MXCHIP®

Datasheet

# EMC3183-E Wi-Fi/BLE IoT Module

Built-in ARM Cortex-M33 MCU
2.4G Hz IEEE 802.11 b/g/n，BLE 5.3,ultra-high integration, rich peripherals

Version：1.0　　Date：2024-05-18　　Number：DS0223CN

## Abstract

- **Voltage Input： 3.0V~3.6V**
- **Operation Temperature：-40℃~+105℃**
- **Processor：Cortex-M33 Core MCU RTL8720CM**
  - RTL8720CM: main frequency up to 100MHz
  - SWD/JTAG simulation debugging interface


- **Memory**
  - 256KB SRAM
  - 384KB ROM
  - 4MB PSRAM
  - 8MB External Flash

- **Wi-Fi**
  - IEEE 802.11 b/g/n 1T1R 2.4GHz
  - Support HT20，max up to 65Mbps@MCS7
  - 802.11e QoS Enhancement (WMM)
  - Support WPA/WPA2 PSK，Open/WEP/TKIP/CCMP
  - Support WPA/WPA2 Enterprise
  - Support WPS, Wi-Fi Direct
  - Support IEEE Power Save mode

- **Bluetooth**
  - Complaint with BLE 5.3 standard
  - Wi-Fi 和 BLE sharing the same PA and antenna through time-division multiplexing
  - Support Bluetooth slave mode and can be used for BLE assisted network distribution

- **Rich Peripheral**
  - 13 x GPIO
  - 1 x I2C
  - 4 x PWM
  - 2 x UART

- **Interface and Dimension**
  - Maintain pin compatibility with similar packaging modules
  - External antenna with IPEX connector
  - 18mm x 19.2mm x 3mm, stamp hole

- **Rich supporting software**
  - Support AliOS and MXOS operating system
  - Provide SDK and AT instructions for accessing major cloud platforms
  - Provide mass-produced firmware for various typical applications

- **Typical Application**
  - Smart home appliances
  - Intelligent electrical products
  - Industrial automation

- **Order Code**

| Code | Description |
|---|---|
| EMC3183-EJK5 | IPEX External Antenna，RTL8720CM processor<br>External 8M Flash<br>Operation temperature:-20°C~85°C |
| EMC3183-EJK7 | IPEX External Antenna，RTL8720CM processor<br>External 8M Flash<br>Operation temperature:-40°C~105°C |

# Order Code

Examples EMC 3 18 3 -E J K 5 -xxx

Product Series

EMC = IoT Wi-Fi/BLE Combo Module

Product Type

3 = Welding Module

Typical Targe Application and Function

18 = IOT Application 18 series

Shape size，enhancement function

3 = 18mm x 19.2mm x 3mm

RF Interface

P = 2.4GHz On-Board PCB Antenna

E = 2.4GHz External Antenna IPEX Connector

PSRAM Capacity（optional）

Z=Without PSRAM

J=4MB PSRAM

Flash Capacity

I = 2MB Flash

J= 4MB Flash

K= 8MB Flash

Temperature Range

5 = Temperature Range, -20°C~85°C

6 = Temperature Range, -40°C~85°C

7 = Temperature Range, -40°C~105°C

Optional

TR = Reel packaging (pallet is used by default)

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 EMC3183 modules. |
| MXKIT-Core-3183 | The development board core board for EMC3183, including the EMC3183 module. Used with MXKIT-Base. |
| FX-3183 | EMC3183 production fixture, including accompanying plate: MXKIT-Base, MXKIT-Core-3183. |

# Version Update

| Date | Version | Update |
|---|---|---|
| 2023-07-04 | 0.1 | Initial Version. |
| 2023-07-07 | 0.2 | Update peripheral parameter<br>Adjust work mode description<br>Add some power parameters |
| 2023-07-14 | 0.3 | Update Bluetooth version |
| 2024-05-18 | 1.0 | Official Version |

# Copyright Notice



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

# Content



# Table

# Figure

# 1. Introduction

EMC3183 series modules are 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 EMC3183 module is built with an ultra-high integration Wi-Fi/BLE Combo SOC chip RTL8720CM, providing the necessary computing power and stable Wi-Fi/BLE connectivity of IOT data terminals. The chip integrates:

- Cortex-M33 processor core with main frequency up to 100MHz.
- 256KB SRAM.
- 4MB PSRAM
- External 8MB Flash.
- 2.4GHz Wi-Fi controller conforming to IEEE 802.11 b/g/n standard.
- Low-power Bluetooth controller conforming to BLE5.3 BQB specification.

