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Product Specification

IEEE 802.11 b/g/n 2.4GHz 1T1R WiFi + NFC Module

Project Name	RTL8711AF IoT Module
Model NO	W87-AF
Customer	
Customer's Part NO	

Approved:Stven kan	Checked: fei pan	Drafted: Tony chen
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Feedback of customer's Confirmation

We accept the specification after Confirmed.

Customer	Customer signature	Approved Date

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O. Revision History

REV NO	Date	Modifications	Draft	Approved
RevO.1	2015-11-07	First Released	Fei pan	Tony Chen

1. Introduction

1.1 Overview

W87-AF is a highly integrated module with low power 802.11n Wireless LAN(WLAN) network controller. It combines an ARM-CM3 MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF function. It also provides a bunch of configurable GPIO which are configured as digital peripherals for different applications and control usage.

W87-AF integrates internal memories for complete WIFI protocol functions.

W87-AF integrates 1MB ROM to provide high access speed, low leakage memory. The ROM memory clock speed is up to 166MHz. The ROM lib provides the following functions:

- Boot Code and MCU initialization.
- Default UART driver.
- Non-flash booting functions and drivers.
- Peripheral libs.
- Security functions libs.

1.2 Product Features

General

- 22.6mm*13.0mm*1.7mm
- CMOS MAC, Baseband PHY, and RF in the module for 802.11b/g/n compatible WLAN
- Complete 802.11n solution for 2.4G band
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth

Standards Supported

- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement(WMM)
- 802.11i(WPA, WP2). Open, shared key, and pair-wise key authentication services
- WiFi Direct support
- Light Weight TCP/IP protocol

WLAN PHY Features

- 802.11n OFDM
- One Transmit and one Receive path(1T1R)
- 20MHz and 40MHz bandwidth transmission
- Short Guard Interval(400ns)
- Maximum data rate 54Mbps in 802.11g and 150Mbps in 802.11n

