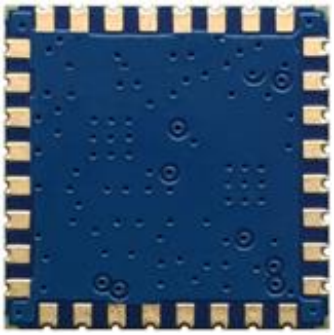
SNM9390
2.4G Transmitter Module

（Top View）


（Bottom View）

Revision History

Revision	Summary	Release Date
0.1	Initial release	2023-11-20
0.2	Update module pin description	2024-01-05
0.3	Update package information	2024-02-18
0.4	Update Components information	2024-05-20
0.5	Update modules information	2024-05-20

1 Introduction

The SNM9390 is a RF transceiver module for the world wide 2.4~2.5GHz ISM band. SNM9390 supports frequency hopping system, has built-in. separated 128-bytes TX/RX FIFO for data buffering and burst transmission auto-ack and auto-resend, CRC for error packet filtering, RSSI for clear channel assessment, WOR (Wake on RX) function to support periodical wakeup from sleep mode to RX mode and listen without MCU interaction.

1.1 Features

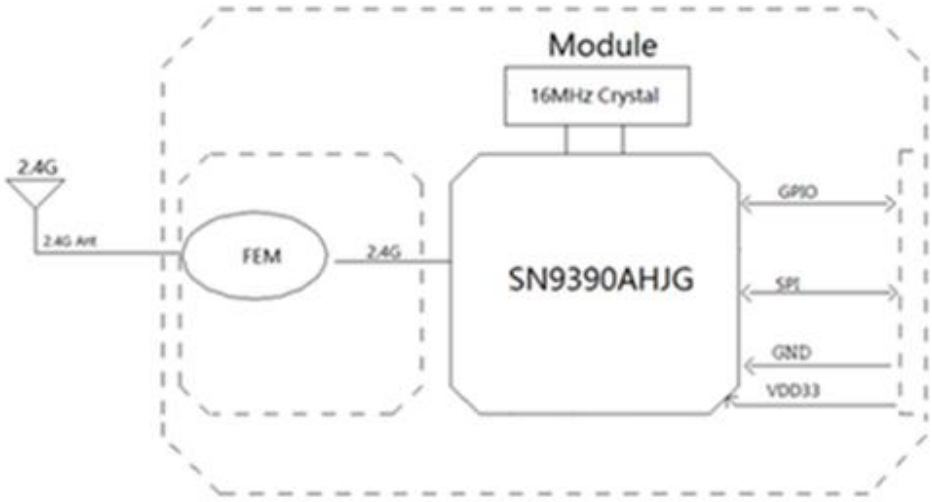
- SOC GFSK transceiver
- Data rate 2M and 4Mbps
- Auto ACK & retransmit
- Address and CRC computation
- AGC (Auto Gain Control) for wide RSSI dynamic range
- RF has two ways of data transmission Director mode and FIFO mode
- Support 4-wire SPI,SPI clock is 8MHz
- Dynamic FIFO length
- Auto IF function
- Built-in crystal (16MHz)
- RF built in ILRC, low power standby mode, turn off Crystal, wake-up function provided by ILRC
- Tiny size moulde 12mm x 12mm
- Voltage
  – Power supply range: 3v to 3.6 V
- Operating
  – Temperature range: -40° C to +85°

1.2 Regulatory compliance:

Regulatory for compliance:

- CE (Europe)
- FCC (USA)

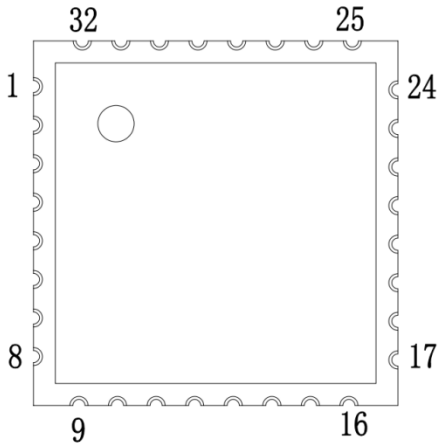
1.3 Block Diagram



1.4 General Specifications

Module Name	SNM9390-F1
Chipset	SN9390AHJG
Receiving frequency	2400~ 2483.5Mhz
Modulation/Demodulati	GFSK
RF data rate	2M and 4Mbps
Host Interface	SPI/0~8MHz
RF Impedance	50Ω
Antenna	Connect to external antenna through Half hole pad
Dimension	12.0*12.0*2.0mm (L*W*H) ±0.3mm
Power Supply	100mA (Typical)@TX Power 19dBm 25mA (Typical)@RX Mode
Operation	-40℃ to +80℃
Operation Humidity	10% to 95% RH (Non-Condensing)

