MXCHIP®

Datasheet

EMC6083 Wi-Fi/BLE IoT Module

Built-in Wi-Fi 6 Combo SoC

2.4G Hz IEEE 802.11 b/g/n/ax, BLE 5.2, ultra-high integration, rich peripherals

Version：0.5 Date：2025-05-23 Number：DS0232EN

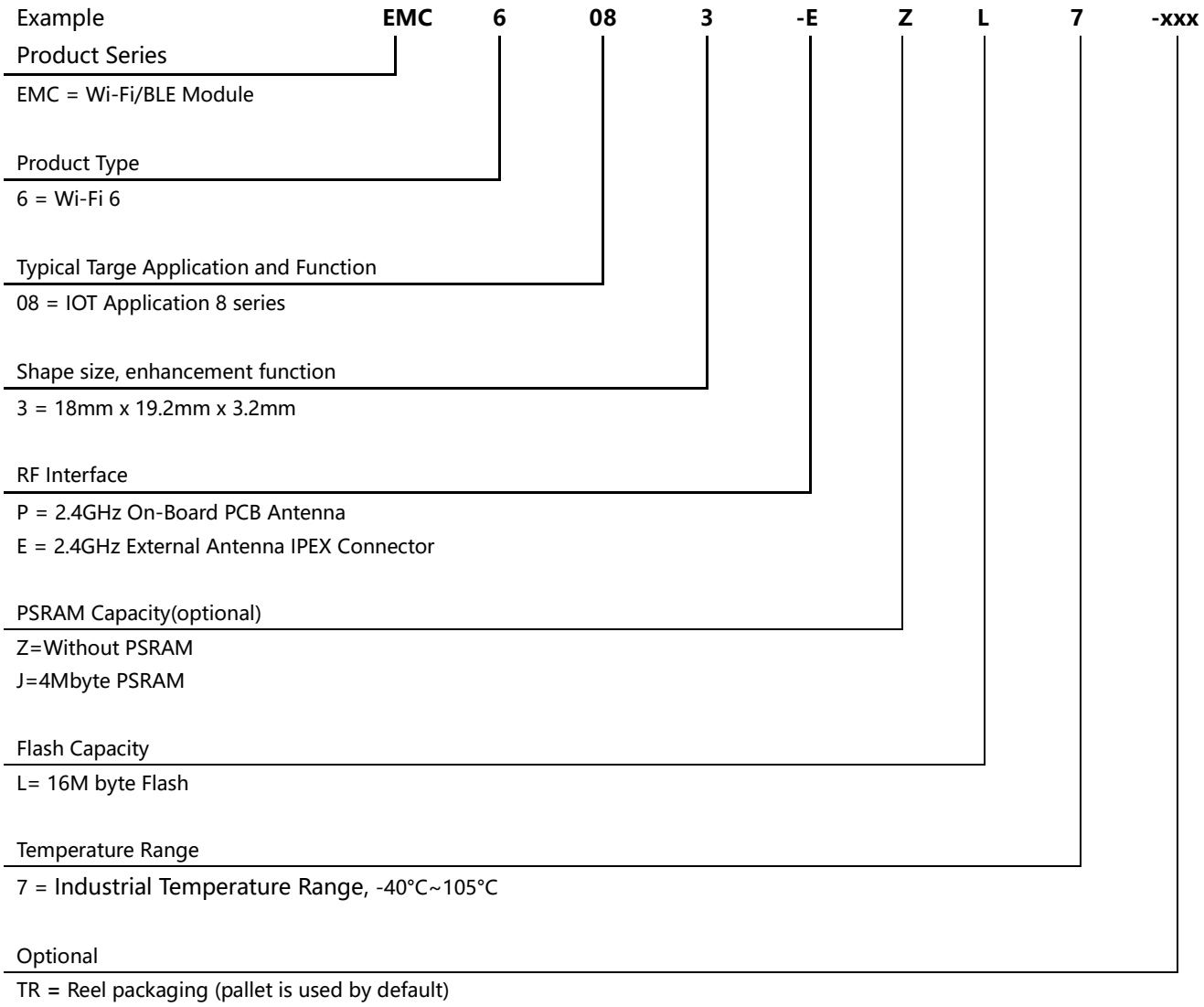
Abstract

- **Input： 3.0V~3.6V**
- **Operating temperature：-40℃ to +105℃**
- **Dual Processor(Arm Cortex-M55 and RISC-V)**
  - 32-bit processor
  - Main frequency up to 240MHz.
  - UART supporting download and debugging.
- **Memory**
  - 512KB SRAM
  - 64KB ROM
  - 8MB XIP Flash
  - 8MB external Flash
- **Wi-Fi**
  - IEEE 802.11 b/g/n/ax 1T1R .
  - Support 20/40MHz Channel bandwidth, 2.4GHz single frequency.
  - Transmitting power up to+18dBm, receiving sensitivity - 99dBm.
  - Support working mode： STA、 AP、 Direct， Concurrency AP+STA.
  - Support WPA/WPA2/WPA3.
  - Integrated BT/WLAN coexistence（PTA）.
- **Bluetooth**
  - Support BLE 5.2 Standard.
  - Support Bluetooth scattering network
  - Support SIG Mesh network communication mode that supports flooding and scattering methods.
  - Support AOA and AOD technology
  - Wi-Fi and BLE share the same PA and antenna, time-sharing multiplexing.
  - Support Bluetooth slave mode, which can be used for Bluetooth distribution network.
- **Rich Peripherals**
  - 21 x GPIO
  - 1 x SPI
  - 3 x UART