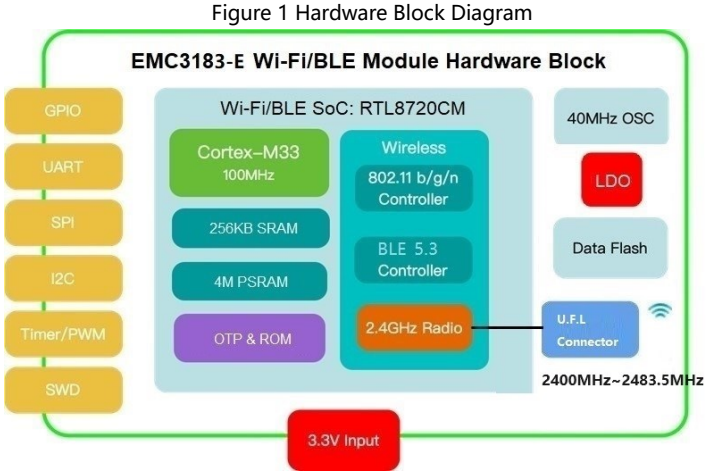
EMC3183 module is powered by 3.3V single power supply and supports the stamp hole SMT installation mode, which is applicable to various smart home appliance application scenarios.

MXCHIP provides the MXOS software platform to support the development of the EMC3183 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 following figure is the hardware block diagram of the EMC3183 module, including:

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

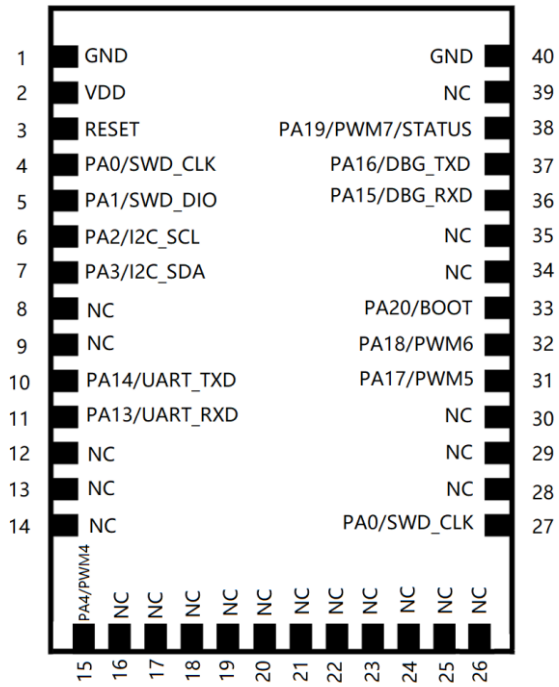
Figure 1 Hardware Block Diagram



# 2. Pin Definition

## 2.1. Pin Arrangement

Figure 2 Pin Arrangement




## 2.2. Pin Definition

Table 1 Pin Definition

| Pin No. | Name | I/O Type | Recommended Function |
|---|---|---|---|
| 1 | GND | P | GND |
| 2 | VDD | P | VDD |
| 3 | RESET | I/O | RESET |
| 4 | PA0 | I/O | SWD_CLK：SWD debugging or working mode selection, refer to Table 2. |
| 5 | PA1 | I/O | SWD_DIO：SWD debugging |
| 6 | PA2 | I/O | I2C_SCL |
| 7 | PA3 | I/O | I2C_SDA |
| 8 | NC | I/O | - |
| 9 | NC | I/O | - |
| 10 | PA14 | I/O | UART_TXD：User UART |
| 11 | PA13 | I/O | UART_RXD：User UART，ISP Mode selection, refer to Table 2. |
| 12 | NC | I/O | - |
| 13 | NC | I/O | - |
| 14 | NC | I/O | - |
| 15 | PA4 | I/O | PWM4 |

