



seeed studio
The IoT Hardware Enabler



EMW110 is a cost-effective embedded Wi-Fi module released by MXCHIP with ARM9. Maximum frequency 120MHz with 256KB SRAM and 2MB FLASH. Power supply is DC 3.3V.

Peripherals: UART×2 , SPI×1 , USB×1 , ADC×1, Up to 15 GPIOs.

Features

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

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

Application

- Intelligent lighting
- Intelligent Transportation
- Smart Home Application
- industrial automation
- Intelligent Security

EMW110 Pin assignment Top view (Unit: mm)

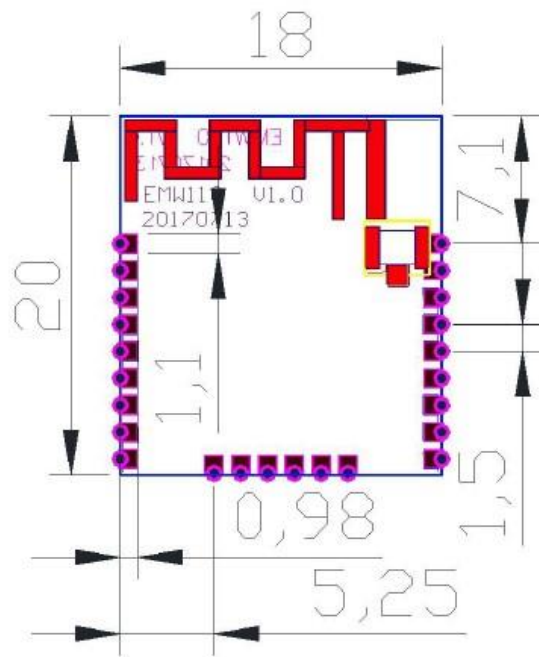


Figure 2-1. EMW110 Dimension Top view

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

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 6Mbps. It supports 5/6/7/8 bit data.
3.4.2 SPI	EMW110 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

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	°C
Maximum soldering temperature	-	260	°C
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	°C
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°C Follow ANSI / ESDA / JEDEC JS - 001 - 2014	2	2000	V
ESD(Charged Device Mode)	VESD (CDM)	T:23 ± 5°C Follow JEDEC EIA / JESD22 - C101F	C2	500	V

ECCN/HTS

HSCODE	8517709000
USHSCODE	85177000