2 Pin Assignments



(Top View)

2.1 Pin Definition

No.	Pin Name	Type	Module Pin Description	Note
1	IO1	I/O	General purpose I/O1	
2	RF_TRXD	I/O	General purpose I/O0	
3	RF_CLK	I/O	General purpose I/O2	
4	SPI_TXD	I/O	General purpose I/O3	
5	SPI_CLK	I/O	General purpose I/O4	
6	SPI_RXD	I/O	General purpose I/O5	
7	SPI_CS	I/O	General purpose I/O6	
8	WAKE_UP	I/O	General purpose I/O11	
9	RX_SEL	I	RX SEL_LNA	
10	IO9	I/O	General purpose I/O9	
11	IO10	I/O	General purpose I/O10	
12	TX_SEL	I	TX SEL_PA	
13	GND	P	Ground connections	
14	GND	P	Ground connections	
15	TMODE	I/O	General purpose I/O, pinmux to IO7	
16	SYS_CLK		General purpose I/O, pinmux to IO8	
17	GND	P	Ground connections	

18	NC	/	NC	
19	NC	/	NC	
20	GND	P	Ground connections	
21	GND	P	Ground connections	
22	GND	RF	Ground connections	
23	ANT1	RF	2.4G RF PAD for WLAN_ANT1	
24	GND	RF	Ground connections	
25	GND	P	Ground connections	
26	GND	P	Ground connections	
27	NC	/	NC	
28	NC	/	NC	
29	GND	P	Ground connections	
30	GND	P	Ground connections	
31	VDD33	P	3.3V Main Power Supply	
32	VDD33	P	3.3V Main Power Supply	

P: Power or Ground; I/O: In/Output; I: Input; O :Output; AI/O: Analog In/Output; RF: Analog RF Port or RF Ground;

3 Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typical	Max	Units
Ambient Operating		-40	25	80	℃
Supply Voltage	VDD33	3.0	3.3	3.6	V

3.2 Current Consumption

Conditions : VDD33=3.3V ; Ta:25℃			
Use Case	VDD33 Current		
	Typical(IRMS)	Max(IPeak)	Units
Typical	120	165	mA

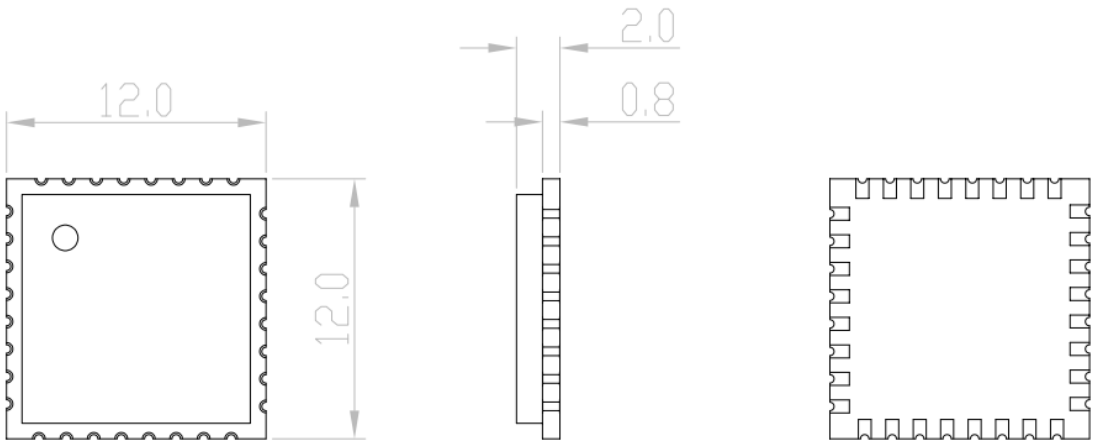
4 RF Specifications

4.1 2.4G RF Specification

Conditions : VDD33=3.3V ; Ta:25℃	
Features	**Description**
Frequency	2.4~2.4835GHz (2.4GHz ISM Band)
Modulation	GFSK
RF Bit Rate	2M and 4Mbps
RF TX/RX Specification	
TX Output power	19dBm @Typical (2M and 4Mbps)
TX Power Tolerance	+/- 2dBm
RX Sensitivity	-92dBm(Typical)@2Mhz -89dBm(Typical)@4Mhz

