MXCHIP®

Datasheet

EMC3080 Wi-Fi/BLE Module

Built-in Cortex-M33 MCU

2.4G Hz IEEE 802.11 b/g/n, BLE4.2, ultra-high integration, rich peripherals

version：0.5　　data：2020-05-13　　Number：DS0156EN

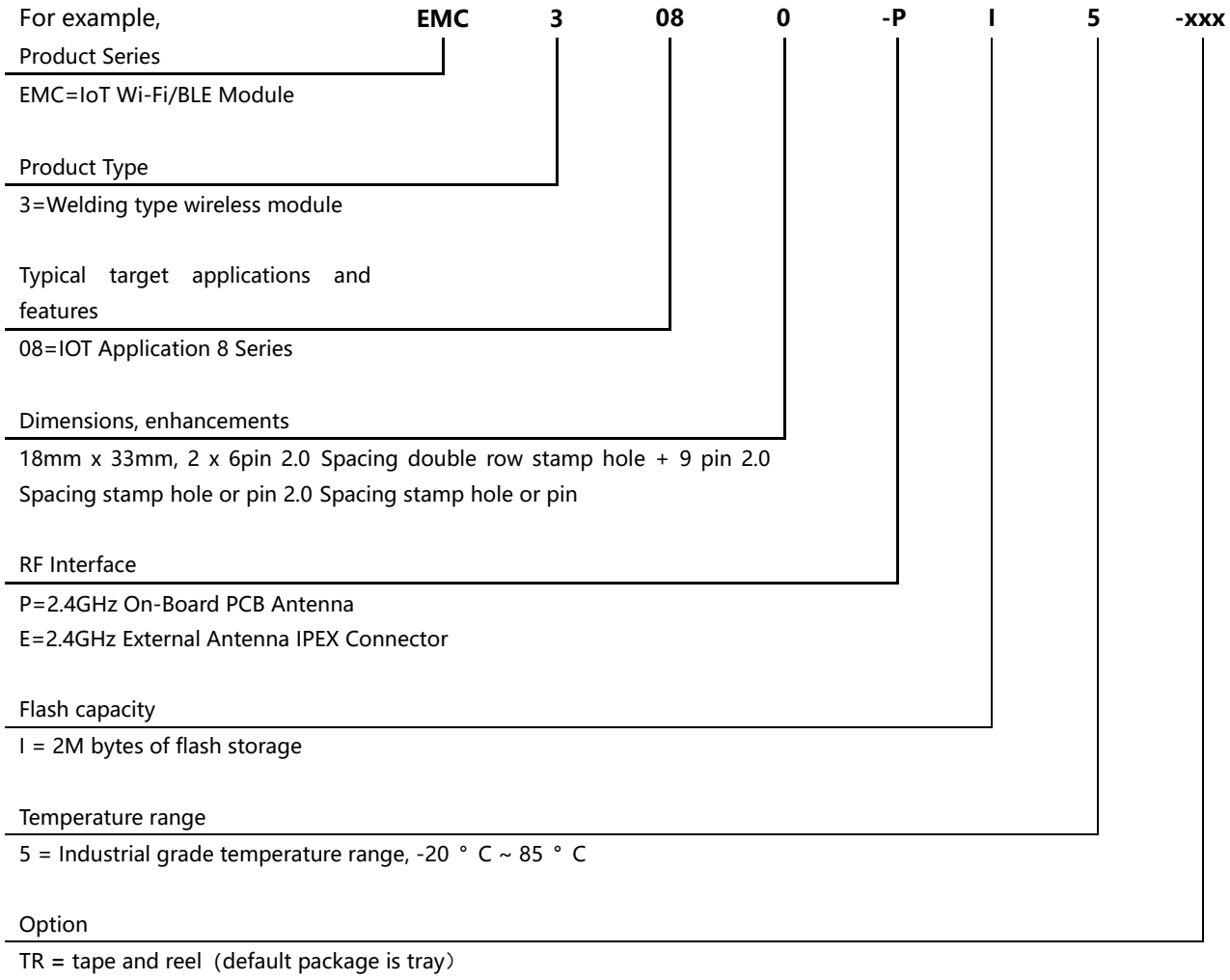
Abstract

- **Input Voltage：3.0V~3.6V**
- **Operating Temperature：** -20℃ to +85℃
- **Processor: Cortex-M33 Processor Core MX1300CF**
  - MX1300CF: Main frequency up to 100MHz
  - SWD/JTAG simulation debugger interface
- **Memory**
  - 256K bytes SRAM
  - 384 bytes OTP memory area
  - 2M bytes XIP flash
- **Wi-Fi**
  - IEEE 802.11 b/g/n 1T1R 2.4GHz Single Frequency
  - Support HT20, up to 65Mbps@MCS7
  - Support 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**
  - Bluetooth Low Energy BLE compliant with the 4.2 standard
  - Wi-Fi and BLE time division multiplexing, sharing the same PA and antenna
  - Support Bluetooth slave mode, can be used for Bluetooth distribution network
- **Rich Peripherals**
  - 14 x GPIO
  - 1 x SPI, 2 x I2C
  - 8 x PWM
  - 3 x UART，support hardware flow control
  - Low-energy RTC

- **Interface and Dimension**
  - Maintain pin compatibility with similar package modules
  - RF Interface: PCB antenna, IPEX connector antenna
  - 18mm x 33mm, stamp hole or pin
- **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
EMC3080-P	PCB antenna, MX1300CF processor
EMC3080-E	IPEX antenna, MX1300CF processor

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.

Accessories

Order Code	Description
MXKIT-Base	Development board for all EMC3080 modules
MXKIT-Core-3080	The development board core board for the EMC3080, used with MXKIT-Base
FX-3080	EMC3080 production fixture with accompanying test board：MXKIT-Base, MXKIT-Core-3080

Version Update Instructions

Date	Version	Update Contents
2019-12-06	0.1	First edition
2020-01-08	0.2	Improve power consumption parameters and RF parameters
