EMW110

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Ver1.7

About this document

This document is about EMW110 MCU WIFI module’s hardware specification, and it contains below contents:

Chapter	Title	Content
Chapter 1	Brief introduction	Main specification introduction
Chapter 2	Pin definition	Pin assignment and description
Chapter 3	Function description	Function and IO description, including CPU, Flash, RAM and interfaces
Chapter 4	Electrical parameters	Electrical parameters

Version history:

Date	Version	Release note
2017.7	V1.0	First version
2017.8	V1.1	Update mechanical drawing
2017.9.8	V1.2	Update
2017.10.12	V1.3	Update flash size
2017.11.08	V1.4	Update Section3.5 working mode truth table
2017.12.19	V1.5	Section3.4.1, add UART support for 8 bit data
2018.1.5	V1.6	Update figure 2-1 Dimension Top view
2018.3.2	V1.7	Update test data

Content

1. Product Introduction

EMW100 is a MCU WIFI module with dimension 18 mm x 20 mm x 3 mm. It supports 2dBi PCB antenna or IPEX connector.

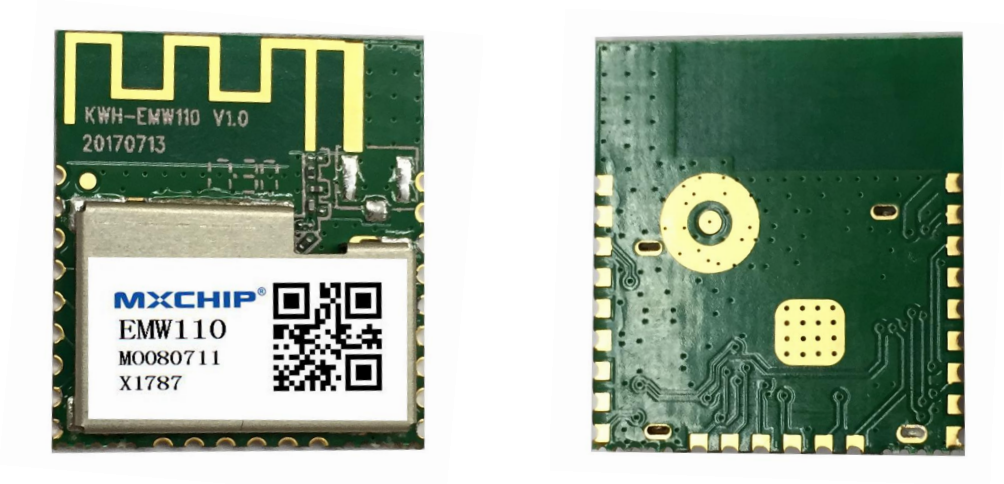


Figure 1-1. EMW110

Table 1-1. EMW110 Specification

Type	Item	Specification
Wireless	Certification	SRRC/FCC/CE
	Wi-Fi protocol	802.11 b/g/n
	Frequency	2412MHz ~ 2472MHz
Hardware	Interface	UART×2，SPI×1，USB×1，ADC×1
	Operating voltage	3.0V ~ 3.6V
	Current	Average:80 mA
	Operating temperature	-20° C ~ 70° C
	Storage temperature	-40° C ~ 85° C
	Dimension	18 mm x 20 mm x 3 mm
Software	WiFi mode	Station，SoftAP，SoftAP + Station
	Encyption	WPA/WPA2/WEP/TKIP/AES
	Firmware programming	SPI/UART/OTA/
	Software development	AT command
		Develop by SDK
	Network protocol	IPv4/IPv6，TCP/UDP/HTTP/FTP/HTTPS/SSL/MQTT
	IOT Cloud support	Aliyun, Amazon, JD, Suning, Huawei, Microsoft

2. Pin Definition

EMW110 Pin assignment Top view（Unit: mm)

