

Built-in ARM Cortex V8 dual-core processor, and Flash memory
2.4/5G Hz dual-frequency Wi-Fi, BLE 5.0, rich peripherals

Version: 0.5

Date: 20223-03-15

Number: DS0206EN

Abstract

- **Input voltage: 3.0V~3.6V**
- **Operating Temperature: -40°C to +85°C**
- **Processor: Dual-core CPU RTL8720DF**
 - Performance core KM4: Cortex-M33 with main frequency up to 200MHz.
 - Energy Efficiency Core KM0: Cortex-M23 with main frequency up to 20MHz.
 - SWD/JTAG simulation debugging interface.
- **Memory**
 - 512K bytes SRAM for KM4 core
 - 64K bytes SRAM for KM0 core
 - XIP flash memory from 4M bytes
- **Wi-Fi**
 - 802.11 a/b/g/n 1T1R 2.4/5GHz dual frequency.
 - Processing Wi-Fi messages using independent Microcontrollers.
 - Support low power TX/RX mode in short distance applications.
 - Support narrow-band mode: 10MHz bandwidth.
 - Support Antenna diversity.
 - Support the IEEE Power Save Model
- **BT 5.0 Low Energy**
 - Comply with Low Power Bluetooth 5.0 Standard.
 - Support high power mode (10dbm).
 - Wi-Fi and BLE time division multiplexing and share the same PA and antenna.
 - Support Bluetooth Master-Slave Mode and BLE mesh.
 - rates
- **Safety**
 - ARM Trust Zone-M Technology.
 - AES/DES/SHA Hardware Accelerator, Random

Number Generator

- Security boot Safe Start
- Anti-reading mechanism: JTAG interface protection, flash encryption technology.

● **Peripherals**

- 10 x GPIO
- 1 x SPI, 1 x I2C,
- 3 x PWM, 2 x ADC
- 3 x UART
- Low power RTC

● **Interface and Dimension**

- Maintain pin compatibility with similar package modules.
- RF Interface: PCB antenna, IPEX connector antenna
- 18mm x 33mm, stamp hole

● **Application Functions**

- Support AliOS and MXOS operating system
- Provide major cloud platforms access SDK
- Mass production firmware for typical applications