2020-03-12	0.3	Pin definition update
2020-04-22	0.4	Label update, power consumption data update
2020-05-13	0.5	Update RF parameters

Copyright Notice

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1. Introduction

The EMC308x series modules are mainly used for IoT data communication. Data collection and control are realized through a rich peripheral interface, and data can be transmitted to the Internet of Things cloud service platform through a Wi-Fi network connection to realize the Internet of Everything. This series of modules is used in a wide range of IoT applications through a variety of different form factors, interface types, antenna interfaces and temperature range.

The module includes a super-integrated Wi-Fi microcontroller MX1300CF that integrates a Cortex-M33 core up to 125MHz, 256K bytes of SRAM, 2M bytes of Flash memory, and IEEE 802.11 b/g/ n Standard 2.4 GHz RF. Streamlined peripheral circuitry makes the overall module size and interface design more flexible and easier to control costs. The high-performance processing core and security module greatly improve the speed of networking interaction and reduce the overall power consumption while ensuring data security.

Shanghai MXCHIP provides MXOS and AliOS software platforms to support the development of EMC3080 series modules, providing an efficient development environment, access protocol stacks for various IoT cloud services, rich sample programs and various typical applications.

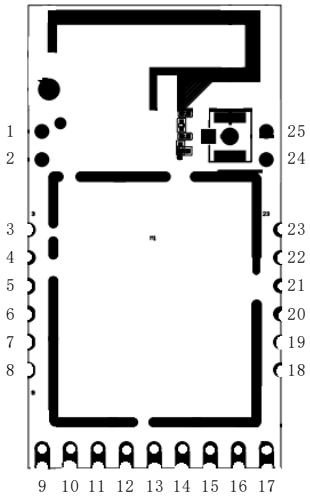
The following figure shows the hardware block diagram of the EMC3080 module, which mainly includes:

- Cortex-M33 core clocked up to 100MHz
- 256K bytes of SRAM
- 2M bytes XIP Flash
- 2.4GHz Wi-Fi controller conforming to IEEE 802.11 b / g / n standard
- Bluetooth Low Energy Controller that complies with BT4.2 BQB specifications

