Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

MXCHIP® | Global leading IOT operating system-MiCO
TEL:021-52709556
Email:sales@mxchip.com

Data Sheet

EMW3166

Embedded Wi-Fi module

V1.0 **Date：2016-10-20** **NO:DS0047EN**

Overview

Features:

- Integration of one Cortex-M4 MCU and one RF chip of 802.11 b/g/n
  - Cortex-M4 core at 100MHz
  - 2M bytes on-board SPI flash and 1M bytes on-chip flash
  - 256K bytes SRAM
- Operation voltage:
  - Low voltage mode: 2.3~3.0V
  - Normal voltage mode: 3~3.6V
- Peripherals
  - 25 GPIOS
  - JTAG/SWD debug interfaces
- Wi-Fi connectivity:
  - 802.11 b/g/n available
  - WEP, WPA/WPA2, PSK available
  - 16.5dBm@802.11b, 14.5dBm@802.11g, 13.5dBm@802.11n
  - Receiver Sensitivity: -87dBm
  - Station, Soft AP and Wi-Fi Direct
  - Easylink available
  - On-board PCB antenna and IPEX connector for external antenna
  - CE, FCC compliant
- Operation Temperature: -30°C~+85°C

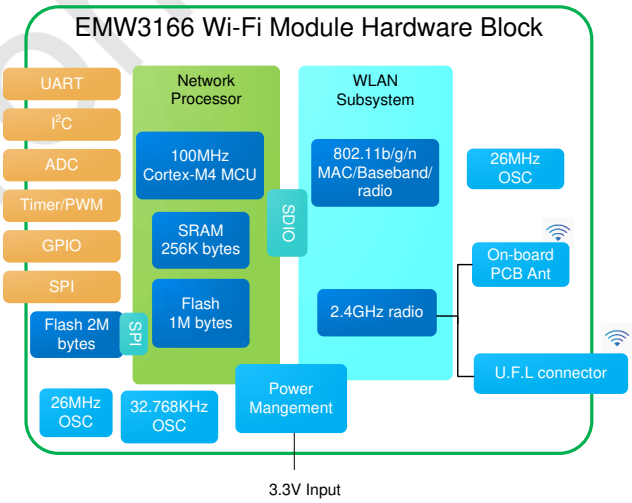
Applications:

- Smart LED
- Smart home appliances
- Medical/Health care
- Industrial automation systems
- Point of Sale system
- Auto electronics

Product list:

Part number	Antenna type	
EMW3166-P	PCB antenna	Default
EMW3166-E	IPX antenna	Optional

Hardware block:



Copyright Notice:

Version Record

Date	Version	**Update content**
2016-8-13	0.1	Initial version
2016-8-17	0.2	Update “Hardware Block”
2016-8-24	0.3	Update “Package”picturer
2016-10-13	0.4	Update TX&RX characteristics
2016-10-18	0.5	Update the power consumption
2016-10-20	1.0	Release version

Catalog

Overview **1**

Version Record **1**

1. Introduction **5**

1.1 EMW3166 appearance 6

1.2 Pin Designation 6

1.3 Recommended Footprint Design 7

1.4 Pin Arrangement 7

2. Electrical Parameters **11**

2.1 Operating Ratings 11

2.2 Absolute maximum ratings (voltage) 11

2.3 Current Consumption 11

2.3.1 Microcontroller Subsystem 11

2.3.2 Power Consumption in Typical Operation Mode 13

2.4 I/O Port Characteristics 13

2.4.1 I/O Static Characteristics 13

2.4.2 RESET pin characteristics 14

2.5 Temperature and Humidity 14

2.6 ESD 15

2.7 Static Latch-up 15

2.8 Other MCU Electrical Parameters 15

3. RF characteristics **16**

3.1 Basic RF characteristics 16

3.2 TX Characteristics 16

3.2.1 IEEE802.11b mode TX characteristics 16

3.3 IEEE802.11g mode TX characteristics 17

3.3.1 IEEE802.11n-HT Mode TX Characteristics 17

3.4 RX Input Level Sensitivity 18

3.4.1 IEEE802.11b Mode in 20MHz 18

3.4.2 IEEE802.11g Mode in 20MHz 18

3.4.3 IEEE802.11n-HT Mode in 20MHz 19

4. Antenna information **21**

4.1 Type of antenna 21

4.2 Minimizing radio interference 21

4.3 U.F.L RF Connector 22

5. Mechanical Dimensions **24**

5.1 EMW3166 Mechanical Dimensions 24

5.2 Use guidelines (Please read carefully) 24

5.3 The matters needing attention 26

5.4 MSL/Storage Condition 26

5.5 Recommended Reflow Profile 26

6. Reference circuit **28**

7. MOQ&Packaging information **30**

8. Sales Information and Technical Support **31**

Picture Catalog

Figure 1 EMW3166 Block Diagram 5
Figure 2 EMW316-P 6
Figure 3 EMW3166-E 6
Figure 4 Half-hole package dimension 7
Figure 5 Recommended Footprint 7
Figure 6 EWM3166-P 21
Figure 7 EMW3166-E 21
Figure 8 EMW3166-B 21
Figure 9 Antenna minimum clearance zone 22
Figure 10 An external antenna connector size diagram 23
Figure 11 EMW3166 top view(Metric units) 24
Figure 12 EMW3166Side View 24
Figure 13 Temperature and humidity indicator CARDS 25
Figure 14 torage Condition 26
Figure 15 **T**emperature Curve 27
Figure 16 Power reference circuit 28
Figure 17 USB to serial reference circuit 28
Figure 18 External Circuit Design 28
Figure 19 UART 5 V - 3.3 V conversion circuit 29