- **Interface and Size**
  - External antenna with IPEX connector.
  - 18mm x 19.2mm x 3.2mm, stamp hole
- **Rich Supporting Software**
  - Support MXOS operating systems.
  - Provide access SDK and AT instructions for major cloud platforms.
  - Provide mass-produced firmware for various typical applications.
- **Typical Application**
  - Smart appliances
  - Intelligent electrician
  - Industrial automation
- **Order code**

Code	Direction
EMC6083-EZJ6	External Antenna with IPEX connector -40℃~105℃

Order Code



For a list of all relevant features (such as packaging, minimum order quantity, etc.) and other information, please contact the nearest MXCHIP sales point and agent.

Parts

Order Code	Direction
MXKIT-Base	Development board motherboard, applicable to all EMC6083 modules.
MXKIT-Core-6083	The development board core board for EMC6083, including the EMC6083-P module. Used with MXKIT-Base.
FX-6083	EMC6083 production fixture, including accompanying plate: MXKIT-Base, MXKIT-Core-6083.

Version Update

Date	Version	Update
2024-01-15	0.1	Initial Version
2024-01-30	0.2	Adjust processor content
2024-04-15	0.3	Add reuse function of some IO pins Update RF parameters Update the final assembly dimension drawing
2024-04-24	0.4	Adjust the final assembly dimension drawing
2024-05-23	0.5	Optimize the annotation data of the final assembly dimension drawing

Copyright Notice

Datasheet lower than 1.0 are for reference only and may be modified before mass production.

Catalog

Figure

Table

1. Introduction

EMC6083 series modules are mainly used for data communication of the Internet of Things. The module realizes data acquisition and device control through rich peripheral interfaces. It can not only communicate directly with mobile devices through low-power Bluetooth, but also connect to the Internet of Things cloud service platform through Wi-Fi network connection to realize the interconnection of everything. This series of modules are applied to a wide range of Internet of Things applications through various external dimensions, interface forms, antenna interfaces and temperature ranges.

The EMC6083 module is built-in an ultra-high integration Wi-Fi/BLE Combo SOC chip, providing the necessary computing power and stable Wi-Fi/BLE connectivity of IOT data terminals. The chip integrates:

- Dual processor(Arm Cortex-M55 and RISC-V)
- Main frequency up to 320MHz.
- 512K Byte SRAM.
- 8M Byte XIP Flash.
- 2.4GHz Wi-Fi controller conforming to IEEE 802.11 b/g/n/ax standard.
- Low-power Bluetooth controller conforming to BLE5.2 BQB specification.

EMC6083 module is powered by 3.3V single power supply and supports the stamp hole SMT installation mode, which is applicable to various smart home appliance application scenarios.

MXCHIP provides the MXOS software platform to support the development of the EMC6083 series modules, and provides an efficient development environment, access protocol stacks for major Internet of Things cloud services, rich sample programs and various typical applications.

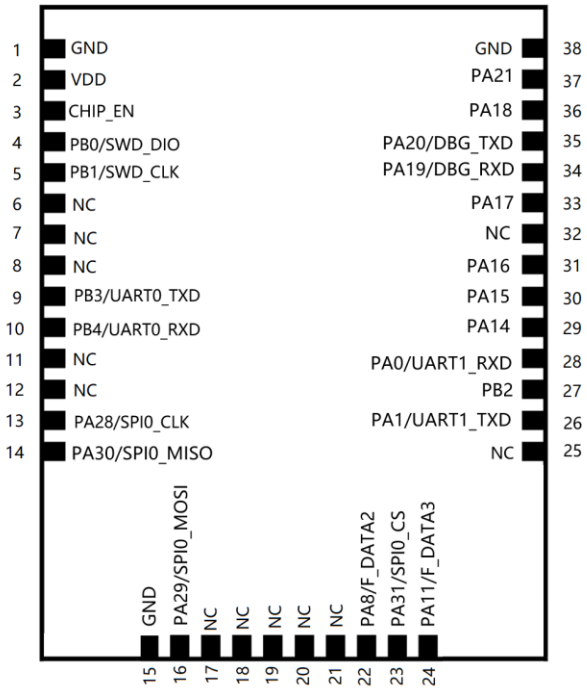
The EMC6083 module is mainly including:

- Wi-Fi microcontroller
- On-board or external antenna
- Power supply and communication interface
- Peripheral interface units