| | | | |
|---|---|---|---|
| 16 | NC | I/O | - |
| 17 | NC | I/O | - |
| 18 | NC | I/O | - |
| 19 | NC | I/O | - |
| 20 | NC | I/O | - |
| 21 | NC | I/O | - |
| 22 | NC | I/O | - |
| 23 | NC | I/O | - |
| 24 | NC | I/O | - |
| 25 | NC | I/O | - |
| 26 | NC | I/O | - |
| 27 | PA0 | I/O | SWD_CLK |
| 28 | NC | I/O | - |
| 29 | NC | I/O | - |
| 30 | NC | I/O | - |
| 31 | PA17 | I/O | PWM5 |
| 32 | PA18 | I/O | PWM6 |
| 33 | PA20 | I/O | BOOT |
| 34 | NC | I/O | - |
| 35 | NC | I/O | - |
| 36 | PA15 | I/O | DBG_RXD：Debug UART |
| 37 | PA16 | I/O | DBG_TXD：Debug UART |
| 38 | PA19 | I/O | PWM7/STATUS: Work mode selection, refer to Table 2. |
| 39 | NC | I/O | - |
| 40 | GND | P | GND |

**Notes:**

1. Module working mode selection signal. During the startup phase, the module detects the level of these pins and enters a specific working state. The correspondence between level and working mode is shown in Table 2:

Table 2 Operation Mode Selection

| **Operation mode** | | **PA0 Default: 0** | **PA20 (BOOT) Default: 1** | **PA19 (STATUS) Default: 1** |
|---|---|---|---|---|
| ISP Program Mode | | 1 | not detect | not detect |
| Test mode | | 0 | not detect | not detect |
| Normal | QC | 0 | 0 | 0 |
| | ATE | | 0 | 1 |
| | APP | | 1 | not detect |

(1). The entry of three modes: ISP Program Mode，Test mode 和 Normal mode is achieved by detecting the level of PA0 during the startup phase, because it is a function of hardware solidification, it cannot be modified.

(2). QC, ATE and APP modes are judged by the firmware provided by MXCHIP, and the detection conditions and functions can be adjusted by modifying the firmware.

(3). ISP Program Mode function description: In the startup phase, if the processor hardware detects that the levels of PA_0 is high, it enters ISP programming mode. In the ISP programming mode, the flash of the module can

be programmed through DBG_UART.

(4). Test mode is the reserved mode of the chip and will not be used.

(5). After the startup is completed, when the processor runs the firmware provided by MXCHIP, the firmware detects the status of PA_20 and PA_19 to enter the corresponding working mode. among them:

- QC mode is used to self-check the hardware during production and generate QC information for the production device to check the quality of the module.
- In the ATE mode, a series of serial commands are provided to make the radio frequency in a specific transceiver mode, so that the instrument can be tested and calibrated.
- APP is the normal working mode for running applications.

2. The DBG_UART is used for the input / output of debugging information. Do not use it during design and provide as easy a way as possible to facilitate software development.
3. The RESET pin is an enable reset pin, which is active low and can be left floating if not used. Or pull up 3.3V.
4. The processing of chip pins inside the module is as follows:

- PA_0, PA_1, PA_23: 10K pull-down resistor.
- PA13: 10K pull-up resistor.

# 3. Electric Parameter

## 3.1. Absolute Maximum Parameters

Table 3 Operation Voltage

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

Table 4 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 are measured in the laboratory wireless shielding environment. Refer to Table 6 for actual application power consumption.

(2). Flash power consumption is not included in the data in Table 4. When reading code or reading and writing data from the Flash, the power consumption of the Flash is not higher than 20mA, and the power consumption of the Flash in standby mode (CS signal is pulled high) is not higher than 50uA.

## 3.2. General I/O Interface

Table 5 DC current: digital I/O

| 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 Consumption

The module current test environment is based on VDD=3.3V. Test under common office application environment (values measured under different test environments will be different).