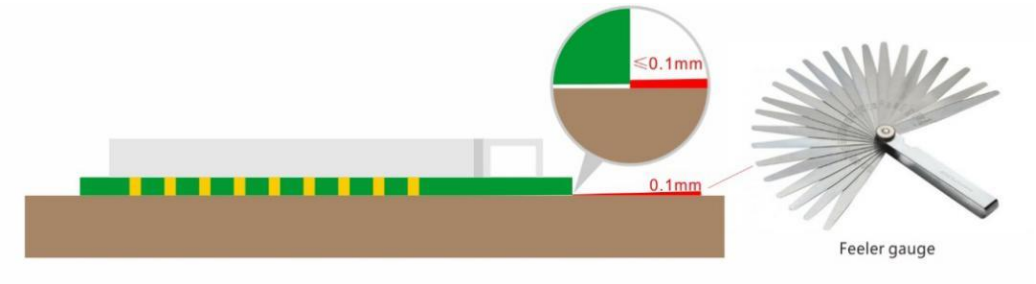
5 Mechanical Specifications

5.1 Module Outline Drawing



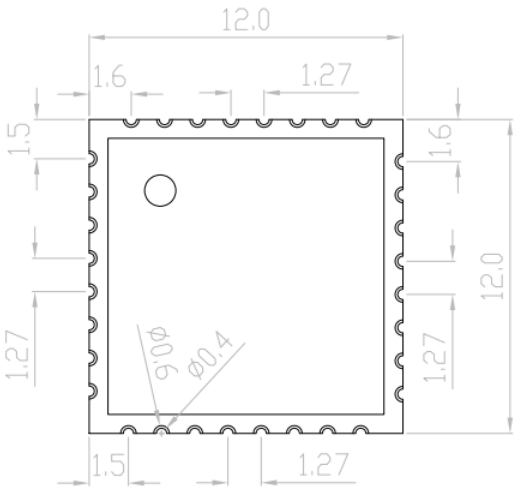
(Top View) (Side View) (Bottom View)