2. Pin Definition

2.1. Pin Arrangement

Figure 2 Pin Arrangement



2.2. Pin Definition

Table 1 pin definition

Pin Number	Name	Main Function (After Reset)	PWM	UART	I2C	SPI	Others
1, 3	PA_0	SWCLK	PWM_0	UART1_RX			EXT_32K
2, 4	PA_1	SWDIO	PWM_1	UART1_TX			
5	NC						
6	PA_4	PA_4	PWM_4	UART1_CTS		SPI_MOSI	
7	PA_2	PA_2	PWM_2	UART1_RX	I2C_SCL	SPI_CS	
8	PA_3	PA_3	PWM_3	UART1_TX	I2C_SDA	SPI_CLK	
9	PA_14	PA_14	PWM_2	UART0_TX			
10	PA_13[5]	PA_13	PWM_7	UART0_RX			
11	CHIP_EN[3]						
12	PA_17[5]	PA_17	PWM_5				
13	PA_18	PA_18	PWM_6				
14	PA_19	PA_19	PWM_7	UART2_CTS	I2C_SCL	SPI_MOSI	
15	NC						
16	VDD						
17	VSS						
18	NC						
19	PA_20[1]	PA_20	PWM_0	UART2_RTS	I2C_SDA	SPI_MISO	
20	NC						
21, 24	PA_16[1] [2]	PA_16	PWM_4	UART2_TX	I2C_SDA	SPI_CLK	
22, 25	PA_15[2]	PA_15	PWM_3	UART2_RX	I2C_SCL	SPI_CS	
23	PA_23[1] [5]	PA_23	PWM_7				

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 3:

Table 2 operation mode

Operation mode		PA_0 Default: 0	PA_13 Default: 0	PA_20 (BOOT) Default: 1	PA_19 (EASYLINK) Default: 1
ISP Program Mode		1	1	not detect	not detect
Test mode		1	0	not detect	not detect
Normal	QC	0	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. PA_0 and PA_13, 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 PA_0 and PA_13 are high, it enters ISP programming mode. In the ISP programming mode, the flash of the module can be programmed through UART2 (PA_16, PA_15).

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

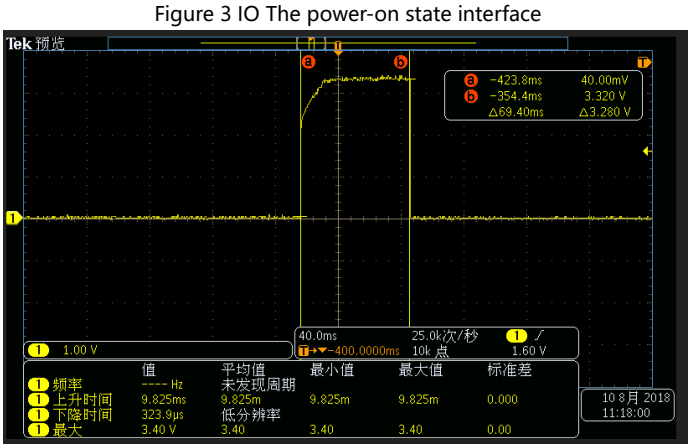
(5). After the startup is completed, when the processor runs the firmware provided by MXCHIP, the firmware detects the status of PA_20 and PA_19 to enter the corresponding working mode. among them:

- 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 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



5. The processing of chip pins inside the module is as follows:
   - PA_0, PA_1, PA_23: 10K pull-down resistor.
   - CHIP_EN: 100K pull-up resistor and 22nF capacitance to ground.Electrical Parameter

3. Electric Parameter

3.1. Absolute Maximum Parameters

Operation of the module outside of its absolute maximum ratings may result in permanent damage. At the same time, long-term exposure to the maximum rated conditions will affect the reliability of the module.

Table 3 Absolute Maximum Parameter: Voltage

Symbol	Ratings	Min	Max	Unit
V_{DD}–V_{SS}	Voltage	–0.3	3.6	V
V_{IN}	Input voltage on any other pin	V_{SS}–0.3	V_{DD}+0.3	V

3.2. Operating Voltage and Current

Table 4 Absolute Maximum Parameter: Current

Symbol	Note	Specification			
		Min.	Typical	Max.	Unit
V_{DD}	Voltage	3.0	3.3	3.6	V
I_{VDD}	3.3V inrush current			400	mA
I_{VDD}	3.3V，RF Tx CCK 11M 21dBm，peak current			600	mA

Table 5 operation parameter: Typical RF power consumption

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)		TBD		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 8 for actual application power consumption.