Table 6 Typical application power consumption

| 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 7 Temperature and humidity parameters

| Symbol | Ratings | Max | Unit |
|---|---|---|---|
| $T_{STG}$ | Storage temperature | –55 to +125 | ℃ |
| $T_{work}$ | Ambient Operating Temperature | -40 to +105 | ℃ |

| | | | |
|---|---|---|---|
| $T_{Jun}$ | Junction Temperature | 0 to +125 | ℃ |

## 3.1. ESD

Table 8 Electrostatic discharge parameters

| Symbol | Name | Name | Level | Max. | Unit |
|---|---|---|---|---|---|
| $V_{ESD}$(HBM) | Electrostatic discharge voltage (Human body model) | TA= +25 °C comply with JESD22-A114 | 2 | 2000 | V |
| $V_{ESD}$(CDM) | Electrostatic discharge voltage (Discharge equipment model) | TA = +25 °C comply with JESD22-C101 | II | 500 | |

## 3.1. Wi-Fi RF Parameter

### 3.1.1. Basic RF Parameter

Table 9 Basic RF Parameter

| Item | | Specification | |
|---|---|---|---|
| Operating Frequency | | 2400~2483.5 MHz | |
| Antenna Interface | | 1T1R, Single stream | |
| Specification | Wi-Fi Standard | IEEE 802.11b/g/n | |
| | Bluetooth | Bluetooth 5.3 | |
| Modulation Type | Wi-Fi | 11b: DBPSK, DQPSK, CCK for DSSS<br>11g: BPSK, QPSK, 16QAM, 64QAM for OFDM<br>11n: MCS0~7, OFDM | |
| | BLE | GFSK | |
| Data Rates | Wi-Fi | 20MHz | 802.11b: 1, 2, 5.5 and 11Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps<br>802.11n: MCS0~7, up to 65Mbps |
| | Bluetooth | 1Mbps | |
| Antenna type | | External IPEX Connector Antenna | |

**Note:** The typical values of the following Tx test data are recorded under normal temperature environment and Tx lasts about 20s.

**TX performance**

Table 10 Output Power

| TX Characteristics | Min. | Typical | Max. | Unit |
|---|---|---|---|---|
| Power@11Mbps, 802.11b | 14 | 16.5 | 18 | dBm |
| Power@54Mbps, 802.11g | 13 | 14.5 | 16 | dBm |
| Power@HT20, MCS7,802.11n | 11 | 12.5 | 14 | dBm |

Table 11 Frequency error

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

Table 12 EVM

| TX Characteristics | Min. | Typical | Max. | Unit |
|---|---|---|---|---|
| EVM@11Mbps, 802.11b | - | -20 | -10 | dB |
| EVM@54Mbps, 802.11g | - | -29 | -25 | dB |
| EVM@HT20, MCS7,802.11n | - | -31 | -27 | dB |

**RX performance**

Table 13 RX Sensitivity

| RX Characteristics | Min. | Typical | Max. | Unit |
|---|---|---|---|---|
| **Minimum Input Level Sensitivity** | | | | |
| PER≦8%@11Mbps,802.11b | - | -87 | - | dBm |
| PER≦10%@54Mbps,802.11g | - | -75 | - | dBm |
| PER≦10%@HT20, MCS7, 802.11n | - | -72 | - | dBm |

### 3.1.2. Bluetooth RF Parameters

Table 14 Bluetooth TX/RX Parameters

| Item | Data Rate | 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 | 6.1 | 150 | KHz |
| \|F0-Fn\| | LE_1M | | 2.37 | 50 | KHz |
| \|F1-F0\| | LE_1M | | 2.1 | 20 | KHz |
| \|Fn-Fn5\| | LE_1M | | 0.89 | 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<br>PER ≤30.8% | LE_1M | - | -98 | -97 | dBm |

# 4. Antenna Information

EMC3183-E module adopts external antenna. Please refer to the order code for order. IPX antenna connectors are not soldered on the modules using PCB antennas. By connecting an external antenna through an IPX connector, you can get better RF performance.

