MXCHIP® | Global Leading IOT Operating System-MiCO

Datasheet

EMW3165

Embedded Wi-Fi Module

Version : 1.4 **Date : 2016-5-31** **No. : DS0007E**

Overview

Features

- Supports IEEE 802.11b/g/n
- Integrated ARM Cortex-M4 processor and WLAN MAC/Baseband/RF
  - Cortex-M4 core at 100MHz
  - 2M bytes on-board SOI flash and 512K bytes on-chip flash
  - 128K bytes RAM
- Operating voltage : DC 3V-3.6V
- Peripherals
  - 22 GPIOS
  - JTAG/SWD debug interfaces
- Wi-Fi features
  - 802.11 b/g/n available
  - WEP, WPA/WPA2, PSK/Enterprise 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

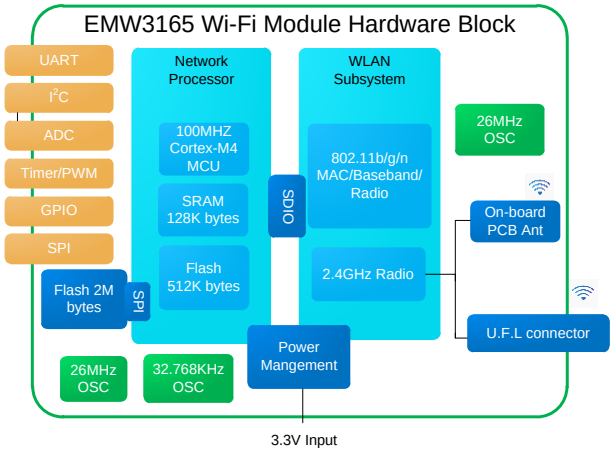
Applications

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

Module model

Part number	Antenna type	
EMW3165	PCB antenna	Default
EMW316-E	IPX antenna	Optional

Hardware Block Diagram



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1. Description

EMW3165 is one embedded Wi-Fi module designed by MXCHIP of low-power, small-size and low-cost. It integrates one Cortex-M4 microcontroller of 128Kbytes RAM and 512Kbytes 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 are reserved for some typical applications, like UART to Wi-Fi DTU, easylink configuration and services for cloud interfacing.

EMW3165 appearance:

Figure 1 EMW3165

Figure 2 EMW3165-E

EMW3165 contains four main parts as showed in Figure 3:

- Cortex-M4 processor
- WLAN MAC/BB/RF/ANT
- Peripherals
- Power management

(1) Cortex-M4 CPU, up to 100MHz operating frequency, integrated128KB SRAM, 512 KB Flash.

(2) 2MB SPI Flash for customized firmware

(3) Supports PCB antenna or IPEX external antenna

(4) Operating voltage: DC 3.3V

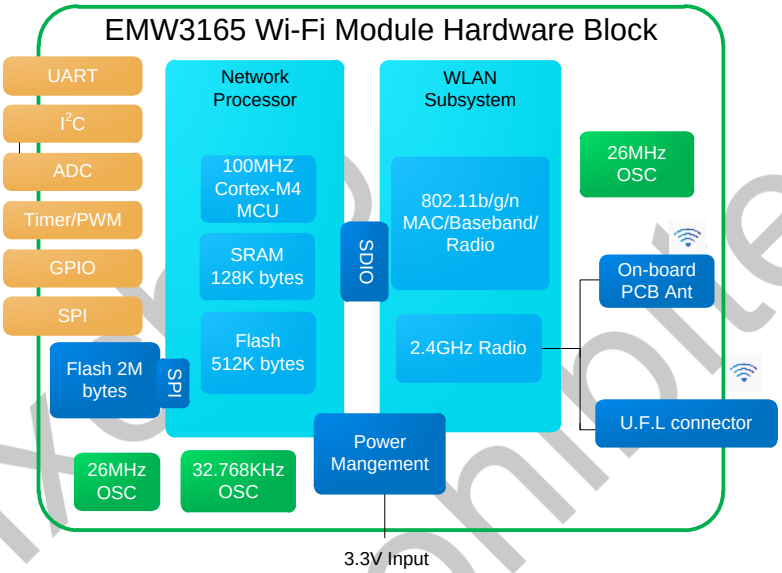


Figure 3 EMW3165 Hardware Block Diagram

2. Pinouts

2.1. Pinouts

EMW3165 owns two groups of pins (1X20 + 1X21). The lead pitch is 1mm.

EMW3165 has half-hole footprint fit for hand-soldering

EMW3165 pin outs :

Figure 4 Half-hole package dimension

2.2. Pin Assignments

Table 1 EMW3165 Pin Description

Pins	Name	Type	I/O level	Function	Note
1	-	-	-	Not connected	NC
2	PB2	I/O	FT	BOOT1	√
3	-	-	-	Not connected	NC
4	PA7	I/O	FT	Flash_SPI1_MOSI	×
5	PA15	I/O	FT	Flash_SPI1_NSS	×
6	PB3	I/O	FT	Flash_SPI1_SCK	×
7	PB4	I/O	FT	Flash_SPI1_MISO	×
8	PA2	I/O	FT	TIM2_CH3,TIM5_CH3,TIM9_CH1, I2S2_CKIN,USART2_TX, ADC1_2	×***DEBUG_OUT***
9	PA1	I/O	FT	TIM2_CH2,TIM5_CH2,SPI4_MOSI/I2S4_SD, USART2_RTS, ADC1_1	×（EasyLink）