Module dimension: 12.0*12.0*2.0mm(L*W*H; Tolerance: ±0.3mm_L/W, ±0.2mm_H

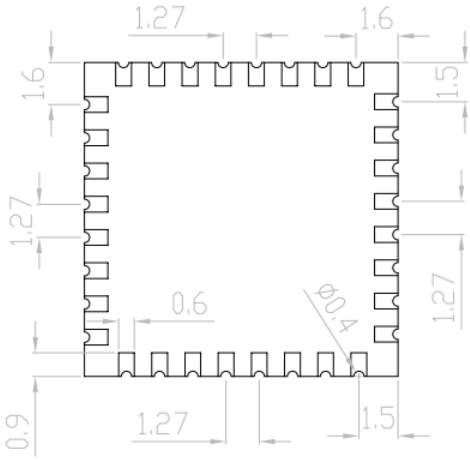


Module Bow and Twist：≤0.1mm

6 Mechanical Dimensions



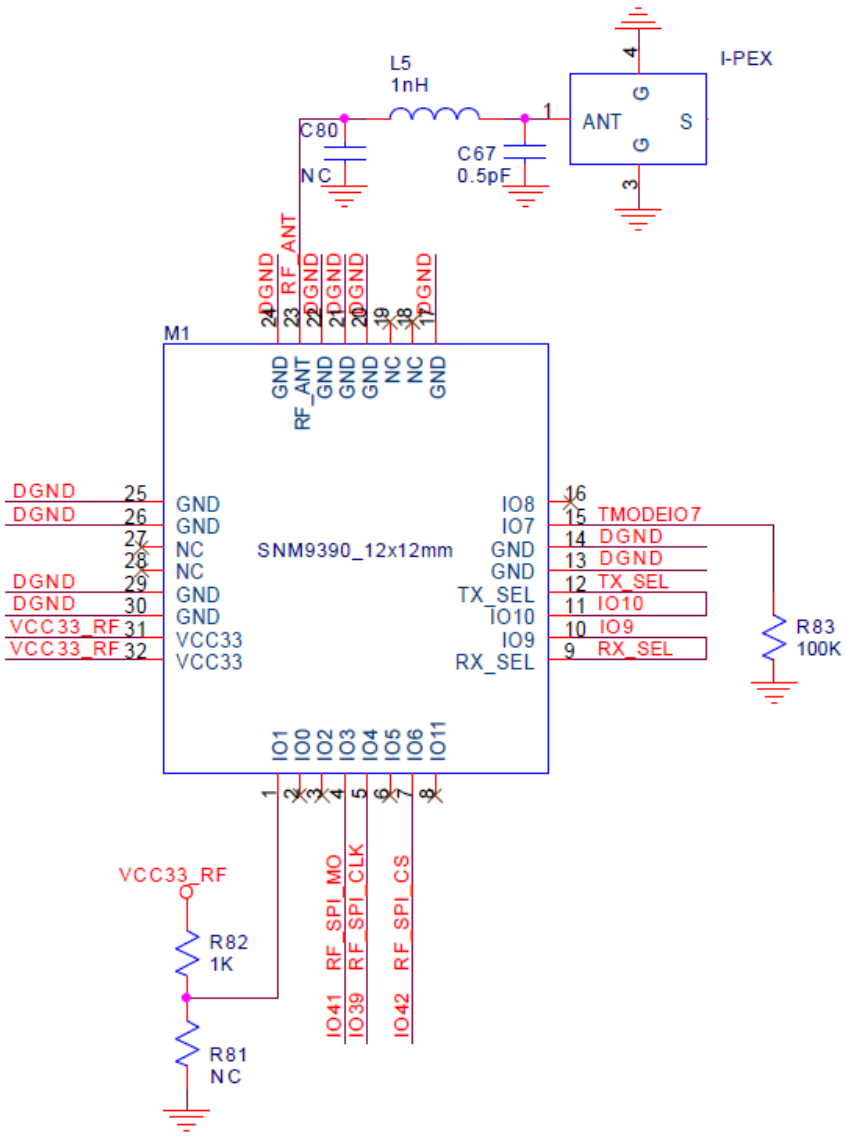
(Top View)



(Bottom View)

7 Application Information

7.1 Typical Application Circuit

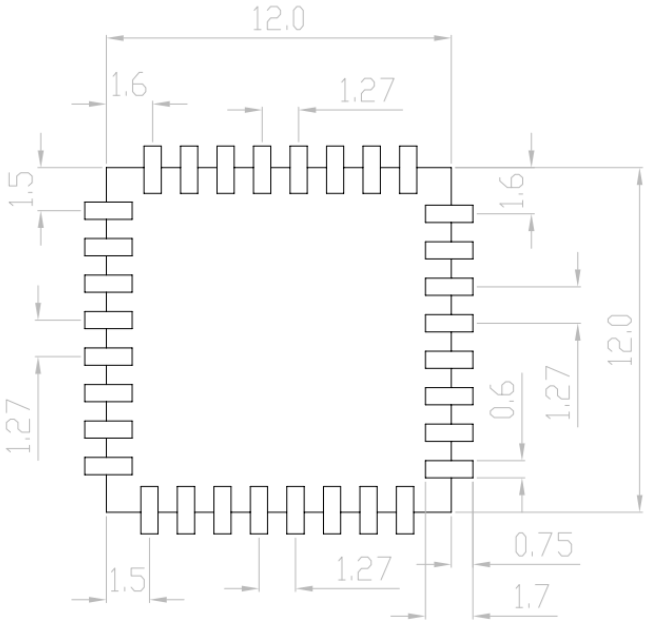


NOTE:

A. RF traces need to keep 50 ohm impedance. Please reserve a “pi” circuit for antenna matching.

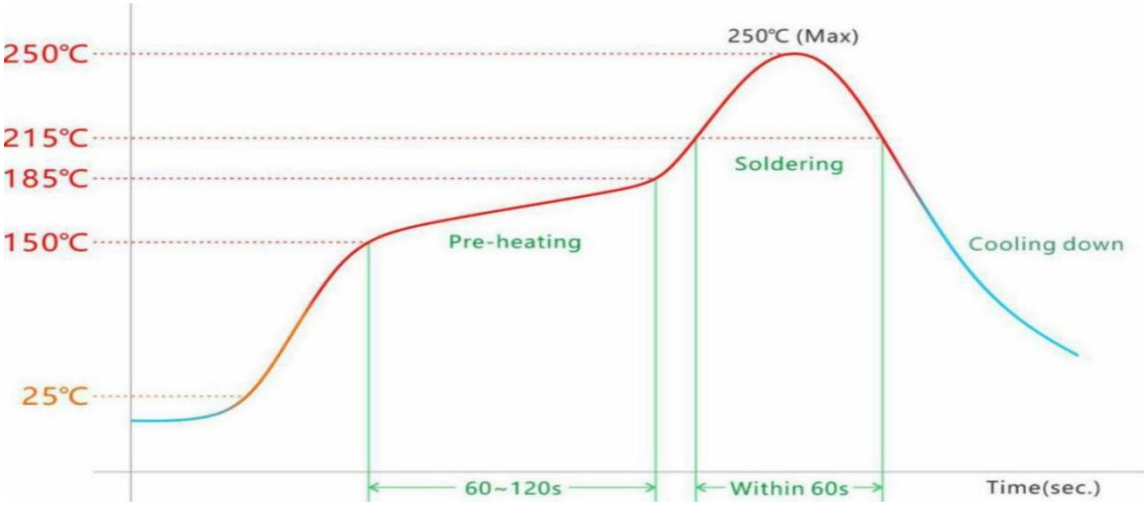
B. CLK trace has a good ground reference.