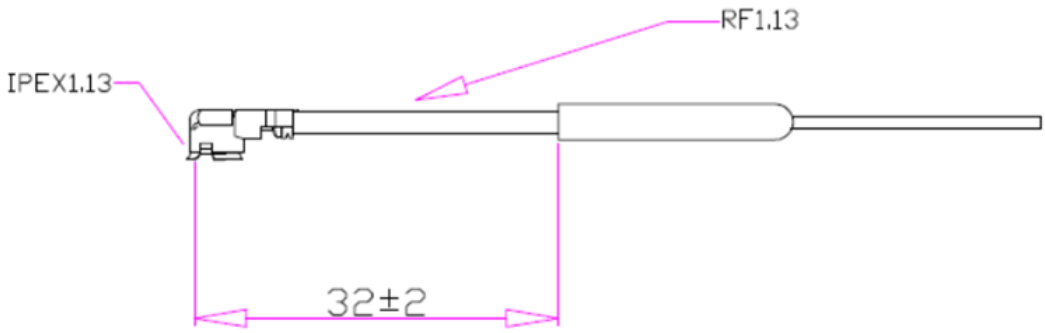
## 4.1. External IPEX Antenna

### 4.1.1. External Antenna Parameter

Users can choose 2.4G antennas with different external dimensions and gain not exceeding 2dBi according to the application environment.

The following is a commonly used copper tube antenna with IPEX connectors for MXCHIP.

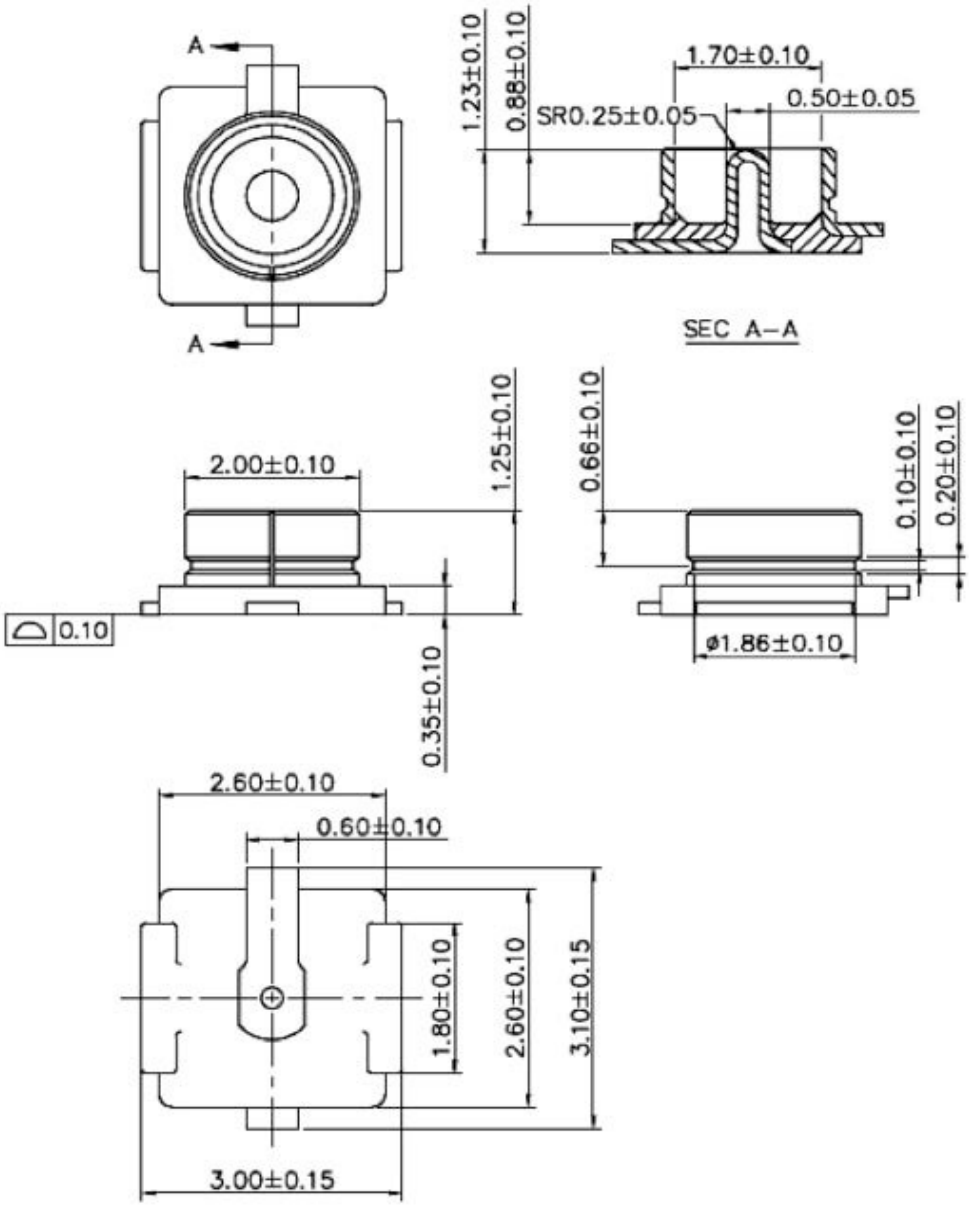
Figure 3 Dimensions of Copper Tube Antenna