Pins	Name	Type	I/O level	Function	Note
10	VBAT	S	-	-	×
11	-	-	-	Not connected	NC
12	PA3	I/O	FT	TIM2_CH4,TIM5_CH4,TIM9_CH2, I2S2_MCK,USART2_RX, ADC1_3	×***DEBUG_IN***
13	NRST	I/O	FT	RESET	×
14	PA0	I	TC	Wi-Fi wake up MCU	×
15	-	-	-	Not connected	NC
16	PC13	I/O	FT	RTC_AMP1, RTC_OUT, RTC_TS	√
17	PB10	I/O	FT	TIM2_CH3,I2C2_SCL, SPI2_SCK/I2S2_CK,I2S3_MCK	√
18	PB9	I/O	FT	TIM4_CH4,TIM11_CH1,I2C1_SDA, SPI2_NSS/I2S2_WS,I2C2_SDA	√
19	PB12	I/O	FT	TIM1_BKIN,I2C2_SMBA,SPI2_NSS/I2S2_WS, SPI4_NSS/I2S4_WS, SPI3_SCK/I2S3_CK	√
20	GND	S	-	-	×
21	GND	S	-	-	×
22	-	-	-	Not connected	NC
23	-	-	-	Not connected	NC
24	-	-	-	Not connected	NC
25	PA14	I/O	FT	SWD_SWCLK	×
26	PA13	I/O	FT	SWD_SWDIO	×
27	PA12	I/O	FT	TIM1_ETR, SPI5_MISO, USART1_RTS, USART6_RX, USB_FS_DP	√
28	-	-	-	Not connected	NC
29	PA10	I/O	FT	TIM1_CH3, SPI5_MOSI/I2S5_SD, USART1_RX, USB_FS_ID	√ ***USER_UART_RX***
30	PB6	I/O	FT	TIM4_CH1, I2C1_SCL, USART1_TX	√ ***USER_UART_TX***
31	PB8	I/O	FT	TIM4_CH3, TIM10_CH1,I2C1_SCL, SPI5_MOSI/I2S5_SD, I2C3_SDA	√
32	-	-	-	Not connected	NC
33	PB13	I/O	FT	TIM1_CH1N, SPI2_SCK/I2S2_CK,	√

Pins	Name	Type	I/O level	Function	Note
				SPI4_SCK/I2S4_CK,	
34	PA5	I/O	TC	TIM2_CH1/TIM2_ET, SPI1_SCK/I2S1_CK, ADC1_5	√
35	PA11	I/O	FT	TIM1_CH4, SPI4_MISO, USART1_CTS, USART6_TX, USB_FS_DM	√
36	PB1	I/O	FT	TIM1_CH3N, TIM3_CH4, SPI5_NSS/I2S5_WS, ADC1_9	× (BOOT)
37	PB0	I/O	FT	TIM1_CH2N,TIM3_CH3, SPI5_SCK/I2S5_CK, ADC1_8	×STATUS
38	PA4	I/O	TC	SPI1_NSS/I2S1_WS,SPI3_NSS/I2S3_WS, USART2_CK, ADC1_4	√
39	VDD	S	-	-	×
40	VDD	S	-	-	×
41	ANT	-	-	External Antenna 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 "STM32F411Xe reference" for more details of the pins.

Important Note:

If developers build an application based on MICO system, they can define or modify the function for every pin on EMW3165.

The pin arrangement of the firmware MXCHIP developed could take the Application Note as a reference.

Download link:

http://www.joinmx.com/uploadfiles/soft/EMW/RM0001E_mxchipWNet_DTU_V4_1.pdf

3. Electrical Parameters

3.1. Operating Ratings

EMW3165 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.

Voltage conditions:

Table 2 Voltage Conditions

Symbol	Description	Condition	Detail			
			Min.	Typ.	Max.	Unit
VDD	Power supply		3.0	3.3	3.6	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	

3.2. 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

3.3. Current Consumption

3.3.1. Wi-Fi Subsystem

Current consumption on Wi-Fi Subsystem:

Table 5 Current Consumption on Wi-Fi Subsystem

Symbol	Note	Conditions	Typical	Unit
I_{RF}	OFF1		2	μA
I_{RF}	SLEEP[4]	-	200	μA
I_{RF}	Rx(Listen)[2]	-	52	mA
I_{RF}	Rx(Active)[3]	-	59	mA
I_{RF}	Power Save[5, 6]	-	1.9	mA
I_{RF}	Tx CCK[7, 10]	11 Mbps at 18.5dBm	320	mA
I_{RF}	Tx OFDM[8 ,10]	54 Mbps at 15.5dBm	270	mA
I_{RF}	Tx OFDM[9 ,10]	65 Mbps at 14.5dBm	260	mA

Notes:

1. Power is off.
2. Carrier Sense (CCA) when no carrier present
3. Carrier Sense (CS) detect/Packet Rx
4. Intra-beacon Sleep
5. Beacon Interval = 102.4ms, DTIM = 1, Beacon duration = 1ms @1 Mbps. Integrated Sleep + wakeup + Beacon Rx current over 1 DTIM interval.