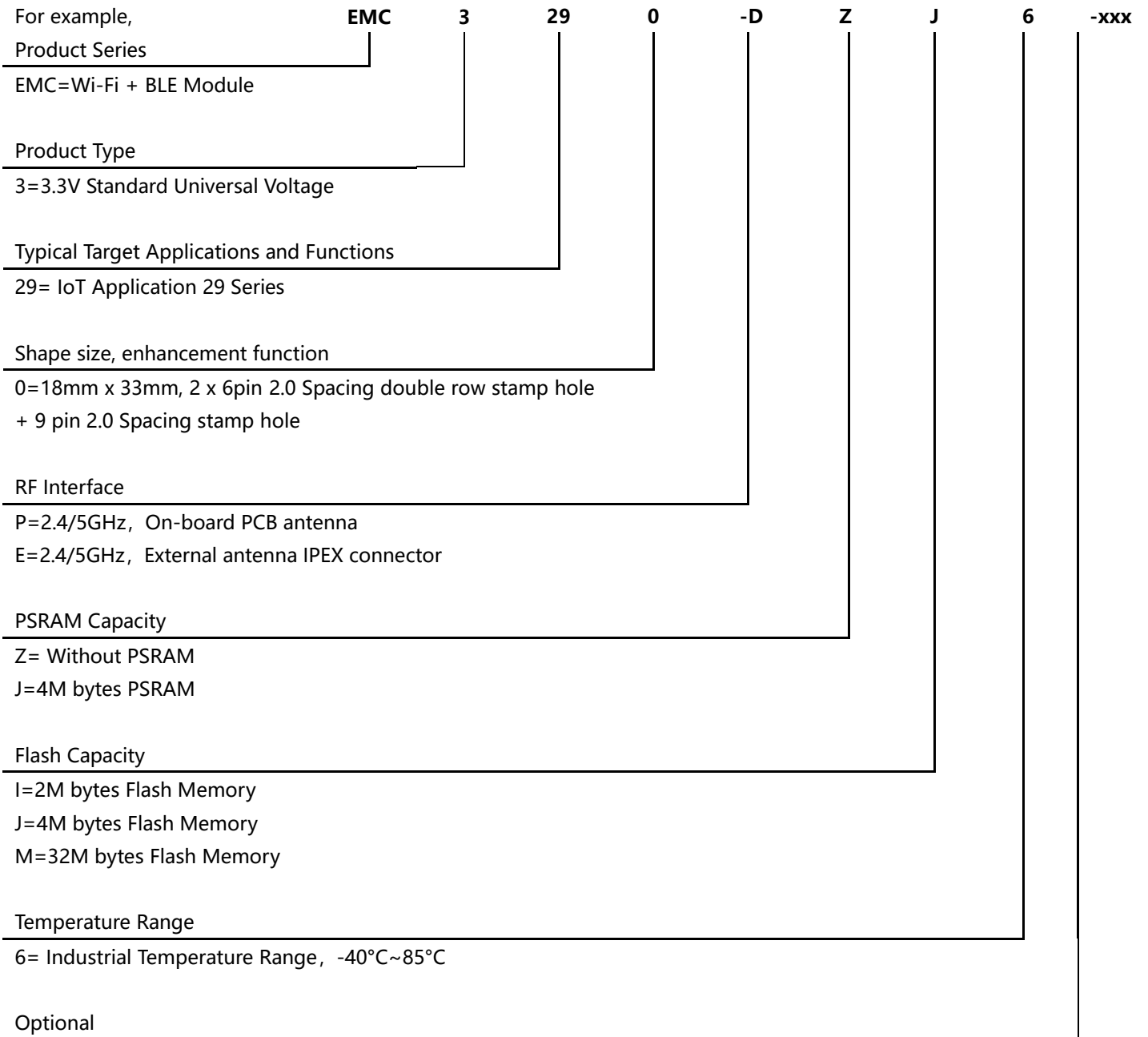
● **Typical applications**

- smart home appliances
- smart electric equipment
- Industrial automation

● **Ordering Code**

| Ordering Code | Notes |
|---------------|----------------------------------|
| EMC3290-DZJ6 | PCB antenna, RTL8720DF Processor |

Order Code



Optional Model

| Order Code | Description |
|------------------|---|
| MXKIT-Base | Development board motherboard, suitable for all EMC3290 modules. |
| MXKIT-Core-C3290 | Development board core board for EMC3290 includes the EMC3290-P module. Used with MXKIT-Base. |
| FX-3290 | EMC3290 Production fixture, including accompanying plate: MXKIT-Base, MXKIT-Core-3290. |

Version Update Record

| Date | Version | Update Items |
|------------|---------|-------------------|
| 2023-03-15 | 0.5 | Initial Document. |

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

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1. Introduction

EMC3290 is a high-performance module mainly used in applications of the Internet of Things. It has a dual-core microcontroller with ultra-high integration, supports 2.4/5GHz dual-band Wi-Fi and BLE 5.0 wireless communication technology, and includes large capacity Flash, RAM, meet various complex requirements in speech application.

The core of high performance is a 32-bit core with a main frequency up to 200 MHz. Based on the latest ARM v8-M architecture, it not only has low power consumption, but also can complete floating-point operation. The core frequency of high energy efficiency reaches 20MHz, which provides a simplified instruction system for ultra-low power applications, so that the system can keep standby for a long time.

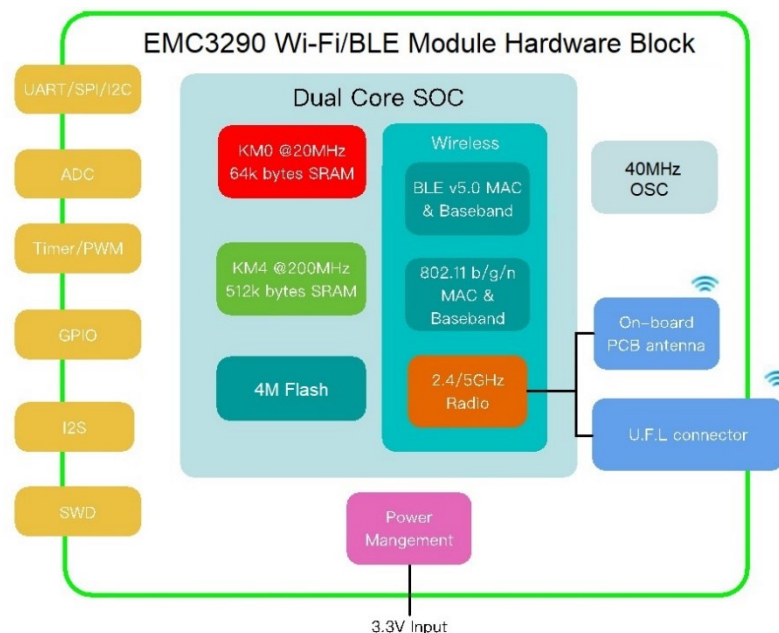
2.4/5GHz dual-band Wi-Fi guarantees stable Internet connection at any time. BLE 5.0 technology can not only facilitate users to complete the rapid configuration of products, but also realize the intelligent networking of a large number of local devices through Mesh technology.

Shanghai MXCHIP provides MXOS software platform to support the development of EMC3290, providing an efficient development environment, rich sample programs and typical applications.