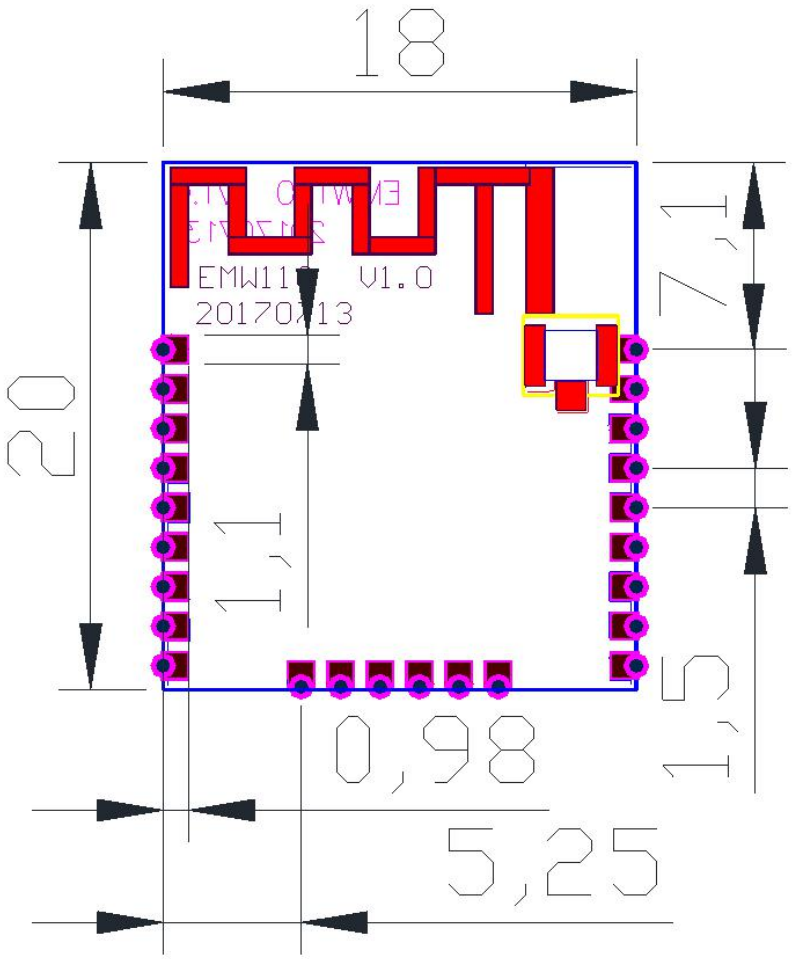


Figure 2-1. EMW110 Dimension Top view

Table 2-1. EMW110 Dimension

Length	Width	Height	PAD size(bottom)	Pitch size
18mm	20 mm	2.8 mm	3.0mm x 3.2 mm	1.5 mm

Table 2-2. EMW110 Pin Definition

NO.	Name	Funtion
1	VCC_3V3	3.3V power supply (VDD) Note: The max current of power supply should be above 500mA.
2	CHIP_EN	Chip Enable. Internal Pull High in module.
3	GPIO_14	GPIO14/SD_CLK/SPI_CLK
4	GPIO_17	GPIO17/SD_DATA1/SPI_MISO
5	GPIO_16	GPIO16/SD_DATA0/SPI_MOSI
6	GPIO_15	GPIO15/SD_CMD/SPI_CSN
7	GPIO_11	GPIO11/UART1_TX（debug UART-TX）
8	GPIO_10	GPIO10/UART1_RX（debug UART-RX）
9	GND	Ground
10	VDD_FLASH	Power supply for internal flash（for firmware programming）
11	DIG_TEST	Digital test enable，active high(for firmware programming)
12	FLASH_SCK	GPIO20/I2C1_SCL/JTAG_TCK/FLASH_SCK（for firmware programming）
13	FLASH_CSN	GPIO21/I2C1_SDA/JTAG_TMS/FLASH_CSN（for firmware programming）
14	FLASH_SI	GPIO22/XHO/JTAG_TDI/FASH_SI（for firmware programming）
15	FLASH_SO	GPIO23/JTAG_TDO/FLASH_SO（for firmware programming）
16	GPIO_30	GPIO30/USB_DN
17	GPIO_01	GPIO1/ I2C2_SDA/UART2_RX（user UART-RX）
18	GPIO_31	GPIO31/ I2C2_SCL/UART2_TX（user UART-TX）
19	GND	Ground
20	GPIO_29	GPIO29/USB_DP
21	NC	Not connected
22	GPIO_4	GPIO4/ADC1
23	GND	Ground

24	GND	Ground

3. Function description

3.1. MCU

EMW110 integrates ARM9 MCU with frequency up to 120MHz.

3.2. RAM, Flash

EMW110 integrates 256Kbytes RAM, and 2Mbytes Flash.

3.3. Clock

EMW110 should work with 26MHz crystal, with 10pF load capacitor, ±10 PPM accuracy.

3.4. Interface

3.4.1 UART

There are two UARTs in EMW110: user UART and debug UART. The max baud rate can be up to 6Mpbs. It supports 5/6/7/8 bit data.