(2). Flash power consumption is not included in the data in Table 6. 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 50mA.

3.3. General I/O interface

Table 6 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		1.78	1.87	1.97	V
I_{T-}	Schmitt-trigger Low Level		1.36	1.45	1.56	V
I_{IL}	Input-Leakage Current	V_{IN}=3.3V or 0	-10	±1	10	μA

3.4. 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 7 Typical application power consumption

Mode	Average	Max.	Unit	Note
Wi-Fi off	18.2	20	mA	CPU Active
Wi-Fi off	TBD	TBD	mA	CPU Sleep
Wi-Fi initialization	TBD	TBD	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	97.4	mA	Turn on Wi-Fi low power consumption, turn off MCU low power consumption, DTIM = 1
Keep Wi-Fi connected	TBD	TBD	mA	Turn on Wi-Fi low power consumption, turn off MCU low power consumption, DTIM = 3
Keep Wi-Fi connected	TBD	TBD	mA	Turn on Wi-Fi low power consumption and MCU low power consumption, DTIM = 1
Keep Wi-Fi connected	TBD	TBD	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	Distribution process, in RX state
Iperf performance mode	TBD	TBD	mA	Turn off the low power consumption of Wi-Fi and MCU, iperf sends at full speed

3.5. Temperature

Table 8 Temperature and humidity parameters

Symbol	Ratings	Max	Unit
T_{STG}	Storage temperature	–55 to +125	℃
T_{work}	Ambient Operating Temperature	-20 to +85	℃
T_{Jun}	Junction Temperature	0 to +125	℃

3.6. ESD

Table 9 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	

3.7. RF Parameter

Table 10 RF Parameter

Item	Specification
Operating Frequency	2.412~2.484GHz
Channel BW	20MHz
Antenna Interface	1T1R, Single stream
Wi-Fi Standard	IEEE 802.11b/g/n
Modulation Type	11b: DBPSK, DQPSK, CCK for DSSS 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: MCS0~7, OFDM
Data Rates	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 65Mbps
Antenna type	One U.F.L connector for external antenna PCB printed ANT (Reserve)

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

IEEE 802.11b mode

Table 11 RF TX Parameters in IEEE802.11b mode

TX Characteristics	Min.	Typical	Max.	Unit
Transmitter Output Power				
11b Target Power	14	16	18	dBm
Spectrum Mask				
fc +/-11MHz to +/-22MHz			-30	dBr
fc > +/-22MHz			-50	dBr
Frequency Error	-10	-2	+10	ppm
Constellation Error (peak EVM)				
1~11Mbps		-15.5	35% (or -11dB)	

Table 12 RF RX parameters in IEEE802.11b mode

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
1Mbps (FER≦8%)		-98	-83	dBm
11Mbps (FER≦8%)		-89	-76	dBm

IEEE802.11g

Table 13 RF TX Parameters in IEEE802.11g mode

TX Characteristics	Min.	Typical	Max.	Unit
Transmitter Output Power				
11gTarget Power@6Mbps	13	14.5	16	dBm
11g Target Power@54Mbps	13	14.5	16	dBm
Spectrum Mask @ target power				
fc +/- 11MHz			-20	dB
fc +/- 20MHz			-28	dB
fc > +/-30MHz			-40	dB
Frequency Error	-15	-5	+15	ppm
Constellation Error (peak EVM) @target power				
6Mbps	-	-26	-24	dB
54Mbps	-	-29	-27	dB

Table 14 RF RX Parameters in IEEE802.11g mode

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
6Mbps (FER≦10%)		-92	-	dBm
54Mbps (FER≦10%)		-75	-	dBm