The following diagram is the hardware block diagram of EMC3290 module, which mainly includes:

- Dual-core wireless microcontroller
- Flash memory with optional capacity
- Plate-borne antenna or external antenna pedestal

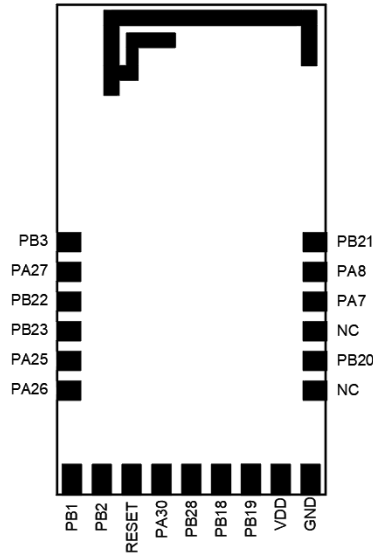
Figure 1 EMC3290 Hardware Block Diagram



2. Pin Definition

2.1. Pin Distribution

Figure 2 Pin Arrangement



2.2. Pin Definition

Table 1 EMC3290 Pin Definition

| Pin No. | Name | I/O | Recommended Function |
|---------|---------------------------------------|-----|---|
| 3 | PB3 | I/O | SWD_CLK: SWD debugging |
| 4 | PA27 | I/O | SWD_DIO: SWD debugging |
| 5 | PA12 | I/O | ADC4 |
| 6 | PA13 | I/O | ADC5 |
| 7 | PA25 | I/O | I2C_SCL |
| 8 | PA26 | I/O | I2C_SDA |
| 9 | PB1 | I/O | LP_UART_TXD, application serial port |
| 10 | PB2 | I/O | LP_UART_RXD, application serial port, ISP mode, refer to Table 2 for operating mode selection |
| 11 | CHIP_EN ⁽³⁾ ⁽⁵⁾ | I/O | RESET |
| 12 | PA30 | I/O | PWM7 |
| 13 | PA28 | I/O | PWM6 |
| 14 | PB18 | I/O | HS_UART0_RXD |
| 15 | PB19 | I/O | HS_UART0_TXD |
| 16 | VDD | I/O | VDD |
| 17 | VSS | I/O | GND |
| 18 | NC | I/O | - |
| 19 | PB22 ⁽¹⁾ | I/O | BOOT, refer to Table 2 for operating mode selection |
| 20 | NC | I/O | - |
| 21 | PA7 | I/O | DBG_TXD, debugging/download serial port |
| 22 | PA8 | I/O | DBG_RXD, debugging/download serial port |

| | | | |
|----|------|-----|---|
| 23 | PB23 | I/O | EASYLINK, refer to Table 2 for operating mode selection |
|----|------|-----|---|

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:

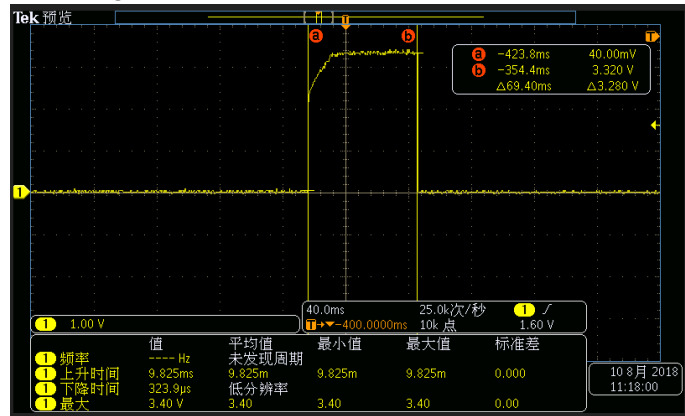
Table 2 operation mode

| Operation mode | | PB3 Default: 0 | PB2 Default: 0 | PB20 (BOOT) Default: 1 | PB21 (EASYLINK) Default: 1 |
|------------------|-----|-------------------|-------------------|---------------------------|-------------------------------|
| ISP Program Mode | | 1 | 1 | not detect | not detect |
| Test mode | | 1 | 0 | not detect | not detect |
| Normal | QC | 1 | not detect | 0 | 0 |
| | ATE | | | 0 | 1 |
| | APP | | | 1 | not detect |

- (1) ISP Program Mode, Test mode and Normal mode are detected by hardware at startup. PB3 and PB2, 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 contempt: In the startup phase, if the processor hardware detects that the levels of PB3 and PB2 are high, it enters ISP programming mode. In the ISP programming mode, the flash of the module can be programmed through UART2 (PA7, PA8).
- (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 PB20 and PB21 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 UART2 serial port 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 CHIP_EN pin is an enable reset pin, which is active low and can be left floating if not used. Or pull up 3.3V.
4. Please keep the unused pins floating. It should be noted that the IO port is in a floating state at startup. If you need to configure the state of the pin through software, you need to wait until the code in the bootloader starts to execute. The time from when the module is powered on to when the code in the bootloader is executed will be affected by the flash startup time. Therefore, if you need IO to be in a certain level state at startup, you need to use a 100k resistor on the pin to pull up and down. Figure 3 shows the level change of the IO port whose software is configured as a low level after being pulled up by an external 100K resistor in the floating state. It can be seen that the

time from the power-on of the module to the controllable IO port software is 69.4ms, and the time during which the IO is pulled to the high level is about 20ms.