3.4.2 SPI

EWM110 supports high speed SPI with clock frequency up to 50MHz.

Support master and slave mode.

SDIO (in the same pins with SPI) supports master and slave mode with clock frequency up to 50MHz.

3.4.3 I2C

There are two I2C in EMW110, and the max frequency is 400kHz.

3.4.4 USB

Support full speed USB2.0 protocol. Support host and device.

3.4.5 ADC

Support 10-13 bit output.

3.4.6 GPIO

Support up to 14 GPIOs. Every GPIO supports interrupt, and can be wake up pin in sleep mode.

3.4.7 CHIP_EN

CHIP_EN is system enable pin. When in high voltage, module is on. When in low voltage, module is off. Please make sure CHIP_EN is high when power on.

3.4. Software programming

There are 6 test pins in the bottom, and they are connected with module pin10~15.

These 6 pins and GPIO_4, GPIO_14 are used for software programming.

Table 3-1. Programming mode and working mode Truth table

Pin	Programming mode	Working mode
DIGTEST	H	L/NC
VDDFLASH	H	/
IO04	H	/
IO14	L/NC	/

3.5. Working mode

EMW110 supports four working modes: bootloader mode, normal work mode, ATE test mode, and QC mode. These mode are configured by three pins: BOOT, STATUS, ELINK.

Note: in below table, 1 means high voltage level, 0 means low voltage level. All the three IOs are internally initialized as input pull high.

Table 3-2. Working mode truth table

Pin	GPIO_31	GPIO_30	GPIO_29
Pin Function	BOOT	STATUS	ELINK
Bootloader mode	0	1	1
Normal work mode	1	x	x
ATE test (RF test)	0	1	0
QC mode	0	0	1

4. Electrical parameters

Note: test condition VDD=3.3V, temperature *25° C*

4.1. Absolute maximum rating

Table **4-1.** Absolute maximum rating

Item	Specification	Value	Unit
Storage temperature	_	-40 ~ 85	℃
Maximum soldering temperature	_	260	℃
Operating voltage	IPC/JEDEC J-STD-020	3.0 ~ 3.6	V

4.2. Operating condition

Table 4-2. Operating condition

Item	Symbol	Min.	Typ.	Max.	Unit
Operating temperature	_	-20	20	80	℃
Operating voltage	VDD	3.0	3.3	3.6	V

4.3. Digital IO characteristic

Table 4-3. Digital IO characteristics

Item	Symbol	Min.	Max.	Unit
Input low	VIL	-0.3	-0.25 VDD	V
Input high	VIH	0.75 VDD	-VDD + 0.3	V
Output low	VOL	N	0.1 VDD	V
Output high	VOH	0.8 VDD	N	V

4.4. RF parameters

Table 4-4. RF parameter

Item	Min.	Max.	Unit
Frequency	2412	2472	MHz
Out Power			
802.11b 11Mbps	17	17.7	dBm
802.11g 54Mbps	12.1	12.7	dBm
802.11n HT20 MCS7	11.1	11.7	dBm
EVM			
802.11b 11Mbps	-23.6	-23.8	
802.11g 54Mbps	-27.6	-25.5	dB

802.11n HT20 MCS7	-30.2	-28.9	dB
Min Sensitivity			
802.11b 11Mbps	-90	-89	dBm
802.11g 54Mbps	-74	-75	dBm
802.11n HT20 MCS7	-70	-68	dBm
Frequency error			
802.11b 11Mbps	-1.1	-0.5	ppm
802.11g 54Mbps	-1.1	-0.8	ppm
802.11n HT20 MCS7	-1.3	-0.9	ppm