6. In WLAN power-saving mode, the following blocks are powered down: Crystal oscillator, Baseband PLL, AFE, RF PLL and Radio.
7. CCK power at chip port. Duty cycle is 100%. Includes PA contribution.
8. OFDM power at chip port. Duty cycle is 100%. Includes PA contribution.
9. OFDM power at chip port is 16dBm, duty cycle is 100%, includes PA contribution.
10. Absolute junction temperature limits maintained through active thermal monitoring and dynamic TX duty cycle limiting.

3.3.2. Microcontroller Subsystem

Typical and maximum current consumption in Run mode, code with data processing running from Flash memory (ART accelerator enabled) or RAM.

Typical and maximum current consumption in Run mode:

Table 6 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	21.0	23.3	mA
		84	17.0	19.2	
		64	12.0	13.2	
		50	9.5	10.4	
		20	4.5	5.8	
	External clock, all peripherals disabled	100	12.0	14.6	
		84	10.0	11.9	
		64	7.0	8.4	
		50	5.5	6.6	
		20	2.5	3.7	

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	3.0	μA
		RTC and LSE OFF	2.1	

3.3.3. Power Consumption in Typical Operation Mode

Current consumption of EMW3165 in typical operation mode:

Table 8 Power Consumption in Typical Operation Mode

Symbol	Item	Conditions	Min	Ave	Max	Unit
			Ta=25°C			
I_{Module}	Total power consumption on EMW3165 module	No Wi-Fi data is transmitting[1]	2.8	7.2	75	mA
		Receive data in UDP mode, 20kbps[1]	2.8	12	262	mA
		Send data in UDP mode, 20kbps[1]	3	24	280	mA
		RF off, MCU enter standby mode[2]	37	40	45	μA
		Connecting to AP	52	74	340	mA

Note 1: TA=25°C, MCU frequency=100MHz, with data processing running from Flash memory (ART accelerator enabled). Firmware process TCP/IP stack and IEEE 802.11 MAC every 250 ms, enter stop mode when no task is pending. Wi-Fi subsystem is connected to an access point and run under power save mode in IEEE 802.11n@14.5 dBm TX power. AP Beacon Interval = 100ms, DTIM = 1.

Note 2: Wi-Fi connection is disconnected.

Note 3: These data may not be the same depend on different firmware functions.

3.4. I/O Port Characteristics

3.4.1. I/O Static Characteristics

GPIO static characteristics:

Table 9 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
	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	All pins	VIN=VSS	30	40	50	kΩ

Symbol	Item		Conditions	Min	Typical	Max	Unit
	pull-up equivalent resistor	except for PA10					
		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

3.4.2. RESET pin characteristics

The RESET pin input driver uses CMOS technology. It is connected to a permanent pull-up resistor, RPU. EMW3165 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 10 RESET Pin Characteristics

Symbol	Item	Conditions	Min	Typical	Max	Unit
VF(NRST)	NRST Input filtered pulse	-	–0.5	-	0.8	V
VNF(NRST)	NRST Input not filtered pulse	-	2	-	VDD+0.	
RPU	Resistor for Pulling up	VIN= VSS	30	40	50	kΩ
TNRST_OU	Generated reset pulse	Internal Reset	20	-	-	us

3.5. Temperature and Humidity

Temperature and humidity condition of EMW 3165:

Table 11 Temperature and Humidity conditions

Symbol	Name	Range	Unit
TSTG	Storage Temperature	-40 to +85	℃
TA	Operating Temperature	-30 to +85	℃
Humidity	Non-condensing, relative humidity	<95	%

3.6. ESD

Table 12 ESD Parameters

Symbol	Name	Spec	Rank	Max.	Unit
V_{ESD}(HBM)	Electronics Static Discharge (Human Body Model)	TA= +25 °C JESD22-A114	2	2000	V
V_{ESD}(CDM)	Electronics Static Discharge (Charge Device Model)	TA = +25 °C JESD22-C101	II	500	

3.7. Static latch-up

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

Static latch-up:

Table 13 Static latch-up

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

3.8. Other MCU electrical parameters

Please refer to STM32F411xE datasheet for more information

4.RF Parameters

4.1. Basic RF Parameters

Table 14 RF Parameters

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)

4.2. IEEE802.11b mode

IEEE802.11b mode specification:

Table 15 IEEE802.11b Mode Specification

Item	Specification
Modulation Type	DSSS / CCK
Frequency range	2400MHz~2484MHz
Channel	CH1 to CH14
Data rate	1, 2, 5.5, 11Mbps

IEEE802.11b mode TX characteristics:

Table 16 IEEE802.11b Mode TX Characteristics

TX Characteristics	Min.	Test Data	Max.	Unit
Transmitter Output Power				
11bTarget Power	13.5	16.2	16.5	dBm
Spectrum Mask @ target power				
fc +/-11MHz to +/-22MHz	-	-41.73	-30	dBr
fc > +/-22MHz	-	-51.89	-50	dBr
Frequency Error	-20	3.9	+ 20	ppm
Constellation Error(peak EVM)@ target power				
1~11Mbps	-	-25.52	-9	dB

IEEE802.11b mode RX characteristics:

Table 17 IEEE802.11b Mode RX Characteristic

RX Characteristics	Min.	Test data	Max.	Unit
Minimum Input Level Sensitivity				
1Mbps (FER≦8%)	-	-87	-83	dBm
2Mbps (FER≦8%)	-	-85	-80	dBm
5.5Mbps (FER≦8%)	-	-83	-79	dBm
11Mbps (FER≦8%)	-	-80	-76	dBm

4.3. IEEE802.11g mode

IEEE802.11g mode specification:

Table 18 IEEE802.11g Mode Specification

Item	Specification
Modulation Type	OFDM
Frequency range	2400MHz~2484MHz
Channel	CH1 to CH14
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps

IEEE802.11g mode TX characteristics:

Table 19 IEEE802.11g Mode TX Characteristics

TX Characteristics	Min.	Test data	Max.	Unit
Transmitter Output Power				
11gTarget Power	11.5	14.16	14.5	dBm
Spectrum Mask @ target power				
fc +/-11MHz	-	-31.61	-20	dBr
fc +/-20MHz	-	-40.73	-28	dBr
fc > +/-30MHz	-	-43.54	-40	dBr
Frequency Error	-20	3.9	+ 20	ppm
Constellation Error(peak EVM)@ target power				
54Mbps		-28.52	-25	dB

IEEE802.11g mode RX characteristics:

Table 20 IEEE802.11g Mode RX Characteristic

RX Characteristics	Min.	Test data	Max.	Unit
Minimum Input Level Sensitivity				
6Mbps (FER≦10%)	-	-87	-82	dBm
9Mbps (FER≦10%)	-	-85	-80	dBm
12Mbps (FER≦10%)	-	-84	-79	dBm
18Mbps (FER≦10%)	-	-82	-77	dBm
24Mbps (FER≦10%)	-	-80	-74	dBm
36Mbps (FER≦10%)	-	-79	-70	dBm
48Mbps (FER≦10%)	-	-77	-66	dBm
54Mbps (FER≦10%)	-	-75	-65	dBm

4.4. IEEE802.11n 20MHz bandwidth mode

IEEE802.11n mode specification:

Table 21 IEEE802.11n Mode Specification

Item	Specification
Modulation Type	MIMO-OFDM
Channel	CH1 to CH14
Data rate	MCS0/1/2/3/4/5/6/7

IEEE802.11n mode TX characteristics:

Table 22 IEEE802.11n mode TX characteristics

TX Characteristics	Min.	Test data	Max.	Unit
Transmitter Output Power				
11n HT20 Target Power	10.5	13.43	13.5	dBm
Spectrum Mask @ target power				
fc +/-11MHz	-	-30.23	-20	dBr
fc +/-20MHz	-	-38.48	-28	dBr
fc > +/-30MHz	-	-44.8	-40	dBr
Frequency Error	-20	3.9	+ 20	ppm
Constellation Error(peak EVM)@ target power				
MCS7	-	-28.59	-28	dB

IEEE802.11n mode RX characteristics:

Table 23 IEEE802.11n mode RX characteristics

RX Characteristics	Min.	Test data	Max.	Unit
Minimum Input Level Sensitivity				
MCS0 (FER≦10%)	-	-85	-82	dBm
MCS1 (FER≦10%)	-	-83	-79	dBm
MCS2 (FER≦10%)	-	-82	-77	dBm
MCS3 (FER≦10%)	-	-80	-74	dBm
MCS4 (FER≦10%)	-	-78	-70	dBm
MCS5 (FER≦10%)	-	-74	-66	dBm

RX Characteristics	Min.	Test data	Max.	Unit
MCS6 (FER≦10%)	-	-72	-65	dBm
MCS7 (FER≦10%)	-	-69	-64	dBm

5.Antenna Information

5.1. 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.

EMW3165 loads the resistance (0Ω/0402) in the red box, it means user can use PCB antenna. If user want 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 switch the resistance from red box to yellow box, user can use antenna pad (pin 41).

Type of antenna:

Figure 5 EWM3165

Figure 6 EMW3165-E

Figure 7 EMW3165-B

5.2. 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 :

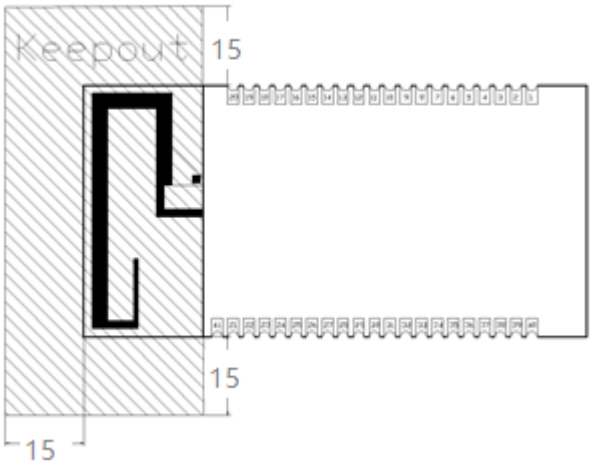


Figure 8 Minimum Size of Keep-out Zone around Antenna

5.3. Connector for External Antenna

EMW3165 use U.F.L type RF connector for external antenna connection.