Figure 3 IO The power-on state interface



3. Electrical Parameters

3.1. Absolute Maximum Parameter

Modules operating outside the absolute maximum ratings may cause permanent damage. At the same time, long-term exposure to the maximum rating conditions will affect the reliability of the module.

Table 3 Absolute maximum parameter: voltage

| Symbol | Ratings | Min | Max | Unit |
|---------|--------------------------------|---------|---------|------|
| VDD-VSS | Voltage | -0.3 | 3.6 | V |
| VIN | Input voltage on any other pin | VSS-0.3 | VDD+0.3 | V |

Table 4 operating parameter: voltage and current

| Symbol | Note | Specification | | | |
|------------------|--|---------------|---------|------|------|
| | | Min. | Typical | Max. | Unit |
| V _{DD} | Voltage | 3.0 | 3.3 | 3.6 | V |
| I _{VDD} | 3.3V Rating Current (with internal regulator and integrated CMOS PA) | | | 450 | mA |

3.2. Digital IO DC characteristic

The electrical characteristics of the module's digital IO port are described in Table 12 under 3.3V power supply.

Table 5 operation parameter (3.3V) :Digital IO DC characteristic

| 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 _{IL} | Input-Leakage Current | V _{IN} = 3.3V/0V | -10 | ±1 | 10 | μA |

3.3. Temperature

Table 6 Storage temperature and operation temperature

| Symbol | Ratings | Min. | Max | Unit |
|------------------|-------------------------------|------|-----|------|
| T _{STG} | Storage temperature | -55 | 125 | °C |
| T _A | Ambient Operating Temperature | -40 | 85 | °C |
| T _J | Junction Temperature | 0 | 125 | °C |

3.4. ESD

Table 7 Electrostatic discharge parameters

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

3.5. RF Parameter

3.5.1. Basic RF Parameters

Table 8 RF Standard

| Item | | Specification | |
|---------------------|-----------|--|--|
| Operating Frequency | | 2.4G Band: 2400~2483MHz, 5G band: 5180~5825MHz | |
| Specification | Wi-Fi | IEEE802.11b/g/n(2.4G), 802.11a/n(5G) | |
| | Bluetooth | Bluetooth 5.0 | |
| Modulation Type | Wi-Fi | 11b: DBPSK, DQPSK, CCK for DSSS 11g/a/n: BPSK, QPSK, 16QAM, 64QAM for OFDM 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: MCS0~7, OFDM | |
| | Bluetooth | GFSK | |
| Data Rates | Wi-Fi | 20MHz | 11b: 1,2,5.5 和 11Mbps 11g /a: 6,9,12,18,24,36,48,54Mbps 11n_HT20: MCS0~7, up to 72Mbps |
| | | 40MHz | 11n_HT40(2.4G&5G): MCS0~7, up to 150Mbps |
| | Bluetooth | 2MHz | 1Mbps, 2Mbps (BT 5.0) |

| | |
|-------------------|---|
| Antenna type | One U.F.L connector for external antenna PCB printed ANT (Reserve) |
| Antenna Interface | 1T1R, single-stream |

3.5.2. Wi-Fi RF characteristics

IEEE 802.11b mode

Table 9 EMC3290 IEEE 802.11b TX/RX characteristics

| Item | Description | | | |
|--|-------------------|----------|----------------|------|
| Mode | IEEE802.11b | | | |
| Channel | CH1 to CH13 | | | |
| Data Rates | 1, 2, 5.5, 11Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11b Target Power@1Mbps | 15.0 | 16.5 | 18.0 | dBm |
| 11b Target Power@11Mbps | 15.0 | 16.5 | 18.0 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/-11MHz to +/-22MHz | - | - | -30 | dB |
| fc > +/-22MHz | - | - | -50 | dB |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| 1~11Mbps | - | - | 35% (or -11dB) | |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| 1Mbps (FER≤8%) | - | -98 | - | dBm |
| 11Mbps (FER≤8%) | - | -88 | - | dBm |