Table Catalog

Table 1 EMW3166 pin arrangement 8
Table 2 Voltage Conditions 11
Table 3 Current Conditions 11
Table 4 Absolute Maximum Rating 11
Table 5 Typical and maximum current consumption in Run mode 12
Table 6 Typical and Maximum Current Consumption in Run Mode 12
Table 7 Typical and Maximum Current Consumption in Standby Mode 12
Table 8 Power Consumption in Typical Operation Mode 13
Table 9 RESET Pin Characteristics 14
Table 10 Static Latch-up 15
Table 11 RF basic attributes 16
Table 12 IEEE802.11b Mode TX Characteristics 16

Table 13 IEEE802.11g mode TX characteristics 17
Table 14 IEEE802.11n-HT mode TX characteristics 17
Table 15 IEEE802.11b mode RX characteristics 18
Table 16 IEEE802.11g mode RX characteristics 19
Table 17 IEEE802.11n-HT mode RX characteristics: 19
Table 18 MOQ&Packaging information 30

1. Introduction

EMW3166 is one embedded Wi-Fi module of low-power, small-size and low-cost designed by MXCHIP. It integrates one Cortex-M4 microcontroller of 256Kbytes SRAM and 1Mbytes on-chip flash with another 2Mbytes on-board SPI flash added. Various peripheral interfaces of analog and digital are available. The power supply voltage is 3.3V. It applies half-hole footprint for hand-soldering. The module runs MICO, which is the IOT OS System of MXCHIP, and is available for secondary development. The TCP/IP protocols and security encryption algorithm could be applied in various Wi-Fi applications. In addition, several particular firmware prepares for some typical applications, like UART to Wi-Fi DTU, easylink configuration and services for cloud interfacing.

EMW3166 Block diagram:

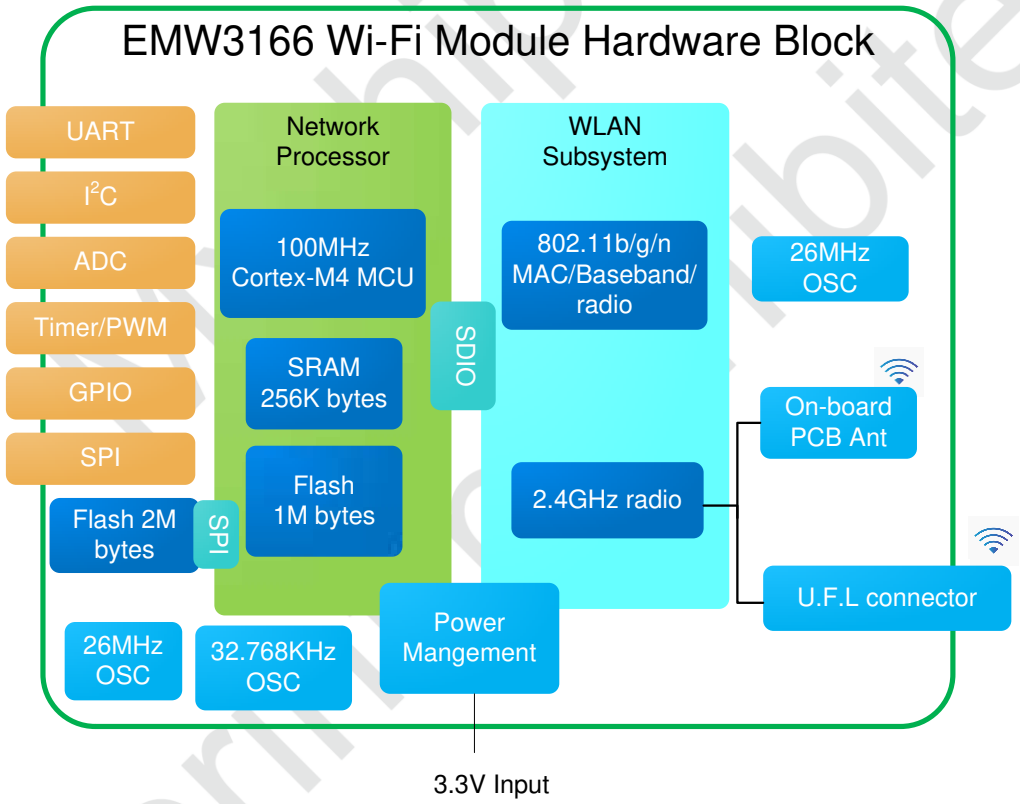


Figure 1 EMW3166 Block Diagram

1.1 EMW3166 appearance

Figure 2 EMW316-P

Figure 3 EMW3166-E

Labels:

CE0700: CE certification ID;

FCC ID P53-EMW3166: FCC certification ID;

EMW3166-P/EMW3166-E: Module type;

047863000093/04786300000C: MAC address;

1635/1632: Production batch;

Linked by MXCHIP: Manufacturer;

1.2 Pin Designation

EMW3166 owns two groups of pins (1X20 + 1X21). The lead pitch is 1mm.

EMW3166 has half-hole footprint fit for hand-soldering

EMW3166 pinouts:

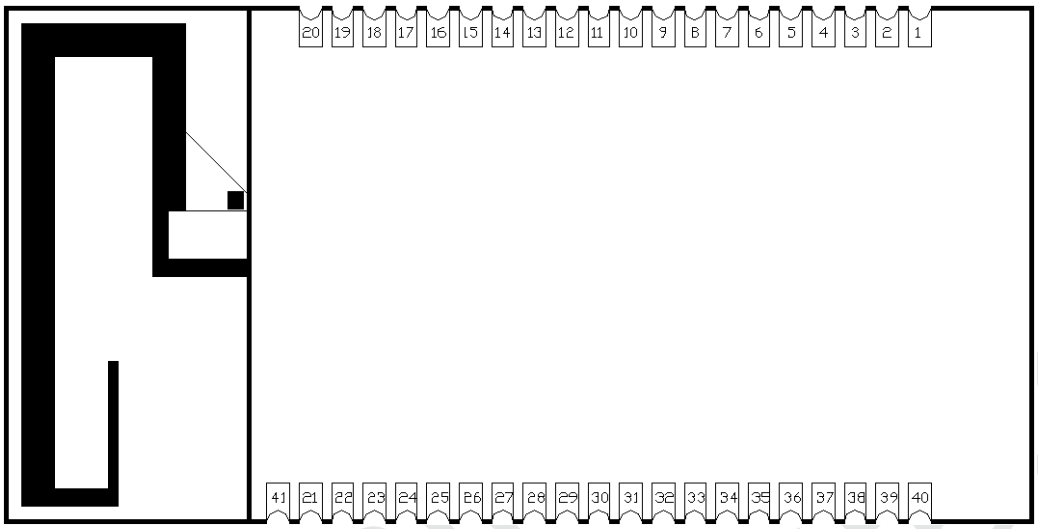


Figure 4 Half-hole package dimension

1.3 Recommended Footprint Design

Recommended footprint (Unit: mm):

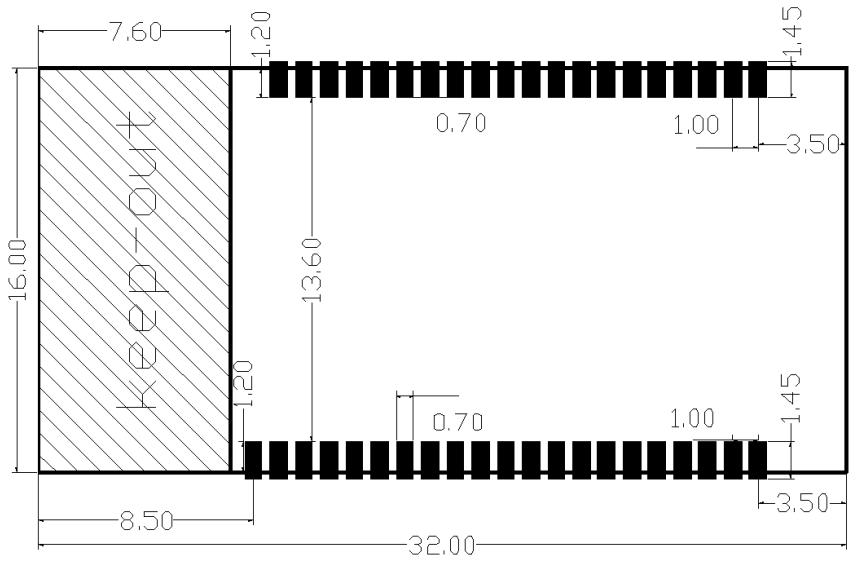


Figure 5 Recommended Footprint

1.4 Pin Arrangement

The general pin description:

Table 1 EMW3166 pin arrangement

Pins	Name	Type	I/O level	Functions				Note
1	-	-	-					***NC***
2	PB2	I/O	FT	GPIO			BOOT1	√
3	-	-	-					***NC***
4	PB15	I/O	FT	SPI2_MOSI	GPIO	TIM12_CH2	I2S2_SD	√
5	PB12	I/O	FT	SPI2_NSS	GPIO	CAN2_RX	I2S2_WS	√
6	PB13	I/O	FT	SPI2_SCK	GPIO	CAN2_TX	I2S2_CK	√
7	PB14	I/O	FT	SPI2_MISO	GPIO	TIM12_CH1		√
8	PC6	I/O	FT	UART6_TXD	GPIO	TIM3_CH1	I2S2_MCK	***DEBUG_OUT***
9	PA15	I/O	FT	GPIO	JTDI	TIM2_CH1	USART1_TXD	***EasyLink***
10	VBAT	S	-	VBAT				***Clock power supply***
11	-	-	-					***NC***
12	PC7	I/O	FT	UART6_RXD	GPIO	TIM3_CH2	I2S2_CK	***DEBUG_IN***
13	NRST	I/O	FT	RESET				√
14	PC0	I	TC	GPIO			WAKEUP	√
15	-	-	-					***NC***
16	PC13	I/O	FT	GPIO				√
17	PB8	I/O	FT	I2C1_SCL	GPIO	TIM4_CH3	CAN1_RX	√

Pins	Name	Type	I/O level	Functions				Note
18	PB9	I/O	FT	I2C1_SDA	GPIO	TIM4_CH4	CAN1_TX	√
19	PB10	I/O	FT	GPIO		TIM2_CH3	I2S2_CK	√
20	GND	S	-	GND				***GND***
21	GND	S	-	GND				***GND***
22	-	-	-					***NC***
23	-	-	-					***NC***
24	-	-	-					***NC***
25	PA14	I/O	FT	SWCLK				√
26	PA13	I/O	FT	SWDIO				√
27	PB3	I/O	FT	GPIO		TIM2_CH2	USART1_RXD	√
28	-	-	-					***NC***
29	PB7	I/O	FT	UART1_RXD	GPIO	TIM4_CH2	I2C1_SDA	***USER_UART_RX***
30	PB6	I/O	FT	UART1_TXD	GPIO	TIM4_CH1	I2C1_SCL	***USER_UART_TX***
31	PB4	I/O	FT	GPIO	JTRST	TIM3_CH1		√
32	-	-	-					***NC***
33	PA10	I/O	FT	USB_ID	GPIO	TIM1_CH3		√
34	PA5	I/O	TC	GPIO			ADC1_5	√
35	PA11	I/O	FT	USB_DM	GPIO	TIM1_CH4	UART1_CTS	√
36	PA12	I/O	FT	USB_DP	GPIO	TIM1_ETR	UART1_RTS	***BOOT***

Pins	Name	Type	I/O level	Functions				Note
37	PB0	I/O	FT	GPIO			ADC1_8	***STATUS***
38	PA4	I/O	TC	GPIO			ADC1_4	√
39	VDD	S	-	3.3V				***3V3***
40	VDD	S	-	3.3V				***3V3***
41	ANT	-	-	ANT				***ANT PAD***

Notes:

1. PIN10, PIN39, PIN40 need connect to VDD 3V3 power and PIN20, PIN21 connects to GND.
2. PIN8 and PIN12 are used for secondary burning, ATE and QC auto detection.
3. PIN29 and PIN30 are used as serial communication port for application.
4. “S” indicates “power supply”, “I” indicates “input pin”, “I/O” indicates “input/output pin”.
5. “FT” indicates the maximum tolerance input voltage is 5V. The maximum tolerance voltage could not be over VCC when configured as analog I/O or RTC.
6. TC=standard 3.6V I/O.
7. PIN4~7 could not be used as the other functions except for the SPI1 interface of on-board flash.
8. Take SWD (PIN25, PIN26) as the replacement of JTAG to debug or download firmware.
9. “√” indicates the pin which could be used for customized applications, while “×” could not be used besides two groups “serial” and one group “SPI”.
10. Please refer to MXCHIP for more support.

Important Note:

- If developers build an application based on MICO system, they can define or modify the function for every pin on EMW3166.
- The pin arrangement of the firmware MXCHIP developed could take the Application Note as a reference.

2. Electrical Parameters

2.1 Operating Ratings

EMW3166 enters an unstable condition whenever the input voltage dips below the minimum value of supply voltage. This condition must be considered during design of the power supply routing, especially if operating from a battery.

Table 2 Voltage Conditions

Symbol	Note	Conditions	Specification			
			Min	Typical	Max	Unit
VDD	Power Supply		3.0	3.3	3.6	V
		Special condition	2.3	2.5	3.0	V

Voltage exceeding maximum ratings will cause hardware damage to the module, and working at the maximum ratings for a long time will affect the reliability of the module.