4.5. Power consumption

Test condition: VDD=3.3V, temperature *25° C*

Table 4-5. Power consumption

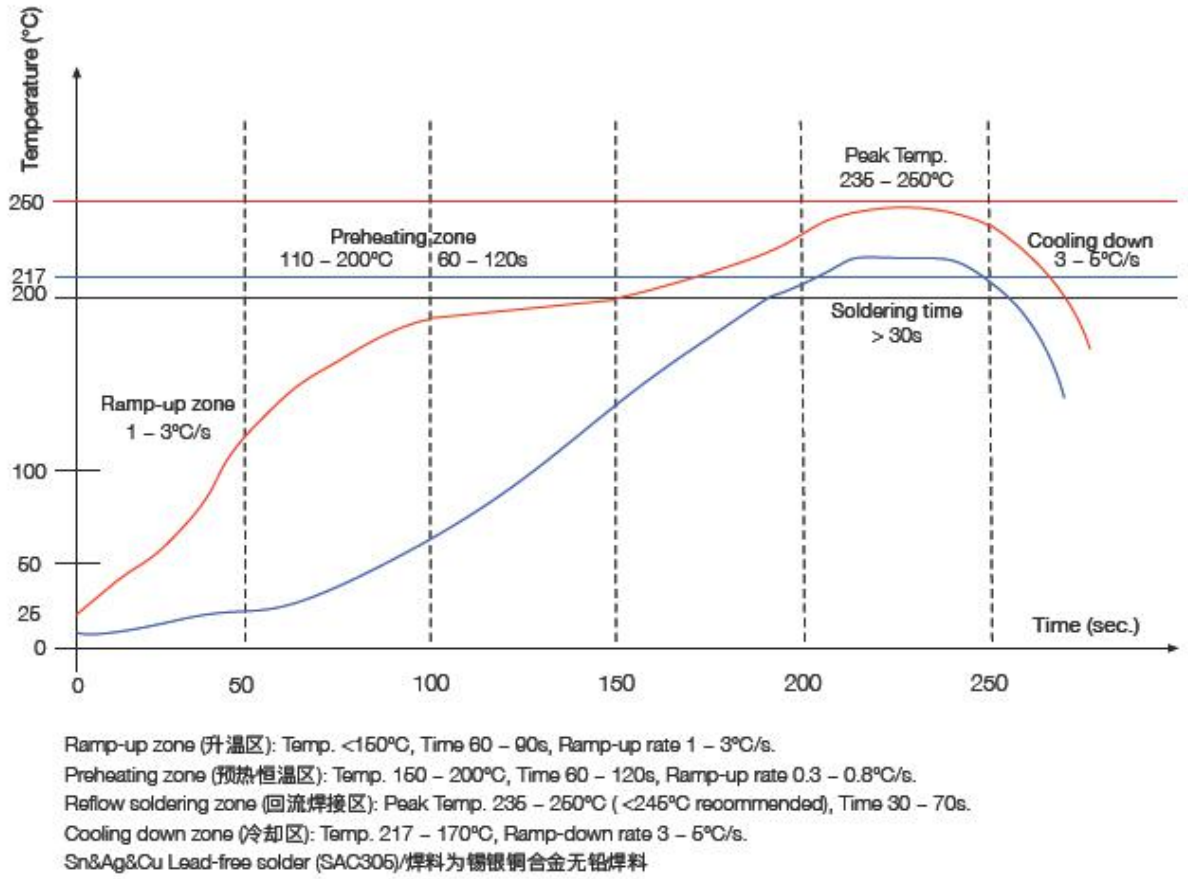
Mode	Description	Min.	Typ.	Max.	Unit
RF transmission	Output power 12dBm		170		mA
RF receive	In sensitivity test mode		110		mA
Sleep	All MCU status keep，MCU stop running		100		uA
Standby	All power off, support wake up by GPIO and internal Timer		10		uA

4.6. Electro-Static discharge

Table 4-6. ESD parameter

Name	Symbol	Specification	Level	Max.	Unit
ESD(Human Body Mode)	VESD (HBM)	T:23 ±5℃ Follow ANSI / ESDA / JEDEC JS - 001 - 2014	2	2000	V
ESD(Charged Device Mode)	VESD (CDM)	T:23 ±5℃ Follow JEDEC EIA / JESD22 - C101F	C2	500	V

4.7. Re-flow temperature curve



Ramp-up zone (升温区): Temp. <150°C, Time 60 – 90s, Ramp-up rate 1 – 3°C/s.
Preheating zone (预热恒温区): Temp. 150 – 200°C, Time 60 – 120s, Ramp-up rate 0.3 – 0.8°C/s.
Reflow soldering zone (回流焊接区): Peak Temp. 235 – 260°C (<245°C recommended), Time 30 – 70s.
Cooling down zone (冷却区): Temp. 217 – 170°C, Ramp-down rate 3 – 6°C/s.
Sn&Ag&Cu Lead-free solder (SAC305)/焊料为锡银铜合金无铅焊料

Figure 4-1. EMW110 re-flow temperature curve

5. Packing information

Part number	MOQ(pcs)	Packing
EMW110-P EMW110-E	600	Tray