2. Pin Definition

2.1. Pin Arrangement

Figure 1 Pin Arrangement



2.2. Pin Definition

Table 1 Pin Definition

No.	Name	Type	Recommended Function	复用功能
1	GND	P	Ground	-
2	VDD	P	DC3.3V Power	-
3	CHIP_EN	I/O	No floating - 1：Enable - 0：Disable	-
4	PB0	I/O	SWD_DIO: SWD Debug	ADC5/TIME8_TRIG/LEDC/SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS UARTn_TXD/UARTn_RXD(n=0,1,2,3) / UARTn_CTS/UARTn_RTS(n=0,3) I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3 DMIC_CLK/DMIC_DATA[1]
5	PB1	I/O	SWD_CLK: SWD Debug	TOUCH4_ADC4/TIME9_TRIG/LEDC/SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3 DMIC_CLK/DMIC_DATA[1]
6	NC	I/O	-	-
7	NC	I/O	-	-
8	NC	I/O	-	-

9	PB3	I/O	UART0_TXD: Application uart	TOUCH2_ADC2/LEDC/SPI1_MOSI/DMIC_CLK/DMIC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3) / UARTn_CTS/UARTn_RTS(n=0,3) I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
10	PB4	I/O	UART0_RXD: Application uart	TOUCH1_ADC1/LEDC/SPI1_MISO/DMIC_CLK/DMIC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
11	NC	I/O	-	-
12	NC	I/O	-	-
13	PA28	I/O	SPI0_CLK	TOUCH8/LEDC/SPI0_CLK/DMIC_CLK/DIMC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
14	PA30	I/O	SPI0_MISO	TOUCH6/LEDC/SPI0_MISO/DMIC_CLK/DIMC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
15	GND	P	Ground	
16	PA29	I/O	SPI0_MOSI	TOUCH7/LEDC/SPI0_MOSI//DMIC_CLK/DIMC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
17	NC	I/O	-	
18	NC	I/O	-	
19	NC	I/O	-	
20	NC	I/O	-	
21	NC	I/O	-	
22	PA8	I/O	F_DATA2	UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA PWM0/PWM1/PWM2/PWM3/PWM4/PWM5/PWM6/PWM7 DMIC_CLK/DIMIC_DATA[0]/DMIC_DATA[1]/LEDC
23	PA31	I/O	SPI0_CS	TOUCH5/LEDC/SPI0_CS/DMIC_CLK/DMIC_DATA[1] UARTn_TXD/UARTn_RXD/UARTn_CTS/UARTn_RTS（n=0,1,2,3） SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
24	PA11	I/O	F_DATA3	UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM0/PWM1/PWM2/PWM3/PWM4/PWM5/PWM6/PWM7
25	NC	I/O	-	-
26	PA1	I/O	UART1_TXD	-
27	PB2	I/O	-	TOUCH3_ADC3/SPI1_CLK/LEDC/DMIC_CLK/DMIC_DATA[1] UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3)

				I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/PWM0/PWM1/PWM2/PWM3
28	PA0	I/O	UART1_RXD	-
29	PA14	I/O	-	UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM0/PWM1/PWM2/PWM3/PWM4/PWM5/PWM6/PWM7 DMIC_CLK/DIMIC_DATA[0]/DMIC_DATA[1]
30	PA15	I/O	-	SPI0_CLK/UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM4/PWM5/PWM6/PWM7DMIC_CLK/DMIC_DATA[0]
31	PA16	I/O	-	SPI0_MOSI/UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM4/PWM5/PWM6/PWM7DMIC_CLK/DMIC_DATA[0]
32	NC	I/O	-	
33	PA17	I/O	-	SPI0_MISO/UARTn_TXD/UARTn_RXD（n=0,1,2,3） SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM4/PWM5/PWM6/PWM7DMIC_CLK/DMIC_DATA[0]
34	PA19	I/O	DBG_RXD：调试串口	UARTn_TXD/UARTn_RXD(n=0,1,2,3)
35	PA20	I/O	DBG_TXD：调试串口	UARTn_TXD/UARTn_RXD(n=0,1,2,3)
36	PA18	I/O	-	SPI0_CS/UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM4/PWM5/PWM6/PWM7DMIC_CLK/DMIC_DATA[0]
37	PA21	I/O	-	TIM9_TRIG/UARTn_TXD/UARTn_RXD(n=0,1,2,3)/UARTn_CTS/UARTn_RTS(n=0,3) SPI1_CLK/SPI1_MISO/SPI1_MOSI/SPI1_CS/LEDC I2C0_SCL/I2C0_SDA/I2C1_SCL/I2C1_SDA/ PWM4/PWM5/PWM6/PWM7DMIC_CLK/DMIC_DATA[0]

Note:

1. Debugging serial port is used for debugging. It should not be used during design and should be provided in a convenient way to facilitate software development.
2. Pull down PA20 (DBG-TXD) and power it on to enter firmware download mode and write the firmware through debugging serial port.
3. The NC pin is not connected and cannot be used.