Current conditions:

Table 3 Current Conditions

Symbol	Note	Max	Unit
I_{VDD}	Total current into VDD power lines	320	mA
I_O	Output current sunk by any I/O and control pin	25	
	Output current sourced by any I/O and control pin	-25	

2.2 Absolute maximum ratings (voltage)

Stresses above the absolute maximum ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Absolute maximum ratings:

Table 4 Absolute Maximum Rating

Symbol	Note	Min	Max	Unit
V_{DD}	Power supply	–0.3	4.0	V
V_{OUT}	Output voltage on 5V tolerance pin	−0.3	5.5	V
V_{IN}	Input voltage on other pins	−0.3	V_{DD}+0.3	V

2.3 Current Consumption

2.3.1 Microcontroller Subsystem

Typical and maximum current consumption in Run mode:

Table 5 Typical and maximum current consumption in Run mode

Symbol	Conditions	f_{HCLK} (MHz)	Ta=25°C		Unit
			Typical	Max	
I_{MCU}	External clock, all peripherals enabled	100	28.4	28.8	mA
		84	23.0	24.09	
		64	16.0	16.83	
		50	12.6	13.46	
		25	6.8	7.63	
		20	5.8	6.31	
	External clock, all peripherals disabled	100	14.3	15.09	
		84	11.6	12.28	
		64	8.2	8.75	
		50	6.5	7.21	
		25	3.6	4.22	
		20	3.2	3.65	

Typical and maximum current consumption in Stop mode:

Table 6 Typical and Maximum Current Consumption in Run Mode

Symbol	Item	Conditions	Ta =25°C		Unit
			Typical	Max	
I_{MCU}	Main regulator usage	Flash in Stop mode, all oscillators OFF, no independent watchdog	124	179	u A
	Low power regulator usage		52.8	104.9	
	Main regulator usage	Flash in Deep power down mode, all oscillators OFF, no independent watchdog	87.6	123	
	Low power regulator usage		26.2	74.7	
	Low power low voltage regulator usage		20.1	58.5	

Typical and maximum current consumption in Standby mode:

Table 7 Typical and Maximum Current Consumption in Standby Mode

Symbol	Item	Conditions	Typical	Unit

			Ta=25°C	
I_{MCU}	Supply current in Standby mode	Low-speed oscillator (LSE) and RTC ON	4.5	μA
		RTC and LSE OFF	2.6	

2.3.2 Power Consumption in Typical Operation Mode

Current consumption of EMW3165 in typical operation mode:

Table 8 Power Consumption in Typical Operation Mode

Status	Average current（3V3）	Peak current（3V3）	Description
WiFi initial	13.42mA	13.49mA	Not low power mode
WiFi connecting	77.52mA	95.52mA	Not low power mode
WiFi connecting	11.52mA	34.28mA	Low power mode
WiFi connecting	5.50mA	33.26mA	Low power mode (WiFi & MCU)
UDP sending	91.64mA	243.59mA	Not low power mode
Easylink	77.07mA	342.20mA	Easylink
Standby	18.54uA	54.36uA	Standby

2.4 I/O Port Characteristics

2.4.1 I/O Static Characteristics

GPIO static characteristics:

Symbol	Item	Conditions	Min	Typical	Max	Unit
VIL	FT and NRST I/O input low level voltage	1.7V ~ 3.6V	-	-	0.3VDD	V
	BOOT0 I/O input low level voltage		-	-	0.1VDD+0.1	
VIH	FT and NRST I/O input low level voltage	1.7V ~ 3.6V	0.7VDD	-	-	V

Symbol	Item		Conditions	Min	Typical	Max	Unit
	BOOT0 I/O input low level voltage			0.17VDD+0.7	-	-	
VHYS	FT and NRST I/O input hysteresis		1.7V ~3.6V	0.1VDD	-	-	V
	BOOT0 I/O input hysteresis			0.1	-	-	
RPU	Weak pull-up equivalent resistor	All pins except for PA10	VIN=VSS	30	40	50	kΩ
		PA10		7	10	14	
RPD	Weak pull-down equivalent resistor	All pins except for PA10	VIN=VDD	30	40	50	kΩ
		PA10		7	10	14	
CIO	I/O pin capacitance		-	-	5	-	pF

2.4.2 RESET pin characteristics

The RESET pin input driver uses CMOS technology. It is connected to a permanent pull-up resistor, R_{PU}. EMW3166 contains RC (resistance-capacitance) reset circuit which ensures the module reset accurately when it powers up. If user need to reset manually, just connect the external control signals to the reset pins directly, but the control signal should be Open Drain Mode。

RESET pin characteristics:

Table 9 RESET Pin Characteristics

Symbol	Item	Conditions	Min	Typical	Max	Unit
VF(NRST)	NRST Input filtered pulse	-		-	100	ns
VNF(NRST)	NRST Input not filtered pulse	VDD > 2.7 V	300	-	-	
RPU	Resistor for Pulling up	VIN= VSS	30	40	50	kΩ
TNRST_OUT	Generated reset pulse duration	Internal Reset source	20	-	-	us

2.5 Temperature and Humidity

Temperature and humidity condition of EMW3166:

Symbol	Item	Scale	Unit
T_{STG}	Storage temperature	-40 to +85	℃
T_A	Working temperature	-30 to +85	℃

Humidity	Non condensing, relative humidity	95%	-

2.6 ESD

The Electromagnetic Environment Electrostatic discharge:

Symbol	Item	Conditions	Level	Max	Unit
V_{ESD}(HBM)	Electrostatic discharge voltage (human body model)	TA= +25 °C conforming to JESD22-A114	2	2000	V
V_{ESD}(CDM)	Electrostatic discharge voltage (charge device model)	TA = +25 °C conforming to JESD22-C101	II	500	

2.7 Static Latch-up

These tests are compliant with EIA/JESD 78A IC latch-up standard.