IEEE802.11g mode

Table 10 EMC3290 IEEE802.11g TX/RX characteristics

| Item | Description | | | |
|-------------------------------------|----------------------------------|----------|------|------|
| Mode | IEEE802.11g | | | |
| Channel | CH1 to CH13 | | | |
| Data Rates | 6, 9, 12, 18, 24, 36, 48, 54Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11g Target Power@6Mbps | 13.5 | 15.0 | 16.5 | dBm |
| 11g Target Power@54Mbps | 13.0 | 14.5 | 16 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/- 11MHz | - | - | -20 | dB |
| fc +/- 20MHz | - | - | -28 | dB |
| fc > +/-30MHz | | | -40 | dB |

| | | | | |
|---|-------------|-----------------|-------------|-------------|
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| 6Mbps | - | -30 | -5 | dBm |
| 54Mbps | - | -30 | -25 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| 6Mbps (FER _≤ 10%) | - | -93 | - | dBm |
| 54Mbps (FER _≤ 10%) | - | -76 | - | dBm |

IEEE802.11n-HT20(2.4G) mode

Table 11 EMC3290 IEEE802.11n-HT20 TX/RX characteristics

| Item | Description | | | |
|---|----------------------------------|-----------------|-------------|-------------|
| Mode | IEEE802.11n HT20 | | | |
| Channel | CH1 to CH13 | | | |
| Data Rates | MCS0/1/2/3/4/5/6/7, up to 65Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11n Target Power@MCS0 | 13.5 | 14.5 | 16 | dBm |
| 11n Target Power@ MCS7 | 12.5 | 14 | 15.5 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/- 11MHz | - | - | -20 | dB |
| fc +/- 20MHz | - | - | -28 | dB |
| fc > +/-30MHz | | | -45 | dB |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| MCS0 | - | -30 | -5 | dBm |
| MCS7 | - | -31 | -27 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| MCS0 (FER _≤ 10%) | - | -93 | -93 | dBm |
| MCS7 (FER _≤ 10%) | - | -73.5 | -73 | dBm |

IEEE802.11n-HT40(2.4G) mode

Table 12 EMC3290 IEEE802.11n-HT40 TX/RX characteristics

| Item | Description | | | |
|---------------------------------|-----------------------------------|-----------------|-------------|-------------|
| Mode | IEEE802.11n HT40 | | | |
| Channel | CH1 to CH13 | | | |
| Data Rates | MCS0/1/2/3/4/5/6/7, up to 135Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11n Target Power@MCS0 | 13.5 | 14.5 | 16 | dBm |
| 11n Target Power@ MCS7 | 12.5 | 14 | 15.5 | dBm |

| Spectrum Mask @ target power | | | | |
|---|-------------|-----------------|-------------|-------------|
| fc +/- 22MHz | - | - | -20 | dB |
| fc +/- 40MHz | - | - | -28 | dB |
| fc > +/-60MHz | - | - | -45 | dB |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| MCS0 | - | -30 | -5 | dBm |
| MCS7 | - | -32 | -27 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| MCS0 (FER _≤ 10%) | - | -90 | - | dBm |
| MCS7 (FER _≤ 10%) | - | -71.5 | - | dBm |

IEEE802.11a mode

Table 13 EMC3290 IEEE802.11a TX/RX characteristics

| Item | Description | | | |
|---|----------------------------------|-----------------|-------------|-------------|
| Mode | IEEE802.11a | | | |
| Channel | CH36 to CH165 | | | |
| Data Rates | 6, 9, 12, 18, 24, 36, 48, 54Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11g Target Power@6Mbps | 12.5 | 14 | 15.5 | dBm |
| 11g Target Power@54Mbps | 11.5 | 13 | 14.5 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/- 11MHz | - | - | -20 | dBr |
| fc +/- 20MHz | - | - | -28 | dBr |
| fc > +/-30MHz | - | - | -40 | dBr |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| MCS0 | - | -29 | -5 | dBm |
| MCS7 | - | -29 | -25 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| 6Mbps (FER _≤ 10%) | - | -89 | - | dBm |
| 54Mbps (FER _≤ 10%) | - | -74.5 | - | dBm |

IEEE802.11n HT20(5G) mode

Table 14 EMC3290 IEEE802.11n-HT20(5G) TX/RX characteristics

| Item | Description |
|-------------|----------------------|
| Mode | IEEE802.11n(5G) HT20 |
| Channel | CH36 to CH165 |

| | | | | |
|---|----------------------------------|-----------------|-------------|-------------|
| Data Rates | MCS0/1/2/3/4/5/6/7, up to 65Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11n Target Power@MCS0 | 11.5 | 13 | 14.5 | dBm |
| 11n Target Power@MCS7 | 10.5 | 12 | 13.5 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/- 11MHz | - | - | -20 | dB |
| fc +/- 20MHz | - | - | -28 | dB |
| fc > +/-30MHz | - | - | -45 | dB |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| MCS0 | - | -28 | -5 | dBm |
| MCS7 | - | -30 | -27 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| MCS0 (FER≤10%) | - | -92.5 | - | dBm |
| MCS7 (FER≤10%) | - | -72 | - | dBm |