IEEE802.11n HT20

Table 15 RF TX Parameters in IEEE802.11n HT20 mode

TX Characteristics	Min.	Typical	Max.	Unit
Transmitter Output Power				
11n Target Power@MCS0	11	12.5	14	dBm
11n Target Power@MCS7	11	12.5	14	dBm
Spectrum Mask @ target power				
fc +/- 11MHz			-20	dB
fc +/- 20MHz			-28	dB
fc > +/-30MHz			-45	dB
Frequency Error	-15	-5	+15	ppm
Constellation Error (peak EVM) @target power				
MCS0	-	-29	-27	dB
MCS7	-	-31	-28	dB

Table 16 RF RX Parameters in IEEE802.11n HT20 mode

RX Characteristics	Min.	Typical	Max.	Unit
Minimum Input Level Sensitivity				
MCS0 (FER≦10%)		-92	-82	dBm
MCS7 (FER≦10%)		-72	-64	dBm

3.8. EMC3080 Bluetooth RF Parameters

Table 17 EMC3080 BLE4.2 TX/RX Parameters

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	6.1	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 PER ≤30.8%	LE_1M	-	-98	-97	dBm

4. Antenna Information

EMC3080 has two specifications: PCB antenna and 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. PCB antenna parameters and use

4.1.1. On-board PCB parameter

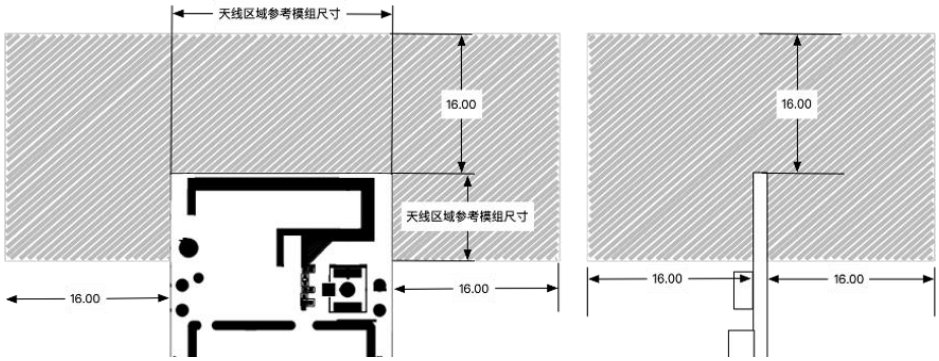
Table 18 On-board PCB parameter

Item	Min.	Typical	Max.	Unit
Frequency	2400		2500	MHz
Impedance		50		Ω
VSWR			2	
Gain	≤2dBi			
Efficiency	>70% or >-1.54dB			

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 Antenna minimum clearance area (unit: mm)



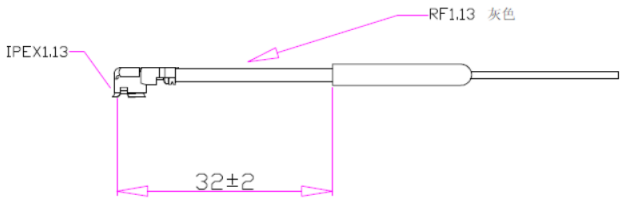
4.3. External antenna parameters and use

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

When using an external antenna, it should be noted that the module must be powered on after the antenna is connected, because the module will perform IQ calibration after power on, and send a single carrier through the PA to pass the RX loop detection signal. If the load is not loaded (the antenna is not connected), it will cause calibration errors, which will make the PA output power abnormal, and a large standing wave will be formed at the PA output, which may damage the internal devices.

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

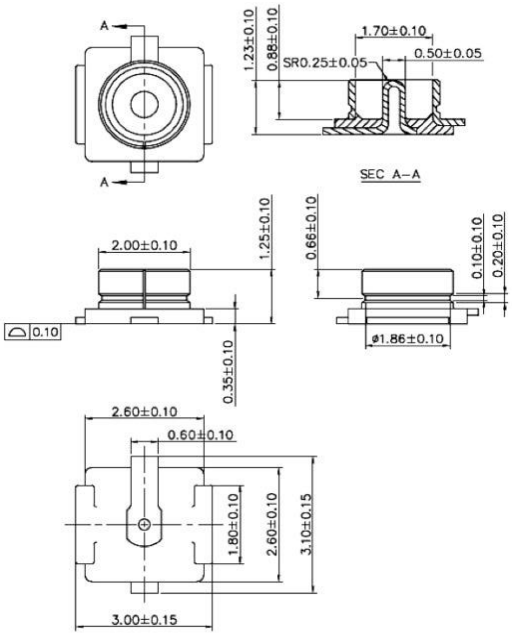
Figure 5 Copper tube antenna size



- Frequency range：2400-2500 MHz
- Input independace：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:

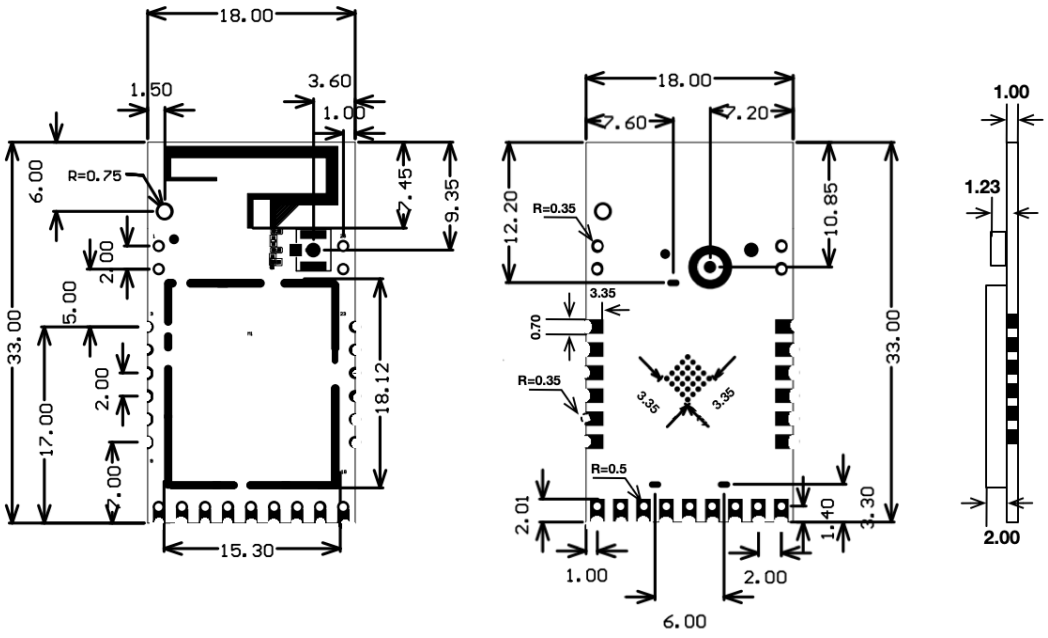
Figure 6 Dimension drawing of external antenna connector



5. Dimensions and Production Guidance

5.1. Assembly Dimension Diagram

Figure 7 Assembly Dimension Diagram（unit: mm, tolerance: ±0.1, outside tolerance±0.2）



5.2. Recommended Package Drawing

The solder resist window and the pad size are the same. SMT recommends a steel mesh thickness of 0.12mm-0.14mm.

Figure 8 DIP package dimension(unit: mm)

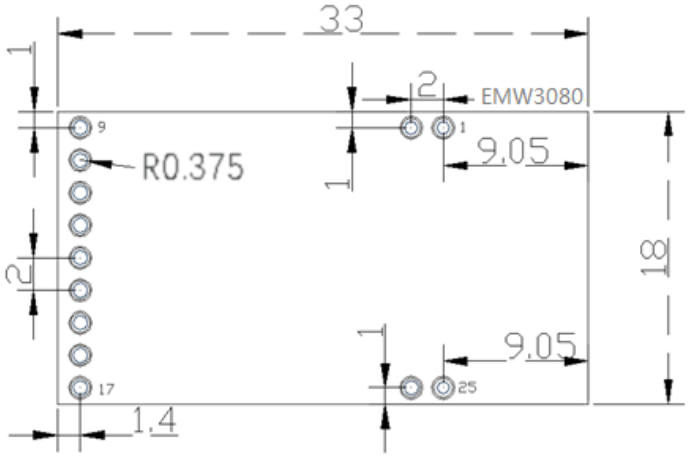


Figure 9 Stamp hole package size (mounting pad, unit: mm)