Table 10 Static Latch-up

Symbol	Item	Conditions	Level
L_U	Static latch-up class	TA= +105 °C conforming to JESD78A	II level A

2.8 Other MCU Electrical Parameters

Please refer to STM32F412xG datasheet for more information.

3. RF characteristics

3.1 Basic RF characteristics

Table 11 RF basic attributes

Item	Specification
Operating Frequency	2.412~2.484GHz
Wi-Fi Standard	802.11b/g/n(single stream n)
Modulation Type	11b: DBPSK, DQPSK,CCK for DSSS 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: MCS0~7,OFDM＊
Data Rates	11b:1, 2, 5.5 and 11Mbps 11g:6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~7, up to 72Mbps
Antenna type	PCB printed ANT U.F.L connector for external antenna (Optional)

3.2 TX Characteristics

3.2.1 IEEE802.11b mode TX characteristics

IEEE802.11b mode TX characteristics:

Table 12 IEEE802.11b Mode TX Characteristics

Channel	Transmitter Output Power（dBm）	EVM(%)	Frequency Error (ppm)
1	16.37	25.01	-2.16
2	16.41	25.12	-2.15
3	16.63	25.20	-2.44
4	16.36	25.90	-2.54
5	16.19	25.26	-2.62
6	16.56	26.33	-2.69
7	16.16	26.50	-2.75
8	16.39	25.01	-2.86
9	16.29	26.26	-2.91
10	16.34	26.40	-2.95
11	16.23	26.13	-2.98

12	16.34	25.71	-3.02
13	16.44	25.83	-3.10

3.3 IEEE802.11g mode TX characteristics

IEEE802.11g mode TX characteristics:

Table 13 IEEE802.11g mode TX characteristics

Channel	Transmitter Output Power（dBm）	EVM(%)	Frequency Error (ppm)
1	13.41	-27.99	-2.21
2	13.24	-27.83	-2.22
3	13.53	-25.70	-2.17
4	13.48	-26.94	-2.10
5	13.52	-27.57	-2.07
6	13.40	-26.99	-2.06
7	13.43	-26.28	-2.06
8	13.22	-26.60	-2.07
9	13.58	-26.67	-2.06
10	13.04	-26.78	-2.03
11	13.22	-25.99	-2.04
12	13.25	-26.67	-2.05
13	13.21	-27.04	-2..09

3.3.1 IEEE802.11n-HT Mode TX Characteristics

IEEE802.11n-HT mode TX characteristics:

Table 14 IEEE802.11n-HT mode TX characteristics

Channel	Transmitter Output Power（dBm）	EVM(%)	Frequency Error (ppm)
1	12.76	-29.52	-2.19
2	12.71	-29.79	-2.14
3	12.62	-30.38	-2.04
4	12.78	-30.33	-1.99
5	12.69	-29.52	-1.99
6	12.62	-30.41	-1.99
7	12.73	-29.06	-1.99
8	12.74	-29.32	-1.89

Channel	Transmitter Output Power（dBm）	EVM(%)	Frequency Error (ppm)
9	12.73	-28.51	-1.97
10	12.69	-29.32	-2.02
11	12.78	-28.51	-1.99
12	12.57	-29.81	-1.98
13	12.59	-29.23	-1.96

3.4 RX Input Level Sensitivity

3.4.1 IEEE802.11b Mode in 20MHz

IEEE802.11b mode RX characteristics:

Table 15 IEEE802.11b mode RX characteristics

Frequency / Channel	1M(dBm)	11M(dBm)
	IEEE spec ： -83	IEEE spec ： -76
1	-96	-88
2	-95	-87
3	-96	-87
4	-96	-87
5	-96	-88
6	-96	-87
7	-96	-87
8	-96	-87
9	-96	-88
10	-96	-88
11	-96	-88
12	-96	-87
13	-96	-88

3.4.2 IEEE802.11g Mode in 20MHz

IEEE802.11g mode RX characteristics:

Table 16 IEEE802.11g mode RX characteristics

Frequency / Channel	6M(dBm)	54M(dBm)
	IEEE spec ： -82	IEEE spec ： -65
1	-90	-74
2	-90	-74
3	-90	-74
4	-90	-74
5	-90	-74
6	-89	-74
7	-89	-74
8	-89	-74
9	-88	-74
10	-89	-74
11	-89	-74
12	-89	-74
13	-88	-74