IEEE802.11n HT40(5G) mode

Table 15 EMC3290 IEEE802.11n-HT40(5G) TX/RX characteristics

| | | | | |
|---|-----------------------------------|-----------------|-------------|-------------|
| Item | Description | | | |
| Mode | IEEE802.11n(5G) HT40 | | | |
| Channel | CH36 to CH165 | | | |
| Data Rates | MCS0/1/2/3/4/5/6/7, up to 135Mbps | | | |
| TX Characteristics | Min. | Typical. | Max. | Unit |
| Transmitter Output Power | | | | |
| 11n Target Power@MCS0 | 11.5 | 13 | 14.5 | dBm |
| 11n Target Power@MCS7 | 10.5 | 12 | 13.5 | dBm |
| Spectrum Mask @ target power | | | | |
| fc +/- 11MHz | - | - | -20 | dBr |
| fc +/- 20MHz | - | - | -28 | dBr |
| fc > +/-30MHz | - | - | -45 | dBr |
| Frequency Error | -10 | -2 | +10 | ppm |
| Constellation Error (peak EVM) @target power | | | | |
| MCS0 | - | -28 | -5 | dBm |

| | | | | |
|--|-------------|-----------------|-------------|-------------|
| MCS7 | - | -30 | -27 | dBm |
| RX Characteristics | Min. | Typical. | Max. | Unit |
| Minimum Input Level Sensitivity | | | | |
| MCS0 (FER _≤ 10%) | - | -89 | - | dBm |
| MCS7 (FER _≤ 10%) | - | -69 | - | dBm |

3.6. **Bluetooth RF characteristic**

TBD

4. Antenna Information

4.1. Antenna Type

EMC3290 has two specifications: PCB antenna and IPX connector. Please refer to order code.

Table 16 EMC3290 Onboard PCB antenna parameter (2.4GHz)

| Item | Min. | Typical | Max. | Unit |
|------------|----------|---------|------|----------|
| Frequency | 2400 | | 2500 | MHz |
| Impedance | | 50 | | Ω |
| VSWR | | | 2 | |
| Gain | -0.37dBi | | | |
| Efficiency | 47% | | | |

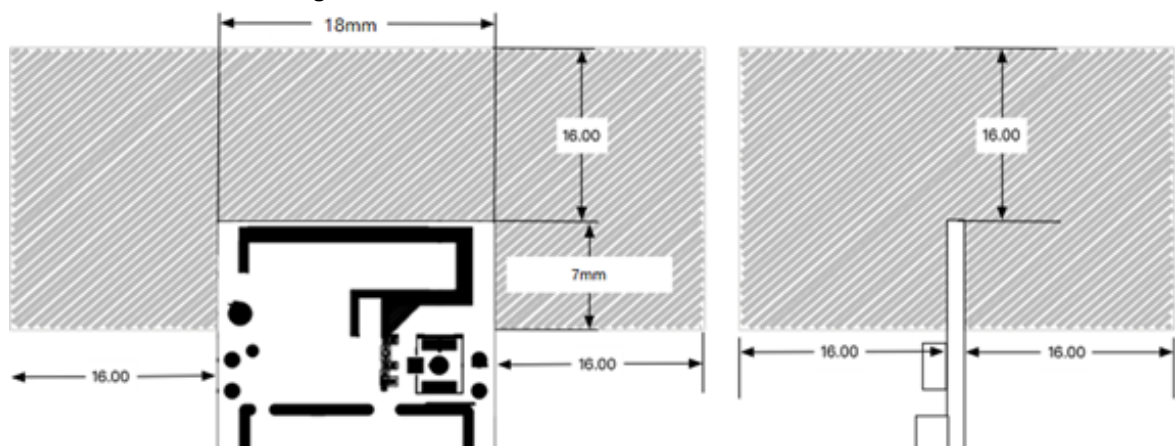
Table 17 EMC3290 Onboard PCB antenna parameter (5GHz)

| Item | Min. | Typical | Max. | Unit |
|------------|----------|---------|------|----------|
| Frequency | 5100 | | 5800 | MHz |
| Impedance | | 50 | | Ω |
| VSWR | | | 2 | |
| Gain | -0.69dBi | | | |
| Efficiency | 42% | | | |

4.2. PCB Antenna Clearance

When using PCB antenna in WIFI module, it is necessary to ensure that PCB and other metal devices are at least 16 mm away from the motherboard. The shaded areas in the figure below need to be far away from metal devices, sensors, interference sources and other materials that may cause signal interference.