- Frequency range：2400-2500 MHz
- Input impedance：50 OHM
- VSWR：< 2.0
- Gain：2.0dBi
- Polarization: vertical
- Directivity: Omnidirectional
- Copper tube: 4.4 * 23mm
- Wire: 1.13 gray wire L-82mm

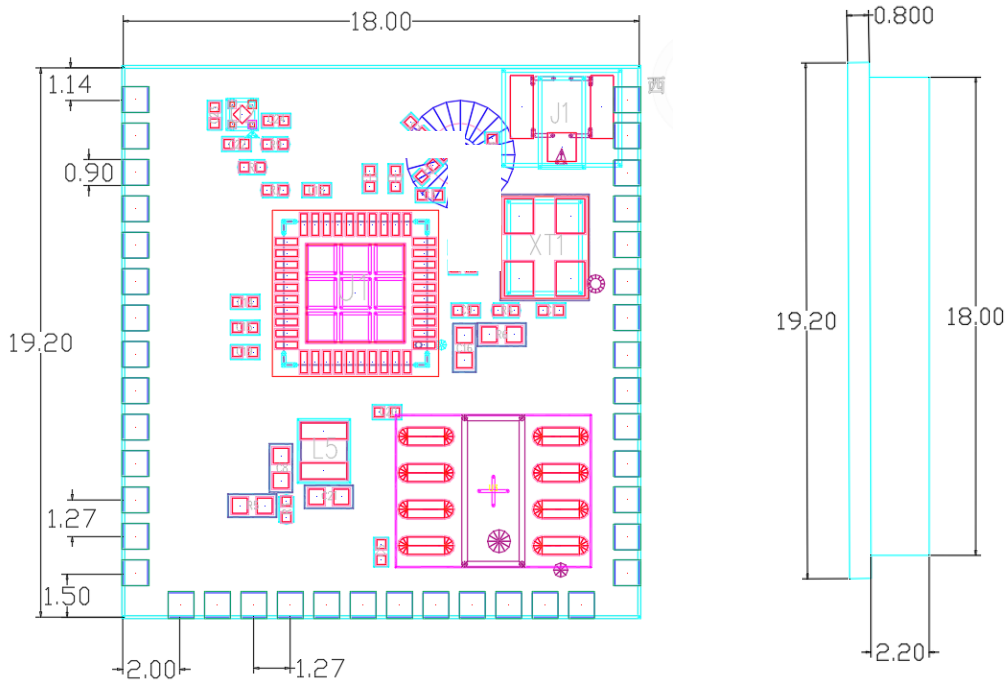
External antenna IPEX seat size:

Figure 4 Dimension drawing of external antenna connector



# 5. Dimensions and Production Guidance

Figure 5 Assembly Dimension Diagram（unit: mm, tolerance: ±0.1, outside tolerance±0.2）



# 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 6 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.

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 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. Secondary reflow temperature curve