3.4.3 IEEE802.11n-HT Mode in 20MHz

IEEE802.11n-HT mode RX characteristics:

Table 17 IEEE802.11n-HT mode RX characteristics:

Frequency / Channel	MCS0(dBm)	MCS7(dBm)
	IEEE spec ： -82	IEEE spec ： -64
1	-89	-72
2	-90	-72
3	-89	-72
4	-89	-72
5	-89	-72
6	-89	-71
7	-89	-71
8	-89	-71
9	-88	-72
10	-89	-72

Frequency / Channel	MCS0(dBm)	MCS7(dBm)
11	-89	-72
12	-88	-72
13	-88	-72

4. Antenna information

4.1 Type of antenna

There are three types of antenna include PCB antenna, external antenna and antenna pad. The default type is PCB antenna. Users can modify the antenna type with the method below but MXCHIP would not take any responsibility for this behavior.

EMW3166 loads the resistance (0Ω/0402) in the red box, it means user can use PCB antenna. If user wants to use U.F.L RF connector for external antenna, just need switch the resistance from red box to blue box and solder an U.F.L RF connector. If user switches the resistance from red box to yellow box, user can use antenna pad (pin 41).

Type of antenna:

Figure 6 EWM3166-P

Figure 7 EMW3166-E

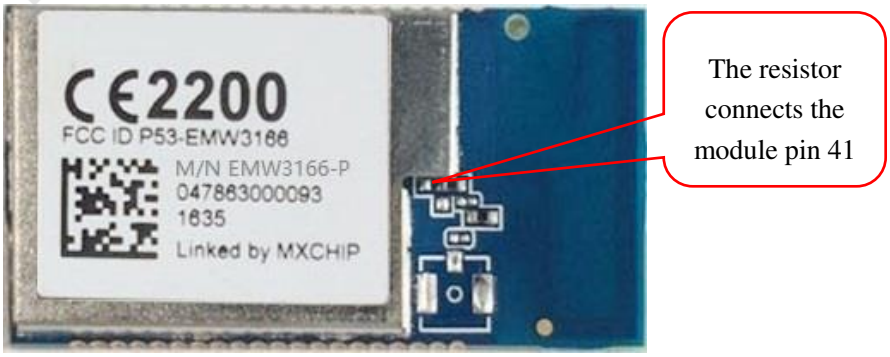


Figure 8 EMW3166-B

4.2 Minimizing radio interference

When integrating the Wi-Fi module with on board PCB printed antenna, make sure the area around the antenna end

the module protrudes at least 15mm from the mother board PCB and any metal enclosure. If this is not possible use the on board U.FL connector to route to an external antenna. The area under the antenna end of the module should be keep clear of metallic components, connectors, vias, traces and other materials that can interfere with the radio signal.

Minimum size of keep-out zone around antenna：

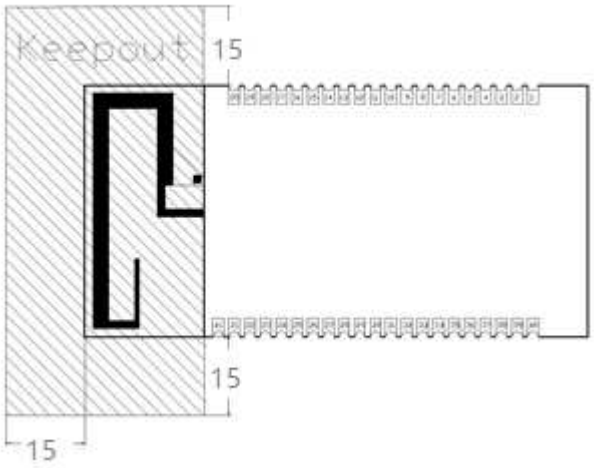


Figure 9 Antenna minimum clearance zone

4.3 U.F.L RF Connector

This module use U.F.L type RF connector for external antenna connection.