Figure 4 PCB Antenna Minimum Clearance (unit: mm)

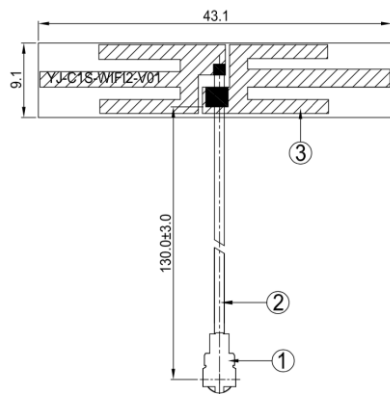


4.3. External Antenna Connector

Users can select 2.4G & 5G antennas with different external dimensions and gains of no more than 2dBi

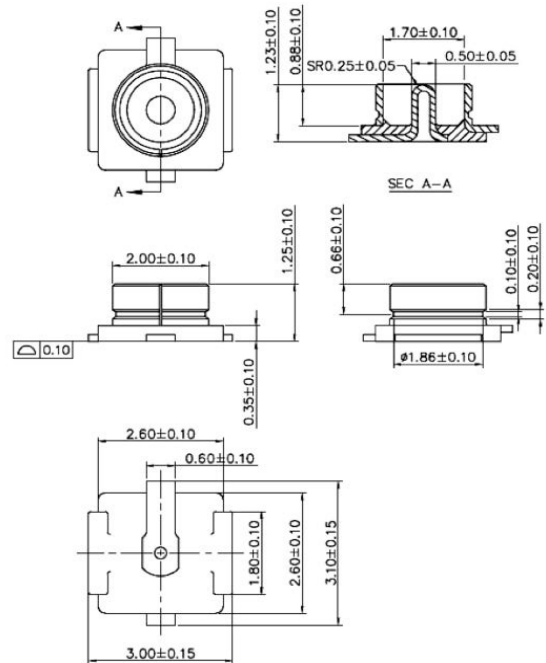
depending on the application environment. The following is a copper tube antenna for an IPEX connector commonly used by MXCHIP.

Figure 5 Eternal antenna size



- Frequency Range: 2.4-2.5GHz 5.15-5.85GHz z
- Input independence: 50 Ohm
- SWR: < 2.0
- Gain: 3.0dBi@2.4-2.5GHz 5.9dBi@5.15-5.85GHz
- Polarization: vertical
- Directionality: Omnidirectional
- Copper tube: 4.4*23mm: 4.4*23mm
- RL: < -10 dB
- Cable: O.D.1.13mm//L=130mm, Blue

Figure 6 Dimension Diagram of External Antenna Connector



PCB Antenna :

Manufacturer : Shanghai MXCHIP Information Technology Co., Ltd
 address : 9th Floor, Building B, Lane2145, Jinshajiang Road, Putuo District, Shanghai
 Model : EMC3290-D
 Type : PCB Antenna

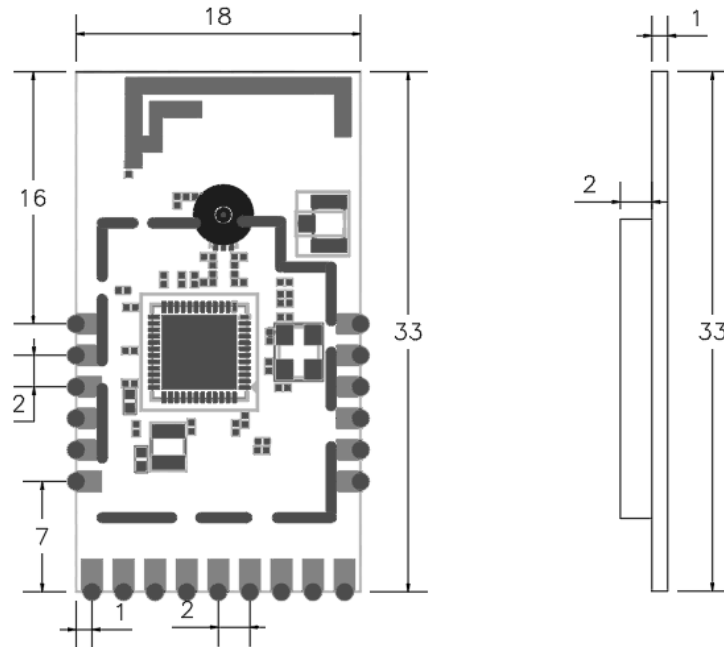
FPC Antenna :

Manufacturer : Shenzhen Bat Wireless Technology Co., Ltd
 address : 1409, Building A, Zhiyun Industrial Park, No. 13 Huaxing Road, Henglang Community, Dalang Street, Longhua District, Shenzhen
 Model : EMC3290-S
 type : Soft Board Antenna