3. Electrical Parameters

3.1. Operation Voltage and Current

Table 2 Operation Voltage

Symbol	Note	Specification			
		Min.	Typical	Max.	Unit
V_{DD}	Voltage	3.0	3.3	3.6	V

Table 3 Operation Current

Symbol	Note		Specification			
	CPU	Wi-Fi	Min.	Typical	Max.	Unit
I_{VDD}	Shut Down	Wi-Fi OFF	-	10	-	μA
I_{VDD}	Deep Sleep	Wi-Fi OFF	-	30	-	μA
I_{VDD}	Standby	Wi-Fi OFF	-	200	-	μA
I_{VDD}	Sleep	Wi-Fi OFF	-	450	-	μA
I_{VDD}	Active	Wi-Fi OFF	-	9	-	mA
I_{VDD}	Active	TX@MCS7/HT20，14dBm	-	198	-	mA
I_{VDD}	Active	TX@MCS7/HT20，16dBm	-	218	-	mA
I_{VDD}	Active	TX@OFDM54M, 15dBm	-	207	-	mA
I_{VDD}	Active	TX@OFDM54M, 17dBm	-	230	-	mA
I_{VDD}	Active	TX@CCK11M, 18dBm	-	249	-	mA
I_{VDD}	Active	TX@CCK11M, 21dBm	-	315	-	mA
I_{VDD}	Active	RX@MCS7, HT20 (Pin= -60dBm)	-	67	-	mA
I_{VDD}	Active	RX@OFDM54M (Pin= -60dBm)	-	63	-	mA
I_{VDD}	Active	RX@CCK11M (Pin= -60dBm)	-	61	-	mA
I_{VDD}	Active	RF Standby	-	33	-	mA
I_{VDD}	Active	RF disable	-	24	-	mA

(1) The above parameters were measured in a wireless shielding environment in the laboratory. Please refer to Table 4 for actual application power consumption!

(2) The power consumption of Flash is not included in table3 Reference source not found. In the data. When reading code or writing data from Flash. The power consumption of Flash should not exceed 20Ma. The power consumption of Flash in standby mode (CS signal raised) shall not exceed 50 μ A.

3.2. General I/O Interface

Table 4 I/O operating parameters

Symbol	Note	Conditions	Specification			
			Min.	Typical	Max.	Unit
V_{IH}	Input-High Voltage	LVTTL	2.0	-	-	V
V_{IL}	Input-Low Voltage	LVTTL	-	-	0.8	V
V_{OH}	Output-High Voltage	LVTTL	2.4	-	-	V
V_{OL}	Output-Low Voltage	LVTTL	-	-	0.4	V
I_{T+}	Schmitt-trigger High Level	-	1.377	1.683	1.908	V
I_{T-}	Schmitt-trigger Low Level	-	0.729	0.957	1.116	V
I_{IL}	Input-Leakage Current	V_{IN}=3.3V or 0	-10	±1	10	μA

3.3. Typical Application Power

The module current test environment is based on VDD=3.3V and is tested in the ordinary office application environment (the values measured in different test environments will be different).

Table 5 Typical Application Power

Mode	Average	Max.	Unit	Note
Wi-Fi off	18.2	20	mA	CPU Active
Wi-Fi off	2.3	2.8	mA	CPU Sleep
Wi-Fi initialization	60	66.8	mA	CPU Active, Wi-Fi initialization is in standby
Keep Wi-Fi connected	82.4	97.4	mA	Turn off Wi-Fi and MCU low power consumption
Keep Wi-Fi connected	35.6	47.8	mA	Turn on Wi-Fi low power consumption, turn off MCU low power consumption, DTIM = 1
Keep Wi-Fi connected	20.7	27.3	mA	Turn on Wi-Fi low power consumption, turn off MCU low power consumption, DTIM = 3
Keep Wi-Fi connected	10.3	11.7	mA	Turn on Wi-Fi low power consumption and MCU low power consumption, DTIM = 1
Keep Wi-Fi connected	6.2	7.8	mA	Turn on Wi-Fi low power consumption and MCU low power consumption, DTIM = 3
SoftAP mode	67.9	244.6	mA	SoftAP networking status
Monitor mode	86.4	101.5	mA	Network Distribution process, in RX state
Iperf performance mode	200	243.5	mA	Turn off the low power consumption of Wi-Fi and MCU, iperf sends at full speed

3.4. Temperature

Table 6 Storage Temperature and operation temperature

Symbol	Ratings	Max	Unit
T_{STG}	Storage temperature	–55 to +125	℃
T_{work}	Ambient Operating Temperature	-40 to +85	℃

T_{Jun}	Junction Temperature	0 to +125	℃

3.5. Electrostatic discharge

Table 7 Electrostatic discharge

Symbo	Description	Name	Level	Max	Unit
V_{ESD}(HBM)	Electrostatic discharge voltage (manikin)	TA= +25 °C following JESD22-A114	2	2000	V
V_{ESD}(CDM)	Electrostatic discharge voltage (Discharge equipment model)	TA = +25 °C following JESD22-C101	II	500	

3.6. RF Parameter

3.6.1. Wi-Fi RF Parameter

Table 8 RF Basic Parameter

Item		Specification
Operating Frequency		2.402~2.484GHz
Antenna Interface		1T1R, Single stream
Specification	Wi-Fi Standard	IEEE 802.11b/g/n/ax
	Bluetooth	Bluetooth 5.2
Modulation Type	Wi-Fi	11b: DBPSK, DQPSK, CCK for DSSS 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: BPSK,QPSK,16QAM,64QAM for OFDM 11ax: BPSK,QPSK,16QAM,64QAM,256QAM for OFDMA
	BLE	GFSK
Data Rates	Wi-Fi	802.11b: 1, 2, 5.5 and 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 802.11n: MCS0~7, up to 72.2Mbps
	Bluetooth	1Mbps
Antenna type		One U.F.L connector for external antenna

Note: The following typical values of Tx test data are recorded for about 20s under normal temperature.

