compliance with RF exposure requirement, use product that maintain a 20cm distance between the device and human body.

Hereby, Shenzhen Magifun Technology Co., Ltd. declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
For the declaration of conformity, visit the Web site http://www.saintway.cn/

CE 0700

Notice: Observe the national local regulations in the location where the device is to be used. This device may be restricted for use in some or all member states of the European Union (EU)

RF Exposure Information and Statement

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with part 15 of the FCC rules and RSS-247 of Industry Canada. 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications 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 operating in conjunction with any other antenna or transmitter.

Full Modular Approval

This Module is full modular approval, it is limited to OEM installation ONLY.

Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product incl. the integrated Module.

Additional measurements (15B) and/or equipment authorizations (e.g Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable.

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

With the documented max output power this Module meets the FCC SAR Exemption, so it comply with any applicable RF exposure requirements in its final configuration. The RF Module is powered by battery, the antenna is PCB antenna and the antenna gain is 2.01dBi.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as “Contain FCC ID: “2AGMB-MF3310 “

The module is limited to installation in mobile or fixed applications.

The separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

GUIDANCE FOR HOST MANUFACTURERS USING MODULES

A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end-use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application .

When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers.

Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

According to RSP-100, Section 5.2.

The host device and all the separately certified modules it contains shall jointly meet the RF exposure compliance requirements of RSS-102, if applicable.

The host device shall be properly labeled to identify the modules within the host device.

The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device; otherwise, the host device must be labeled to display the Industry Canada certification number for the module, preceded by the words “Contains transmitter module”, or the word “Contains”, or similar wording expressing the same meaning, as follows:

Contains transmitter module IC: XXXXXX-YYYYYYYYYYY

where XXXXXX-YYYYYYYYYYY is the module’s certification number.

The applicant for equipment certification of the module shall provide with each unit of the module either a label such as described above, or an explanation and instructions to the user as to the host device labelling requirements.