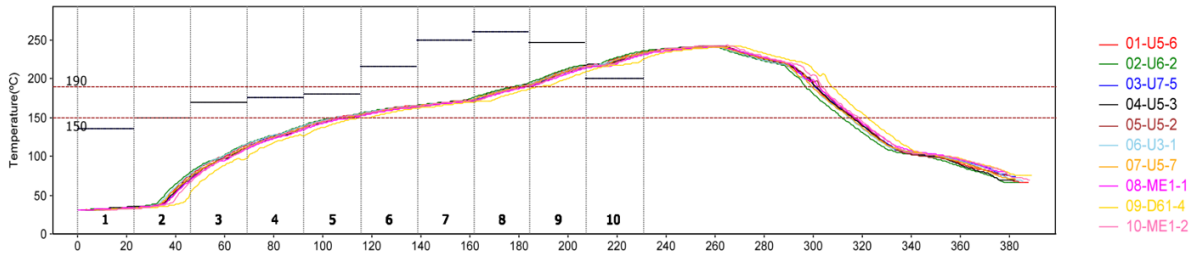
Recommended solder paste type: SAC305, lead free. No more than 2 reflow cycles. Peak temperature not to exceed 245°C. The following is a typical furnace temperature profile setting.

Table 15 Typical furnace temperature settings

| Furnace | Z1 | Z2 | Z3 | Z4 | Z5 | Z6 | Z7 | Z8 | Z9 | Z10 |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Upper temperature zone setting | 135 | 150 | 170 | 175 | 180 | 215 | 250 | 260 | 247 | 200 |
| Lower temperature zone setting | 135 | 150 | 170 | 175 | 180 | 215 | 250 | 260 | 247 | 200 |

Figure 7 Typical secondary reflux temperature profile



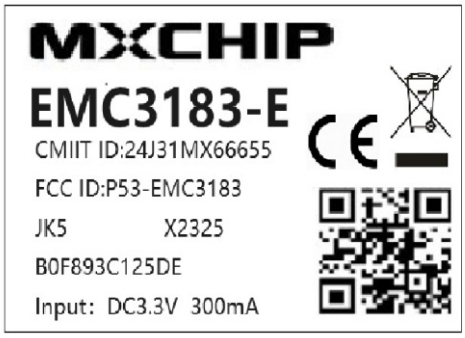

- 30℃～150℃ preheating temperature rise: 0-3℃/s, typical value: 1.2℃/s
- 150℃～190℃ immersion time: 60-100second, typical value：72second
- Peak temperature: 245°C, typical value: 242°C
- Time above 220°C: 50 sec. to 90 sec. Typical value: 70 sec
- 217℃cooling speed: -3～0℃/s, typical value：-2.0℃/s

## 6.3. Storage Condition

Figure 8 Storage Conditions Diagram

# 7. Label Information

Figure 9 Label Diagram




1. MXCHIP: Company Logo
2. EMC3183-E: Product Main Type.
3. CMIIT ID: SRRC Model Authorization ID.
4. FCC ID: FCC Authorization ID.
5. JK5: Product Auxiliary Model
6. X2325: Production serial number
7. B0F893C125DE: MAC Address
8. Input: Operation Voltage and current
9. QR code: MAC Address

**Note: Due to production batch and version reasons, the above label diagram is for reference only. Please refer to the actual product.**

# 8. FCC Warning

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: 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.

The device has been evaluated to meet general RF exposure requirement.

# 9. Radiation Exposure Statement

Radiation Exposure Statement Changes or modifications not expressly approved by the party responsible for compliance could void the user’ s authority to operate the equipment. 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.

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-EMC3183.

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 BLE Module

| **2.4GHz Wi-Fi/BLE Module** | **Operation Frequency** | **Number of Channel** | **Modulation** | **Antenna Spec.** |
|---|---|---|---|---|
| BLE | 2402~2480MHz | 40 | GFSK | External IPEX Connector Antenna 2dBi Max |
| WLAN | 2402~2480MHz | 13 | DSSS,OFDM | |

The module can be used for mobile applications with antenna up to 2dBi. The host manufacturer installing this module into their product must ensure that the final composit 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 microstrip 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 Antenna

Antenna Specification are as follows:

Type: Single External 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 employee ‘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-EMC3183” with their finished product.

1.8 Information on test modes and additional testing requirements Operation Frequency: 2402-2480MHz

Number of Channel: 40、13

Modulation: GFSK，DSSS, OFDM

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.

# 10. 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