Transmitting performance

Table 9 Output power

TX Characteristics	Min.	Typical	Max.	Unit
Power@11Mbps, 802.11b	15	17	18	dBm
Power@54Mbps, 802.11g	14	16	17	dBm
Power@HT20, MCS7,802.11n	14	16	17	dBm
Power@HT20, MCS9,802.11ax	14	16	17	dBm

Table 10 Frequency error

TX Characteristics	Min.	Typical	Max.	Unit
Frequency Error	-15	-2	+15	ppm

Table 11 EVM

TX Characteristics	Min.	Typical	Max.	Unit
EVM@11Mbps, 802.11b	-	-18	-10	dB
EVM@54Mbps, 802.11g	-	-34	-25	dB
EVM@HT20, MCS7,802.11n	-	-35	-27	dB
EVM@HT20, MCS9,802.11ax	-	-34	-27	dB

Receiving performance

Table 12 Receiving sensitivity.

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
PER≦8%@11Mbps,802.11b	-	-90	-	dBm
PER≦10%@54Mbps,802.11g	-	-76	-	dBm
PER≦10%@HT20, MCS7, 802.11n	-	-75	-	dBm
PER≦10%@HT20, MCS9,802.11ax	-	-69	-	dBm

3.6.2. Bluetooth RF Parameter

Table 13 Bluetooth TX/RX Characteristic

Item	DataRate	Min	Typical	Max	Unit
POWER_AVERAGE	LE_1M	6	8	10	dBm
Frequency Drift Error	LE_1M	-50	-5	50	KHz
Carrier frequency offset and drift at NOC:					
ΔFn max	LE_1M	-150	6.5	150	KHz
|F0-Fn|	LE_1M		2.2	50	KHz
|F1-F0|	LE_1M		2.1	20	KHz
|Fn-Fn5|	LE_1M		0.9	20	KHz
Modulation characteristics:					
ΔF1avg	LE_1M	225	249	275	KHz
ΔF2avg	LE_1M	185	238	275	KHz
ΔF2avg/ΔF1avg	LE_1M	0.8	0.96		KHz
ΔF2max	LE_1M	185	245		KHz
In-Band Emissions					
OFFSET_-2	LE_1M		-44.3	-20	dBm
OFFSET_-3	LE_1M		-46.6	-30	dBm
OFFSET_-4	LE_1M		-46.5	-30	dBm
OFFSET_-5	LE_1M		-50.6	-30	dBm
OFFSET_2	LE_1M		-46.1	-20	dBm
OFFSET_3	LE_1M		-45.7	-30	dBm
OFFSET_4	LE_1M		-44.4	-30	dBm
OFFSET_5	LE_1M		-50.2	-30	dBm
RX Characteristics					
Minimum Sensitivity PER ≤30.8%	LE_1M	-	-98	-97	dBm

Table 14 Bluetooth TX/RX Characteristic

Item	Data Rate	Min	Typical	Max	Unit
POWER_AVERAGE	LE_1M	4	6	10	dBm
Frequency Drift Error	LE_1M	-50	10	50	KHz
Carrier frequency offset and drift at NOC:					
ΔFn max	LE_1M	-150	15	150	KHz
|F0-Fn|	LE_1M	0	10	50	KHz
|F1-F0|	LE_1M	0	10	20	KHz
|Fn-Fn5|	LE_1M	0	10	20	KHz
Modulation characteristics:					
ΔF1avg	LE_1M	225	250	275	KHz
ΔF2avg	LE_1M	185	235	275	KHz
ΔF2avg/ΔF1avg	LE_1M	0.8	1	2	KHz
ΔF2max	LE_1M	185	225	275	KHz
RX Characteristics					
Minimum Sensitivity PER ≤30.8%	LE_1M	-	-94	-	dBm

4. Antenna Information

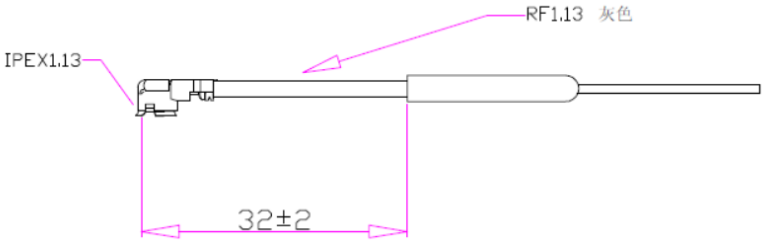
EMC6083 series module adopt external antenna with IPEX connector. Please order according to the order code. Better RF performance can be obtained by connecting external antenna through IPX connector.