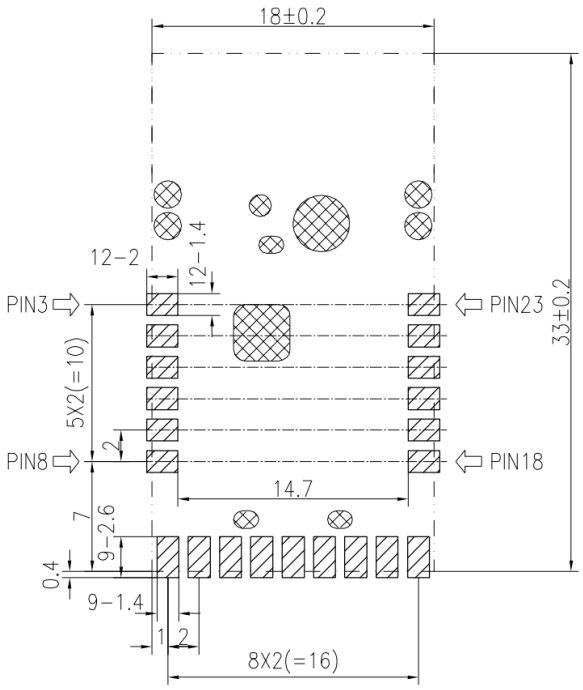
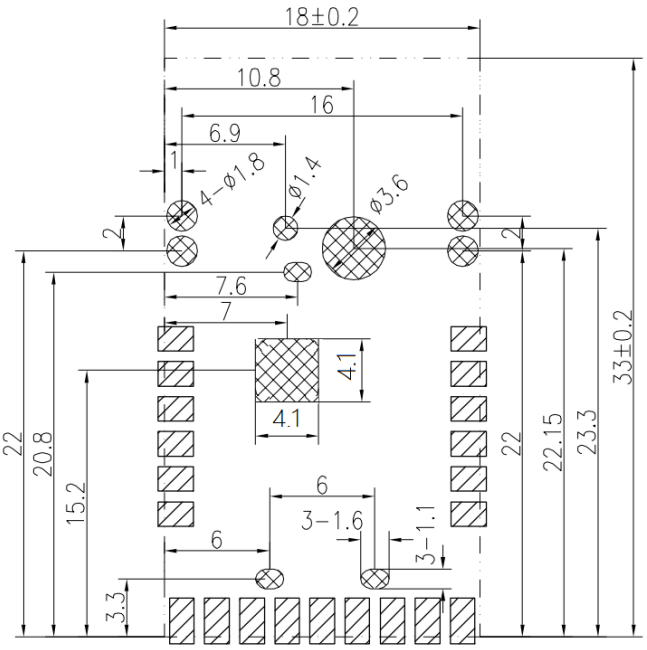


Figure 10 Stamp hole package size (no mounting pad, unit: mm)



Notes:

The two-dot chain line indicates the outline of the module, and components cannot be arranged on the main board in the outline.

The hatching in the middle oblique line indicates the mounting pad of the module on the main board and expresses the size of the mounting position of the module on the main board.

The medium meshed wire frame indicates the place where the pad cannot be placed on the main board, and expresses the position size of the prohibited pad on the motherboard.

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 11 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 13.

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.