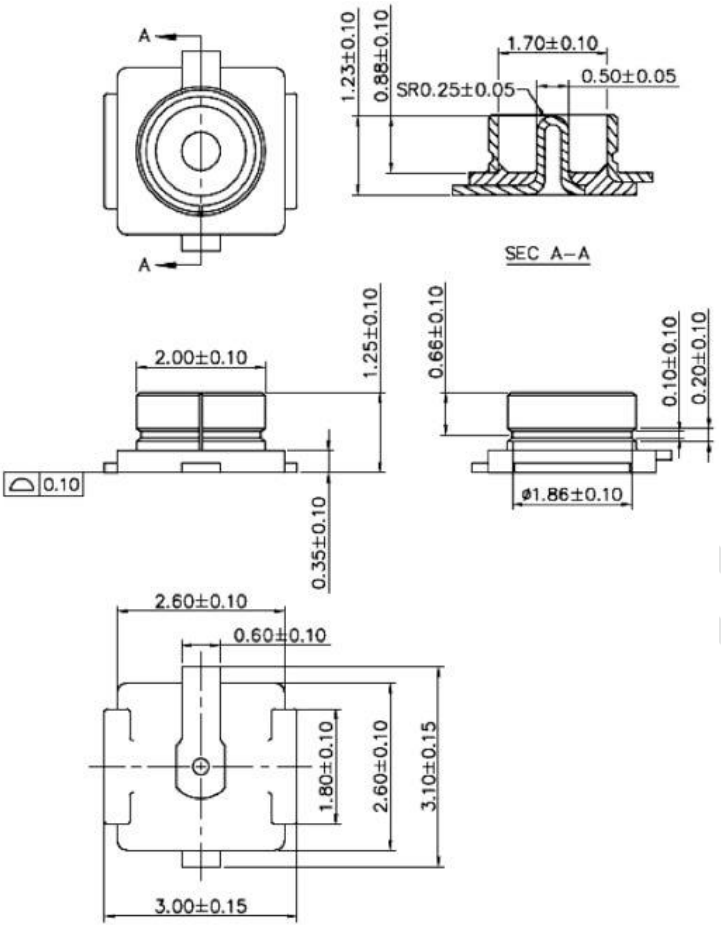


Figure 10 An external antenna connector size diagram

5. Mechanical Dimensions

5.1 EMW3166 Mechanical Dimensions

EMW3166 top view (Unit: mm):

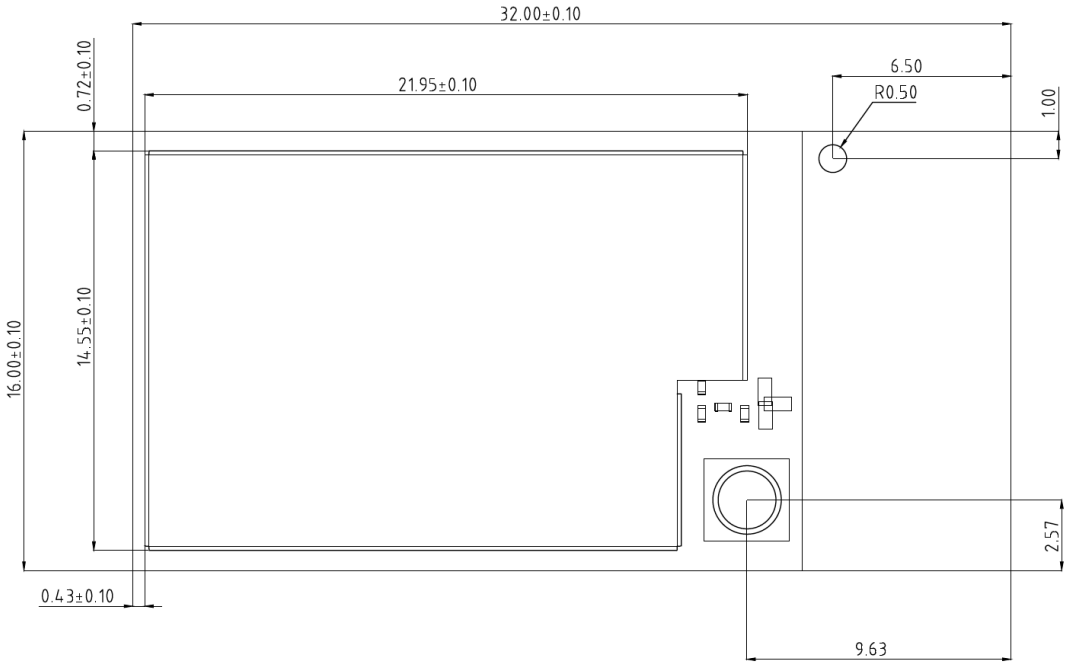


Figure 11 EMW3166 top view(Metric units)

EMW3166 side view (Unit: mm):

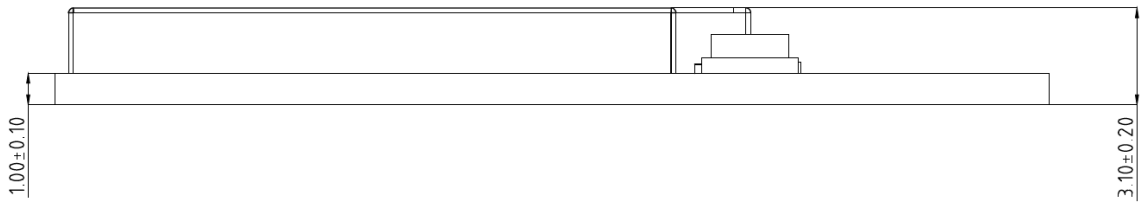


Figure 12 EMW3166Side View

5.2 Use guidelines (Please read carefully)

- Stamps port Wi-Fi modules which factory from MXCHIP are welding must by SMT machine.
  - SMT need machine:
    - Reflow soldering SMT machine
    - The AOI detector
    - 6-8 mm diameter suction nozzle
  - baking need equipment:
    - Cabinet baking box