Host Interface

- 1 x UART
- SDIO
- GPIO

2. Block diagram

The general block diagram for the module is shown in Figure 1

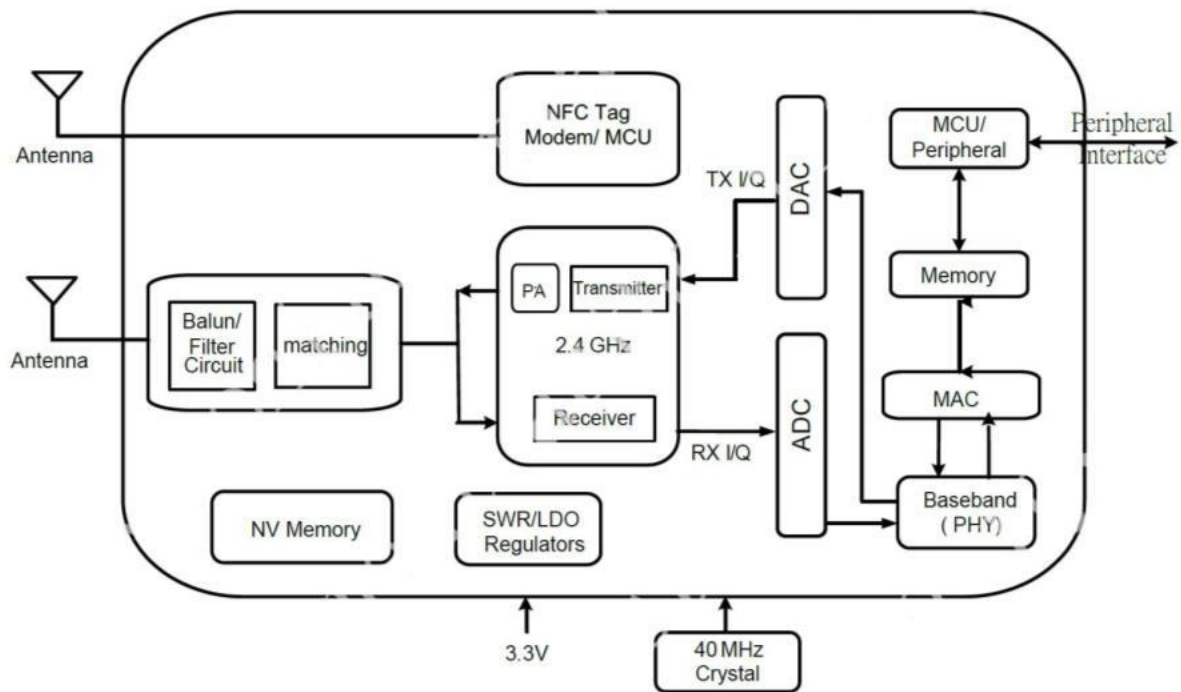


Figure 1

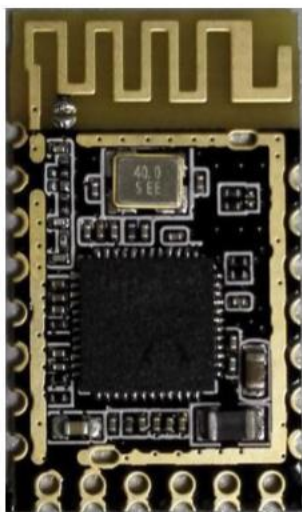
3. General specification

General features	
Main Chipset	Realtek RTL8710AF
Host Interface	UART,GPIO,SDIO
WiFi Standards	802.11b/g/n
Other RF Standards	NFC
Dimension	L22.6mm*W13.0mm*H1.7mm
Operating conditions	
Operating Voltage	3.3±10% Vdc
Operating Temperature	0°C to +70°C
Storage Temperature	-40°C to +80°C
RF features	
Operating Frequency	2.400~2.4835GHz
Channels	WiFi: USA/Canada: channel 1~11; Europe/China/Australia: channel 1~13; Japan: channel 1~14
Modulation	WiFi: 802.11b(DSSS): CCK(11, 5.5Mbps), DQPSK(2Mbps), DBPSK(1Mbps); 802.11g(OFDM): BPSK(9,6Mbps), QPSK(18,12Mbps), 16QAM(36,24Mbps), 64QAM(54,48Mbps); 802.11n(OFDM): BPSK, QPSK, 16QAM, 64QAM(150Mbps)
PHY Data rates	WiFi: 802.11b: 11,5.5,2,1 Mbps 802.11g: 54,48,36,24,18,12,9,6 Mbps 802.11n: up to 150Mbps
Output Power	WiFi: 802.11b 16±2dBm 802.11g 14±2dBm 802.11n 13±2dBm
EVM	802.11b EVM≤35% 802.11g EVM≤-25dB 802.11n EVM≤-28dB

Sensitivity	WiFi: 802.11b@8% PER 1Mbps -88dBm 2Mbps -87dBm 5.5Mbps -85dBm 11Mbps -82dBm 802.11g@10% PER 6Mbps -86dBm 9Mbps -85dBm 12Mbps -84dBm 18Mbps -82dBm 24Mbps -80dBm 36Mbps -77dBm 48Mbps -73dBm 54Mbps -71dBm 802.11n_HT20@10% PER MCS 0 -83dBm MCS 1 -82dBm MCS 2 -80dBm MCS 3 -78dBm MCS 4 -75dBm MCS 5 -71dBm MCS 6 -69dBm MCS 7 -67dBm
Other features	
Antenna	Internal Antenna
Network Architecture	WiFi: Ad-hoc mode (Peer-to-Peer) Infrastructure mode WiFi Direct
Security	802.11i(WPA,WP2). Open, shared key, and pair-wise key authentication services