Mechanical dimensions of U.F.L RF connector:

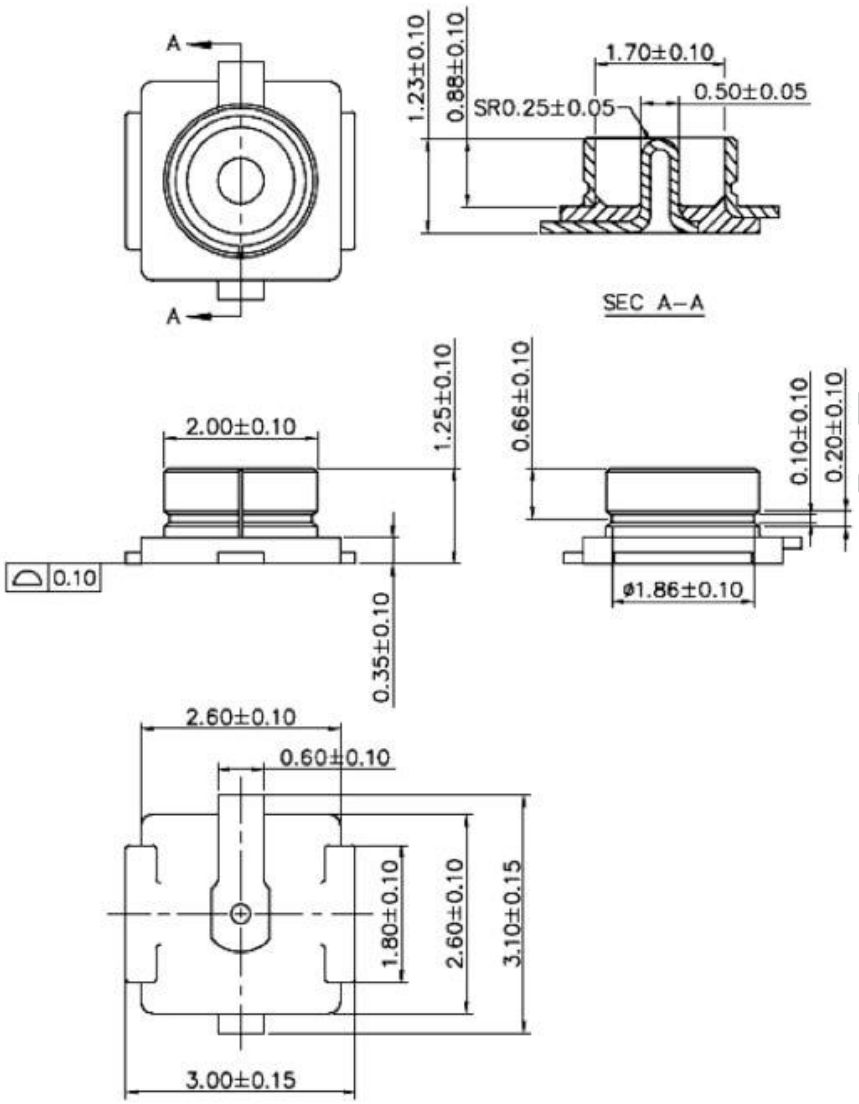


Figure 9 Dimension of connector for external antenna

Recommended external antenna:

Part number F020-000X

Gain: 2.0dBi

6.Manufactory Information

6.1. Mechanical Dimensions

EMW3165 top view (Unit: mm):

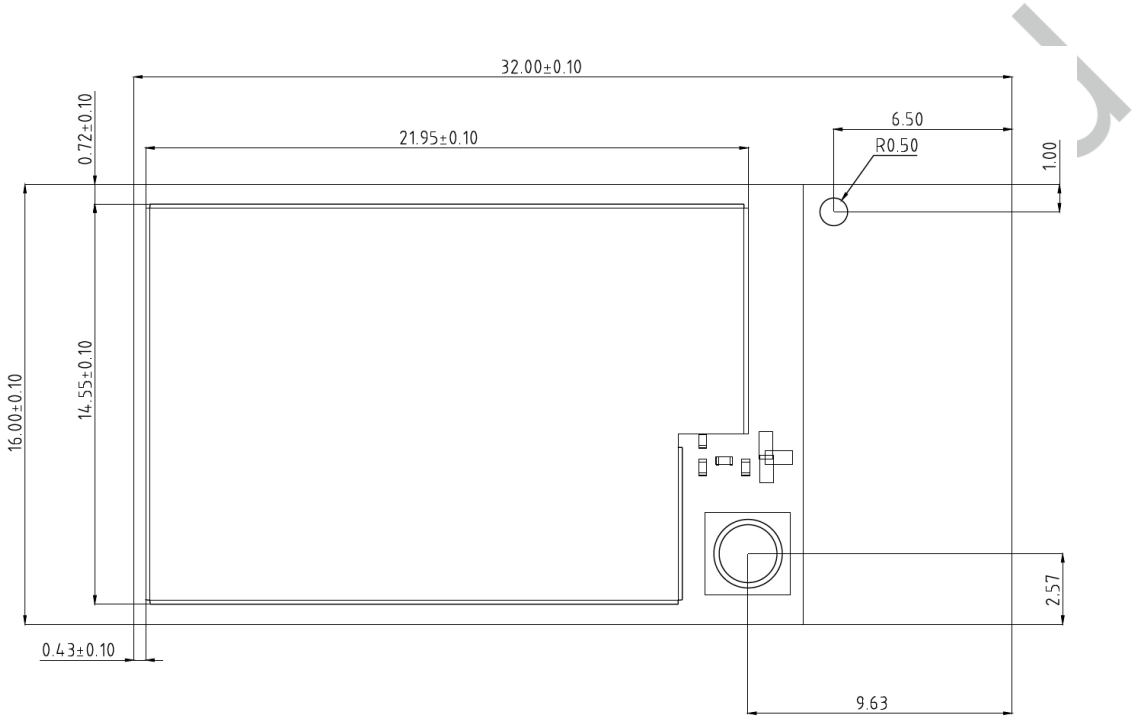


Figure 10 EMW3165 Top View

EMW3165 side view (Unit: mm):