4.1. External antenna parameters and use

Users can select 2.4G antennas with different dimensions and gain no more than 2dBi according to the application environment.

The following is a copper tube antenna with IPEX connector commonly used by MXCHIP.

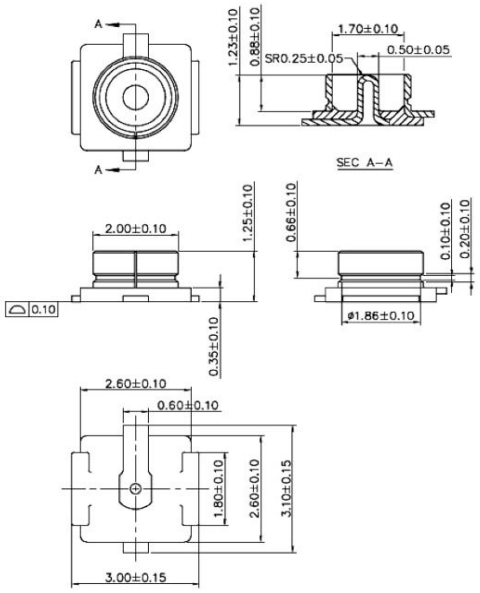
Figure 2 Dimensions of copper tube antenna (unit: mm)



- Frequency range: 2400-2500 MHz
- Input impedance: 50 Ohm
- SWR: <2.0
- Gain: 2.0dBi
- Polarization: vertical
- Directionality: omnidirectional
- Copper pipe: 4.4 * 23mm
- Wire: 1.13 gray line L-82mm

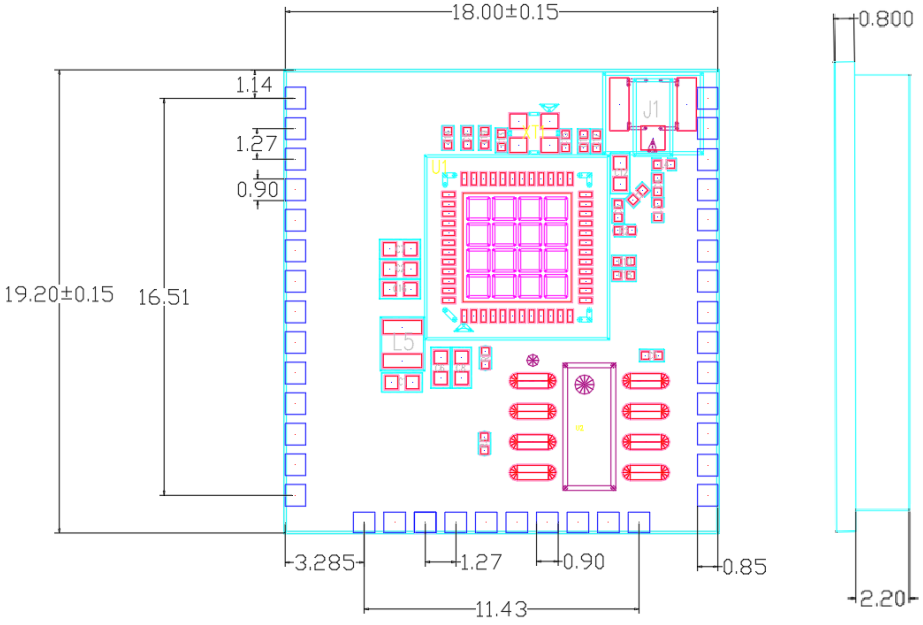
Dimension Diagram of External Antenna Connector.

Figure 3 Dimension Diagram of External Antenna Connector

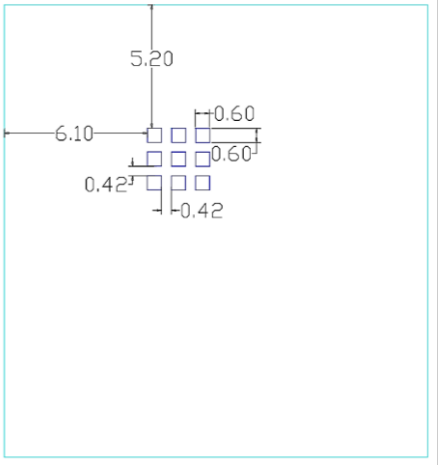


5. General Assembly Size

Figure 4 General assembly dimension drawing (unit: mm, error ± 0.1, external dimension error ± 0.2)



Front view　　Side view



Back view

6. Production Guidelines

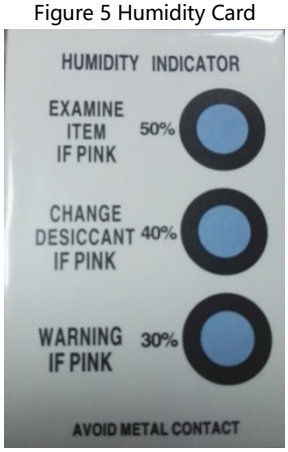
MXCHIP stamp port packaging module must be SMT machine patches, module humidity sensitivity grade MSL3, after unpacking more than a fixed time patches to bake module.