4. Mechanical and Electrical Specification

4.1 Outline Drawing(Unit: mm)

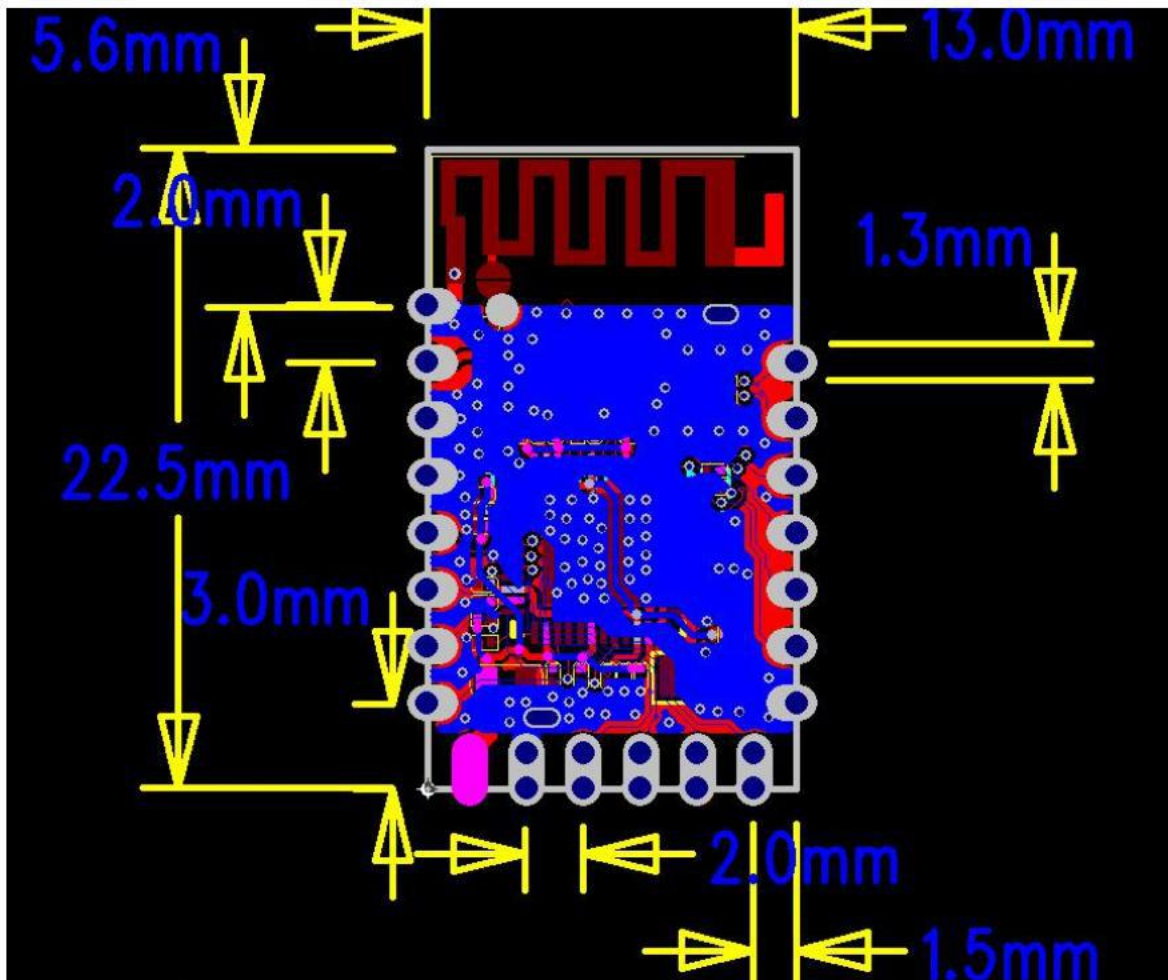
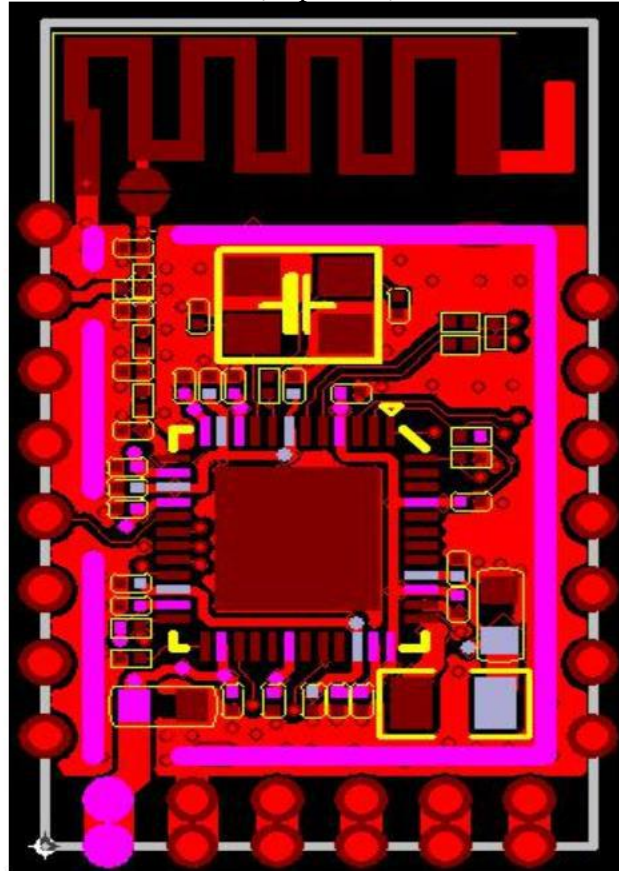