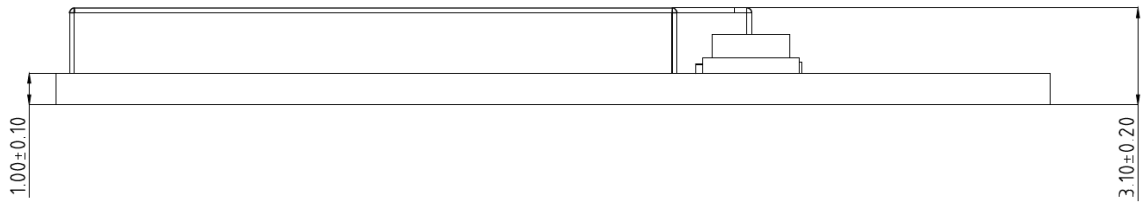


Figure 11 EMW3165 Side View

6.2. Recommended Footprint Design

Recommended footprint (Unit: mm):

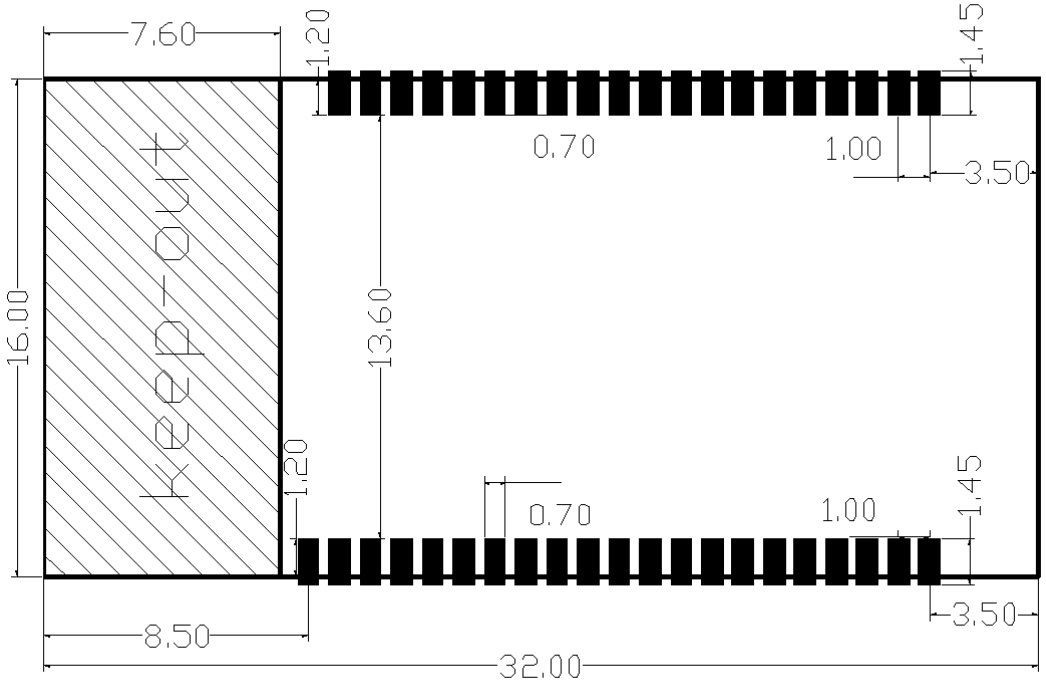


Figure 12 Recommended Footprint

6.3. Manufactory Instruction

1. The module of MXHCIP must be mounted in 24 hours after burning. It must be vacuum packaging again if the mounting could not be finished in 24 hours. The half-hole soldering must use SMT for mounting and toasting is necessary for the module before mountin

   Device for SMT:

   1.1.Reflow soldering SMT machine.

   1.2.AOI testing machine.

   1.3.Suction nozzle with 6-8mm aperture.

   Device for toasting:

   1.1.Cabinet type oven.

1.2.Static-free and high-temperature pallet.

1.3.Static-free and high-temperature gloves.

2. The storage condition of the module:

2.1.Temperature <30°C, Humidity < 85%RH.

2.2.The shelf life is 6 months from the package time.

2.3.The Humidity Card is packaged in the sealed package.

3. Toasting is necessary. The Humidity Card and situations of toasting are listed below.

Figure 13 Humidity Indicator

3.1.When opened, toasting for 2 hours if the Humidity Indicator shows blue all of the three levels;

3.2.When opened, toasting for 4 hours if the Humidity Indicator shows pink of 30% level;

3.3.When opened, toasting for 6 hours if the Humidity Indicator shows pink both of 30% and 40% level;

3.4.When opened, toasting for 12 hours if the Humidity Indicator shows pink all of the three levels

Toasting parameters:

- Toasting temperature: 125°C +/- 5°C;
- Alarm temperature: 130°C;
- Mount after cooling below 36°C;
- Drying times: one time;
- Toast again if no soldering done in 12 hours;

SMT is prohibited if sealed off over 3 months.