8 Recommend PCB Layout Footprint



(Design size: mm)

8.1 Reflow Soldering Standard Conditions



Please use the reflow within 2 times.

Set up the highest temperature within 250℃.

9 Key Components of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	SN9390AHJG	SONIX TECHNOLOGY CO LTD.	
2	RF Front-End	2.4G FEM	RFIC Technology Corp Co.,LTD	
			Xinbaite Microelectronics Co.,LTD	
2	PCB	SNM9390	ShenZhen Tie Fa Technology Limited	
			Quzhou Sunlord Electronics Co.,Ltd	
			Jiangsu Lantek Electronics Tech Co.,LTD	
			SHEN ZHEN QILI ELECTRON CO.,LTD	
3	Crystal	16MHz	Chengde oscillator Electronic Technology CO.,LTD	
			LUCKI CM ELECTRONICS CO.,LTD	
			JinHua East Crystal Electronic CO.,LTD	

10 Module Markings

The following figure shows the top-side marking for the SNM9390 module:

10.1 Module Descriptions

Marking	Description	Note
SNM9390	Generic Part Number	
XXXXXXXXXX	LTC (Lot Trace Code),	
YY	Module Types	F1:SNM9390-F1 T1:SNM9390-T1

11 Package and Storage Information

11.1 Package Dimensions

ITEM	W	AO	BO	KO	E	F	P	P0	P2	D	T
DIM	24.00±0.3	12.50±0.1	12.50±0.1	2.40±0.1	1.75±0.1	11.5±0.1	20.00±0.1	4.00±0.1	2.00±0.1	Ø1.5±0.1	0.30±0.05

Package specification:

1. 1,000 modules per roll and 5,000 modules per box.
2. Outer box size: 37.5*36*29cm.
3. The diameter of the blue environment-friendly rubber plate is 13 inches, with a total thickness of 28mm (with a width of 24mm carrying belt).
4. Put 1 package of dry agent (20g) and humidity card in each anti-static vacuum bag.
5. Each carton is packed with 5 boxes.

11.2 Storage Conditions

Absolute Maximum Ratings:
Storage temperature: -40℃ to +85℃,
Storage humidity: 10% to 95（Non-Condensing）
Recommended Storage Conditions:
Storage temperature: 5℃ to +40℃,

Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.
The Module shall be stored without opening the packing.
After the packing opened, the Module shall be used within 72hours.
When the color of the humidity indicator in the packing changed,
The Module shall be baked before soldering.
Baking condition: 60℃, 24hours, 1time.

ESD Sensitivity：
ESD Protection: (HBM ,Maximum rating)
The Module is a static-sensitive electronic device.
Do not operate or store near strong electrostatic fields.
Take proper ESD precautions!

ESD CAUTION

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FCC Statement

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.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursua nt to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inte rference in a residential installation. This equipment generates uses and can radiate radio frequency energy a nd, if not installed and used in accordance with the instructions, may cause harmful interference to radio com munications. 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 turn ing 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 important announcement

Important Note:

Radiation Exposure Statement

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 and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following"

Contains FCC ID:**2BMXW-SNM9390-F1** "

Manual Information to the End User

The OEM integrator 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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

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.

2.7 Antennas

This radio transmitter **FCC ID:2BMXW-SNM9390-F1** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)		Frequency range:
			Antenna 1	Antenna 2	
FHSS	/	External Antenna	2.73	N/A	2410-2473MHz

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains **FCC ID:2BMXW-SNM9390-F1".**

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

2.11 Note EMI Considerations

Host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.