5. Dimensions and Production Guidance

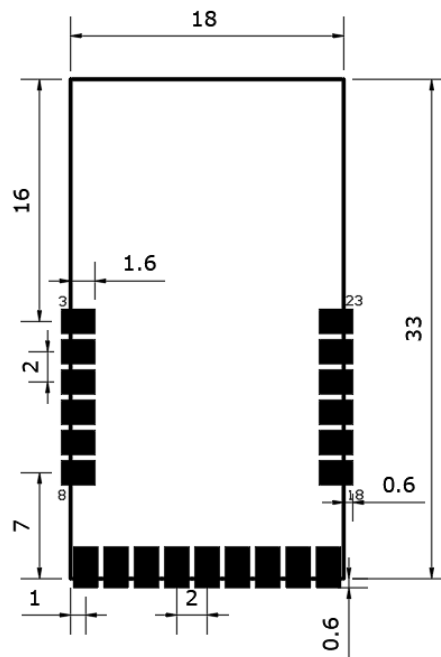
5.1. Assembly Dimension Diagram

Figure 7 EMC3290 dimension (unit: mm)



5.2. Packing dimension diagram

Figure 8 EMC3290 packing dimension (unit: mm)



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 9 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 $120^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and the baking time is 4 hours.
- The alarm temperature is set to 130°C .
- SMT patches can be made after cooling < 36°C 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 11.

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

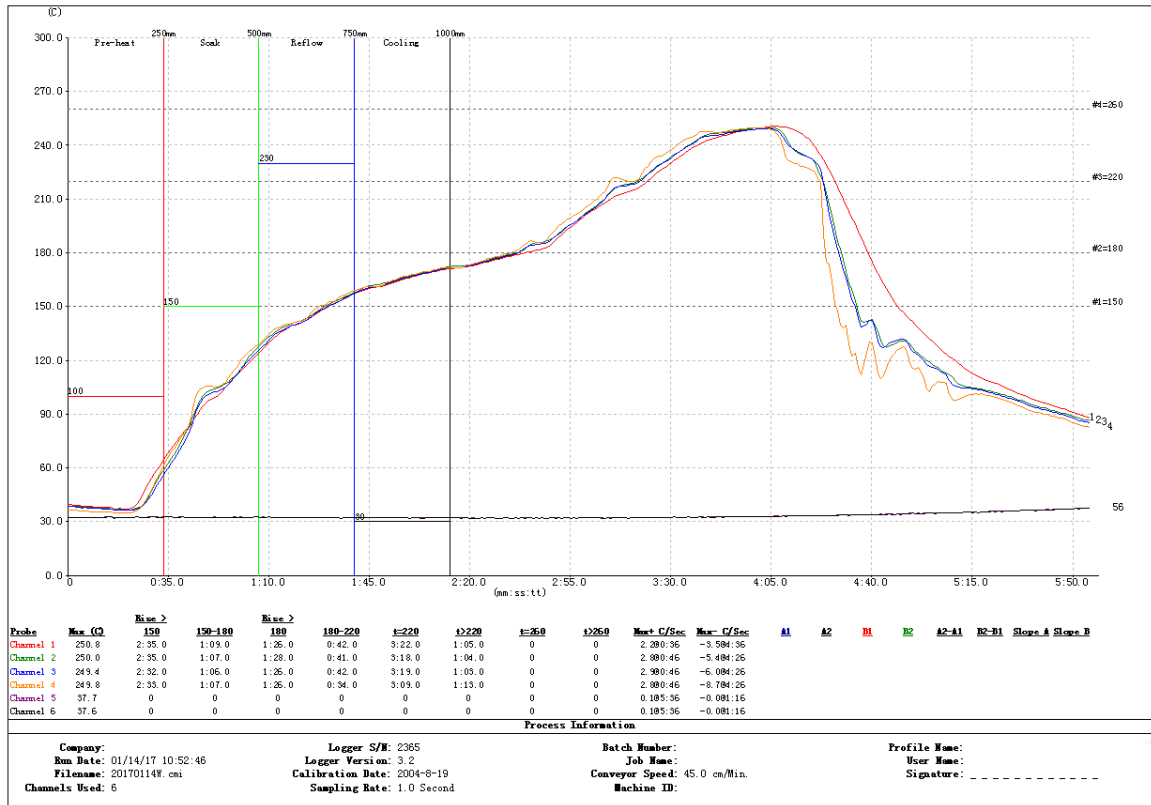
Figure 10 Storage Conditions Diagram



6.3. Secondary Reflux Temperature Curve

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

Figure 11 Reference Secondary Reflux Temperature Curve



7. Label Information

Figure 12 Module Label Schematic Diagram



1. MXCHIP: Company Logo.
2. CMIIT ID: SRRC Model Authorization ID.
3. EMC3290-P: Product Main Type.
4. B0F8936C39CA: MAC Address.

FCC Statements

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.

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

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

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. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification 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-EMC3290Or Contains FCC ID:P53-EMC3290"

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

1. 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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

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. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. The end user manual shall include all required regulatory information/warning as shown in this manual, include:
This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

8. 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, Lane 5, 2145 Jinshajiang Road, Putuo District, Shanghai

Zip code: 200333

Email: sales@mxchip.com