- SMT patches require instruments.
  - Reflow bonding machine.
  - AOI detector
  - 6-8mm suction nozzle
- Baking requires equipment:
  - Cabinet oven
  - Anti-static, high temperature tray
  - Antistatic and heat resistant gloves.

The storage conditions of MXCHIP module are as follows:

- Moisture-proof bags must be stored in an environment with temperature < 30 degree C and humidity < 85% RH.
- A humidity indicator card is installed in the sealed package.

Figure 5 Humidity Card



After the module is split, if the humidity card shows pink, it needs to be baked.

The baking parameters are as follows:

- The baking temperature is 120℃±5℃ and the baking time is 4 hours.
- The alarm temperature is set to 130℃.
- SMT patches can be made after cooling < 36℃ under natural conditions.
- Drying times: 1 time.
- If there is no welding after baking for more than 12 hours, please bake again.

If the disassembly time exceeds 3 months, SMT process is forbidden to weld this batch of modules,

because PCB gold deposition process, over 3 months, pad oxidation is serious, SMT patch is likely to lead to virtual welding, leak welding, resulting in various problems, our company does not assume the corresponding responsibility.

Before SMT patch, ESD (Electrostatic Discharge, Electrostatic Release) protection should be applied to the module.

SMT patches should be made according to the reflow curve. The peak temperature is 250 C. The reflow temperature curve is shown in Chapter 9, Figure 7.

In order to ensure the qualified rate of reflow soldering, 10% of the first patches should be taken for visual inspection and AOI testing to ensure the rationality of furnace temperature control, device adsorption mode and placement mode, and 5-10 patches per hour are recommended for visual inspection and AOI testing in subsequent batch production.

6.1. Precautions

- Operators of each station must wear static gloves during the entire production process.
- Do not exceed the baking time when baking.
- It is strictly forbidden to add explosive, flammable, or corrosive substances during baking.
- When baking, the module uses a high temperature tray to be placed in the oven to keep the air circulation between each module while avoiding direct contact between the module and the inner wall of the oven.
- When baking, please close the oven door to ensure that the oven is closed to prevent temperature leakage and affect the baking effect.
- Try not to open the door when the oven is running. If it must be opened, try to shorten the time for opening the door.
- After baking, the module should be naturally cooled to <36°C before wearing the static gloves to avoid burns.
- When operating, strictly guard against water or dirt on the bottom of the module.

The temperature and humidity control level of MXCHIP factory module is Level3, and the storage and baking conditions are based on IPC/JEDEC J-STD-020.

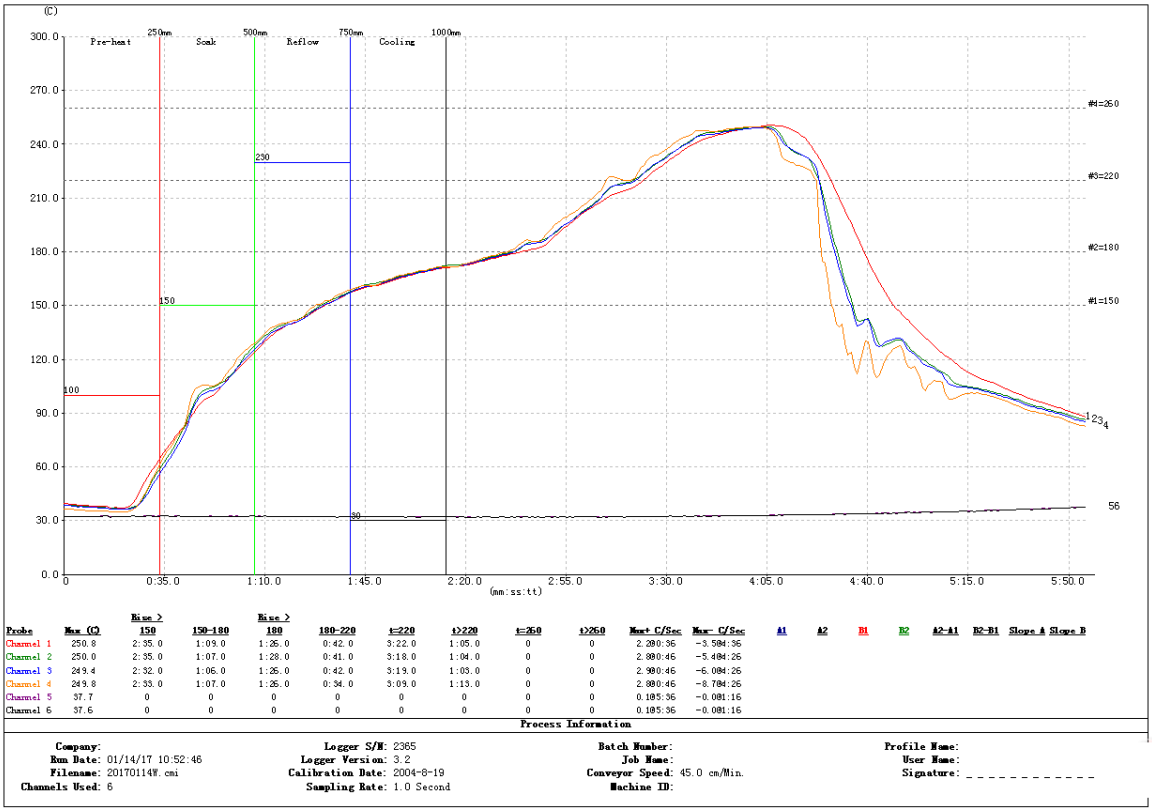
6.2. Storage Condition

Figure 6 Storage Conditions Diagram

6.3. Secondary Reflux Temperature Curve

We recommend solder paste model: SAC305, lead-free. No more than 2 reflux times.