ESD protection is necessary before SMT.

SMT must follow the reflow profile. Peak temperature is 245°C.

To make sure the qualified rate, eyeballing and AOI testing for 10% of the products at first time mounting are necessary. After that, 5-10 pieces module need eyeballing and AOI testing every hour.

6.4. Notes

1. Operators need ware static-free glove when manufacturing.
2. Toasting time could not be expired.
3. Explosive, flammable and corrosive material is prohibited when toasting.
4. Make sure the oven sealed when toasting.
5. Keep away the module from the oven wall and keep the ventilation in the modules which are placed on high-temperature pallet.
6. Do not open the oven when toasting.
7. Take the modules out with the static-free glove after cooling below 36°C.

8. Keep away from water and dirty staff when operating.
9. The temperature and humidity control level is level 3. Storage and toasting conditions follow the "IPC/JEDEC J-STD-020".

6.5. Recommended Reflow Profile

Solder paste recommendations: SAC305, Lead -Free solder paste.

Reflow times<= 2times (Max.)

1.Max Rising Slope : 3℃/sec

2.Max Falling Slope: -3 ℃/sec

3.Soaking Time(150℃~180℃): 60sec~120sec

4.Over 217℃ Time:60sec~120sec ;

5.Peak Temp.240℃~250℃

Recommended reflow profile:

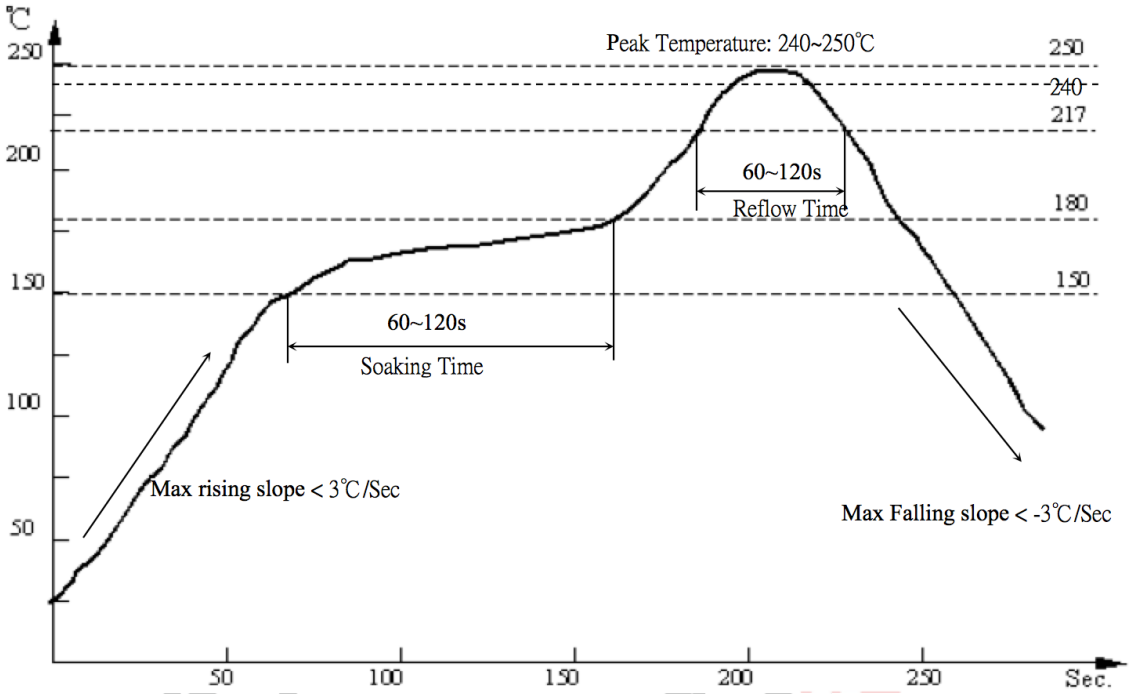


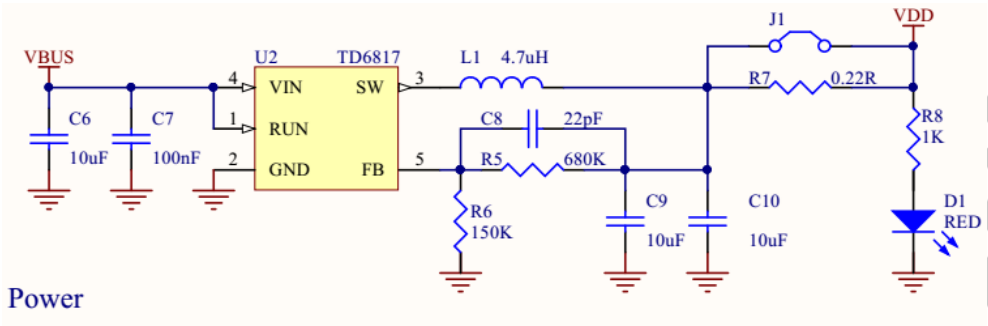
Figure 14 Recommended Reflow Profile

6.6. MSL/Storage Condition

Figure 15 MSL/Storage Condition

7. Reference Circuit

The recommended power supply circuit for EMW3165:



The recommended USB to Serial circuit for EMW3165:

Figure 16 Power reference circuit

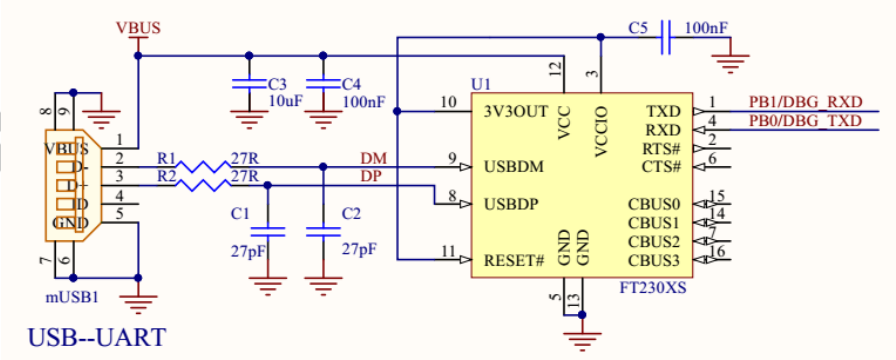


Figure 17 USB to serial reference circuit

The recommended external circuit design for EMW3165:

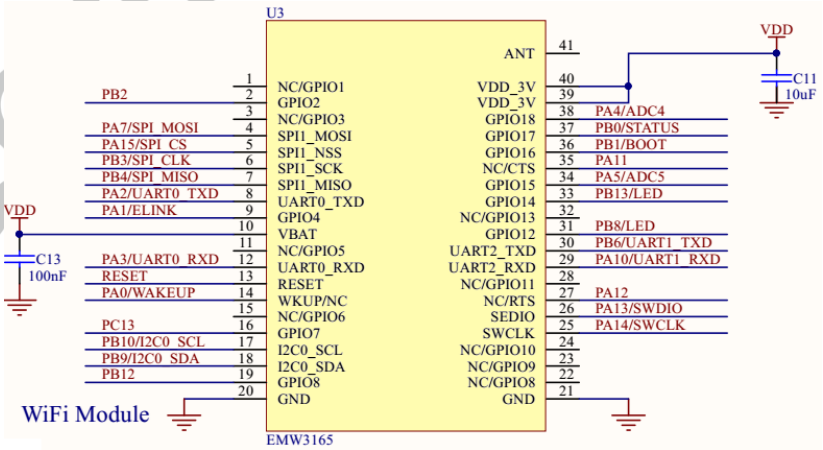


Figure 18 External Circuit Design

EMW3165 UART is 3.3V UART. If UART of user’ s chip is 5V, it is necessary to convert UART from 5V to 3V so that it can communicate with EMW3165. Please refer to Figure 19 for the conversion circuit.

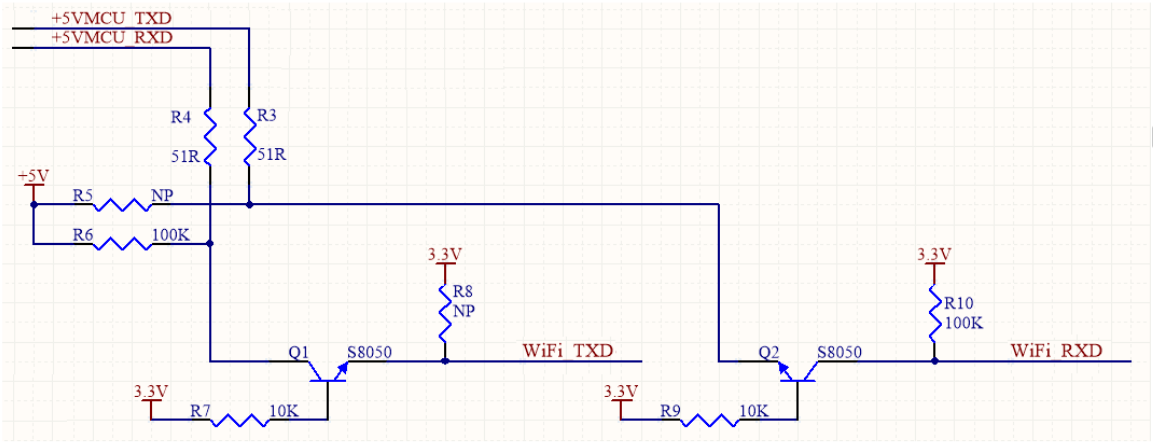


Figure 19 5V UART- 3.3V UART conversion reference circuit

8. Sales Information and Technical Support

If you need to buy this product, please call MXCHIP during the working hours. (Monday ~ Friday A.M.9:00~12:00; P.M. 1:00~6:00)

Telephone: +86-21-52655026 / 52655025

Email: sales@mxchip.com

Postcode: 200333

Contact address: 9F, 5 Building, No.2145 Jinshajiang Road, Shanghai, China

9.Version history

Date	Version	Update
2015-1-26	1.0	Initial version
2015-7-3	1.1	1. Update “antenna types” 2. Update ” recommend packaging size”
2015-9-10	1.2	Update “ Function introduction”
2015-12-21	1.3	Update the power consumption
2016-5-31	1.4	Update 5V UART- 3.3V UART conversion reference circuit