Top Side

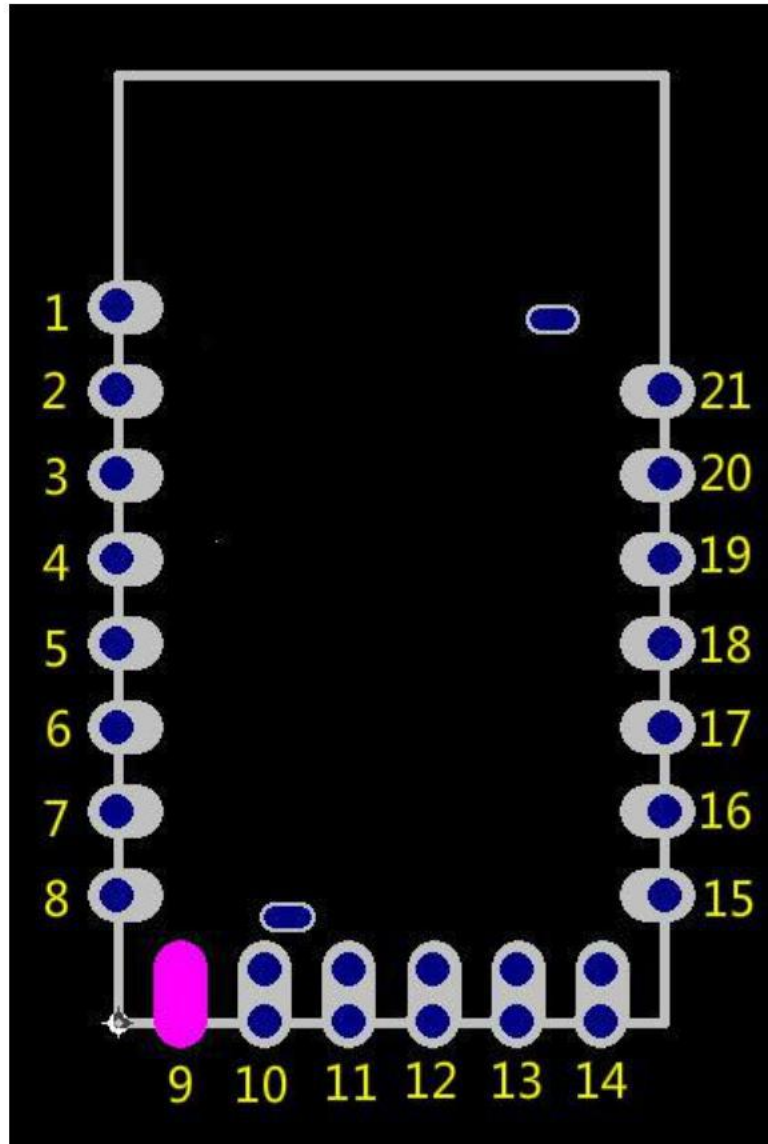


Bottom Side

(Top View)



4.2 Pin Definition(Top View)



Pin Assignment

Pin#	Name	Description
1	GND	Ground
2	RF IO	WLAN RF Signal
3	GND	Ground
4	GND	Ground
5	GPIOE_4	GPIO Pin.The MUX Function can be referred to Pin Function Table
6	GPIOA_4	GPIO Pin.The MUX Function can be referred to Pin Function Table
7	CHIP_EN	Enable chip:1 Enable Chip,0 Shut Down Chip
8	GPIOA_0	GPIO Pin.The MUX Function can be referred to Pin Function Table
9	VA33PA_12	3.3V Input
10	GND	Ground
11	GPIOE_0	GPIO Pin.The MUX Function can be referred to Pin Function Table
12	GPIOE_1	GPIO Pin.The MUX Function can be referred to Pin Function Table

13	GPIOE_2	GPIO Pin.The MUX Function can be referred to Pin Function Table
14	GPIOE_3	GPIO Pin.The MUX Function can be referred to Pin Function Table
15	GND	Ground
16	GPIOB_0	GPIO Pin.UART1_OUT(multiplexing)
17	GPIOB_1	GPIO Pin.UART1_IN(multiplexing)
18	GPIOB_2	GPIO Pin.The MUX Function can be referred to Pin Function Table
19	GPIOB_3	GPIO Pin.The MUX Function can be referred to Pin Function Table
20	NFCIP	NFC Input Differential Signal
21	NFCIN	NFC Input Differential Signal