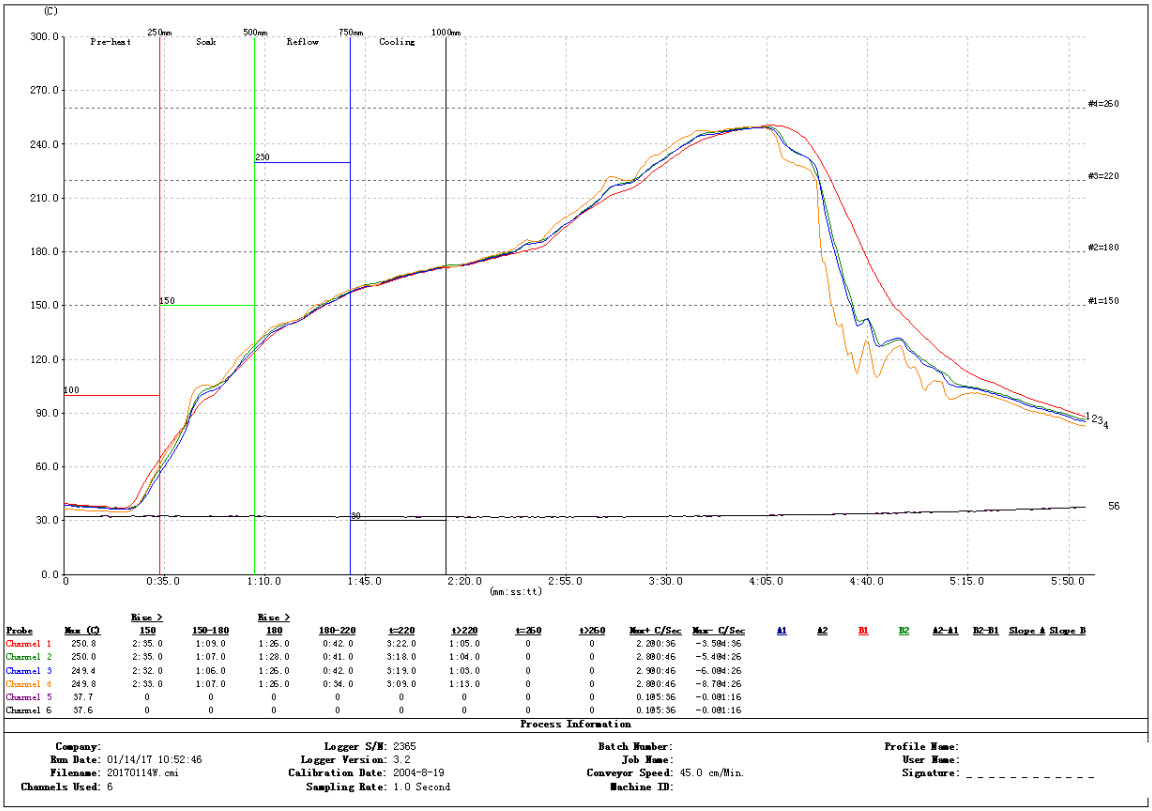
6.2. Storage Condition

Figure 12 Storage Conditions Diagram

6.3. Secondary Reflux Temperature Curve

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

Figure 13 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	0:54.0	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. FCC and IC Information

7.1. 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. The device can be used in portable exposure condition without restriction. 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 equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

7.2. IC warning

- ✓ **- English:**
- ✓ This device complies with Industry Canada license-exempt RSS standard(s).
- ✓ Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.
- ✓ **- French:**
- ✓ Le présentappareilestconforme aux CNR d'Industrie Canada applicable aux appareils radio exempts de license. L'exploitationestautorisée aux deux conditions suivantes:
- ✓ (1) l'appareil ne doit pas produire de brouillage, et
- ✓ (2) l'utilisateur de l'appareildoit accepter tout brouillageradioélectriquesubi, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

8. Label Information

Figure 14 Module Label Schematic Diagram

1. MXCHIP: Company Logo.
2. CMIIT ID: SRRC Model Authorization ID
3. FCC ID: FCC Model Authorization ID
4. EMC3080-P: Product Main Type.
5. ZI5: Product Auxiliary Model.
6. X19521: Production serial number
7. B0F893100008: MAC Address.

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

Zip code: 200333

Email: sales@mxchip.com

10.1 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);

b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);

c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;

d) Appropriate parts by manufacturer and specifications;

e) Test procedures for design verification; and

f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with trace antenna designs, and This manual has been shown the layout of trace design,, antenna, connectors, and isolation requirements.

10.2 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: P53-EMC3080.

10.3 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has a PCB Antenna, , and the antenna use a permanently attached antenna which is unique.

10.4 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: P53-EMC3080.

10.5 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: Topband can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

10.6 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is **only** FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, 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.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.

10.7 The module is limited to OEM installation ONLY.

10.8 The OEM integrator is responsible for ensuring that the end-user has no manual instructions to remove or install module.

10.9 The module is limited to installation in mobile or fixed applications