Figure 7 Reference Secondary Reflux Temperature Curve



Probe	Max (C)	Rise > 150	150-180	Rise > 180	180-220	t=220	t>220	t=260	t>260	Max+ C/Sec	Max- C/Sec	A1	A2	B1	B2	A2-A1	B2-B1	Slope A	Slope B
Channel 1	250.8	2:35.0	1:09.0	1:26.0	0:42.0	3:22.0	1:05.0	0	0	2.200:36	-3.504:36								
Channel 2	250.0	2:35.0	1:07.0	1:28.0	0:41.0	3:18.0	1:04.0	0	0	2.800:46	-5.404:26								
Channel 3	249.4	2:32.0	1:06.0	1:26.0	0:42.0	3:19.0	1:03.0	0	0	2.900:46	-6.004:26								
Channel 4	249.8	2:33.0	1:07.0	1:26.0	0:34.0	3:09.0	1:13.0	0	0	2.800:46	-8.704:26								
Channel 5	37.7	0	0	0	0	0	0	0	0	0.105:36	-0.001:16								
Channel 6	37.6	0	0	0	0	0	0	0	0	0.105:36	-0.001:16								

Process Information

Company:
Run Date: 01/14/17 10:52:46
Filename: 20170114W.cmi
Channels Used: 6

Logger S/N: 2365
Logger Version: 3.2
Calibration Date: 2004-8-19
Sampling Rate: 1.0 Second

Batch Number:
Job Name:
Conveyor Speed: 45.0 cm/Min.
Machine ID:

Profile Name:
User Name:
Signature: _ _ _ _ _ _ _ _ _ _ _ _

7. Label Information

Figure 8 Module Label Diagram

1. MXCHIP: Company Logo.
2. Shanghai MXCHIP Information Technology Co., Ltd. : Manufacturer company name
3. EMC6083-E: Product Main Type.
4. CMIIT ID: SRRC ID.
5. FCC ID: FCC certification ID
6. CE: CE certification logo
7. : Environmental protection sign, indicating no littering in the trash can
8. ZL7: Product Sub model.
9. X2401: Production Serial Number.
10. B0F893C125DE: Module MAC Address.
11. 0000.0000.A258: Software version.
12. Input DC 3.3V 300mA: Operation Voltage and Current
13. QR code: MAC Address.

Note: Due to the production batch and version, the above label schematic diagram is for reference only, please refer to the real object.

8. FCC Warning

Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The module is limited to OEM installation only The OEM integrator is responsible for ensuring that the end-user has no manual instructions to remove or install module If the FCC dentification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: Contains Transmitter Module FCC ID:P53-EMC6083 Or Contains FCC ID: P53-EMC6083

When the module is installed inside another device, the user manual of the host must contain below warning statements.

1.1 List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.209

1.2 Specific operational use conditions

The module is a 2.4GHz Wi-Fi /BLE Module

2.4GHz Wi-Fi /BLE Module	Operation Frequency		Number of Channel		Modulation		Antenna Spec.	
	2.4G Wi-Fi	BLE	2.4G Wi-Fi	BLE	2.4G Wi-Fi	BLE	2.4G Wi-Fi	BLE
EMC6083	2412-2462MHz	2402-2480MHz	11	40	DSSS, OFDM	GFSK	Single PCB antenna, 2dBi Max.	

The module can be used for mobile or portable applications with a maximum 2dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

1.3 Limited module procedures Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

1.4 Trace antenna designs

Not applicable. The module has its own antenna, and doesn’ t need a host’ s printed board microtrip trace antenna etc.

1.5 RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

1.6 Antennas

Antenna Specification are as follows:

Type: Single PCB antenna Gain: 2dBi.

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna; The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employa 'unique' antenna coupler. As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

1.7 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: P53-EMC6083" with their finished product.

1.8 Information on test modes and additional testing requirements

Operation Frequency: 2412-2462MHz / 2402-2480MHz

Number of Channel: 11 / 40

Modulation: DSSS, OFDM / GFSK

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

1.9 Additional testing, Part 15 Subpart B disclaimer The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter

installed.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. —Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

9. Sales and Technical Support Information

If you need to consult or purchase this product, please call Shanghai MXCHIP Information Technology Co., Ltd. during office hours.

Office hours: Monday to Friday morning: 9:00-12:00, afternoon: 13:00-18:00

Contact Tel: +86-21-52655026

Address: 9th Floor, Building B, 2145 Jinshajiang Road, Putuo District, Shanghai

Zip code: 200333

Email: sales@mxchip.com