Pin Function Table

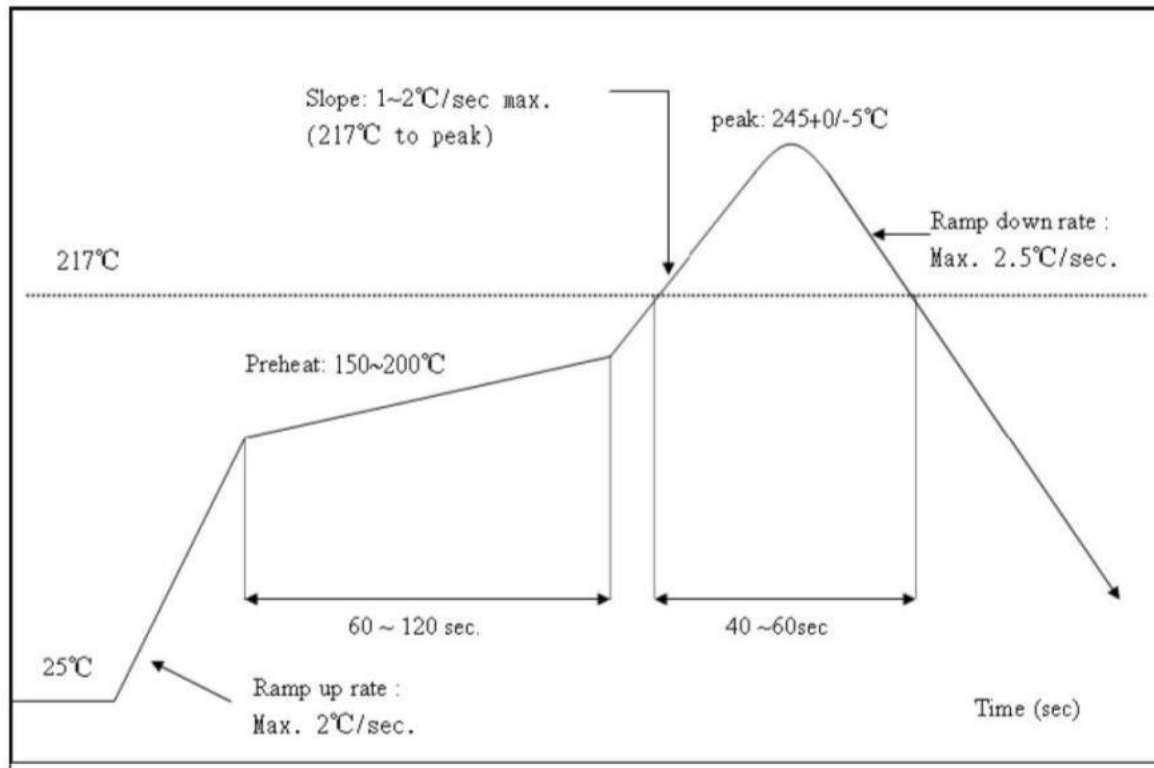
Pin name	JATG	UART	I2C	SPI	I2S	PCM	WL_LED	PWM	ETE	WKDT	GPIO
GPIOA_0		UART_0_OUT									GPIO_INT
GPIOA_4		UART_0_IN									
GPIOB_0		UART_LOG_OUT						ETE0			
GPIOB_1		UART_LOG_IN					WL_LED0	ETE1			
GPIOB_2			I2C0_SCL					ETE2			
GPIOB_3			I2C0_SDA					ETE3			GPIO_INT
GPIOE_0	JATG_TRST	UART_0_UT	I2C1_SCL	SPI0_CS0	I2S_WS	PCMo_SYNC		PWM0			
GPIOE_1	JATG_TDI	UART_RTS	I2C1_SDA	SPI0_CLK	I2S_CLK	PCMo_CLK		PWM1			GPIO_INT
GPIOE_2	JATG_TDO	UART_CTS	I2C2_SCL	SPI0_MOSI	I2S_SD_TX	PCMo_0_UT		PWM2			GPIO_INT
GPIOE_3	JATG_TMS	UART_IN	I2C2_SDA	SPI0_MISO	I2S_MCK	PCMo_IN		PWM3		WKDT3	GPIO_INT
GPIOE_4	JATG_CLK										

4.3 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



4.4 Patch WIFI modules installed before the notice:

WIFI module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil
2. Take and use the WIFI module, please insure the electrostatic protective measures.
3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at 250 + 5°C for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: < 40°C, relative humidity: < 90% r.h.
2. The module vacuum packing once opened, time limit of the assembly:
Card: 1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
- 2.) factory environmental temperature humidity control: $\leq 30^{\circ}\text{C}$, $\leq 60\%$ r.h..
- 3). Once opened, the workshop the preservation of life for 168 hours.
3. Once opened, such as when not used up within 168 hours:
 - 1). The module must be again to remove the module moisture absorption.
 - 2). The baking temperature: 125°C, 8 hours.
 - 3.) After baking, put the right amount of desiccant to seal packages.

5. Package

TBD...