C611L40 WiFi6/BT/BLE Module

Low Power Consumption

Product Specification

802.11b/g/n/ax 1T1R WiFi6/BT/BLE Module

(AIC8800 M40B)

Version Ver1.0

History

Document Release	Date	Modification	Initials	Approved
Version V1.0	2025/07/15			

C611L40 WiFi6 /BT /BLE Module

Overview

AIC8800M40B is a highly integrated chip with dual band Wi-Fi6, BTDM5.4 for wireless application.

1.1 WiFi Features

- CMOS single-chip fully-integrated RF, Modem and MAC
- Support 2.4GHz/5GHz WiFi6
- Data rates up to 286.8Mbps with 20/40MHz bandwidth
- Support 5MHz/10MHz mode
- RX sensitivity -97dBm in 11b 1M mode
- Tx power up to 23dBm in 11b mode, 18dBm in HT/VHT/HE MCS7 mode
- Support STA, AP, Wi-Fi Direct modes concurrently
- Support STBC, beamforming
- Support WiFi6 TWT
- Support Two NAV, Buffer Report, Spatial reuse, Multi-BSSID, intra-PPDU power save
- Support LDPC
- Support MU-MIMO, OFDMA
- Support DCM, Mid-amble, UORA
- Support WEP/WPA/WPA2/WPA3-SAE Personal, MFP

1.2 BTDM 5.4 Features

- Supports all the mandatory and optional features of Bluetooth 2.1+EDR/3.0/4.x/5.3/5.4
- Supports advanced master and slave topologies

1.3 CPU Features

- Integrated Cortex-M4F CPU with MPU and FPU
- On-chip memory includes 992KB SRAM and 896KB ROM
- Supports SDIO3.0/SPI/USB2.0
- Integrated hardware crypto accelerator AES/HASH
- Integrated True Random Number Generator (TRNG)
- Integrated SPI flash in package, from 8Mbits to 128Mbits flash
- Integrated GPIOs with external level/edge trigger/wakeup
- Integrated UART/I2S/I2C/PWM/SPI/SDMMC

- Integrated 2 channels application 14bits ADC
- Integrated low power timer and watchdog
- Support freeRTOS

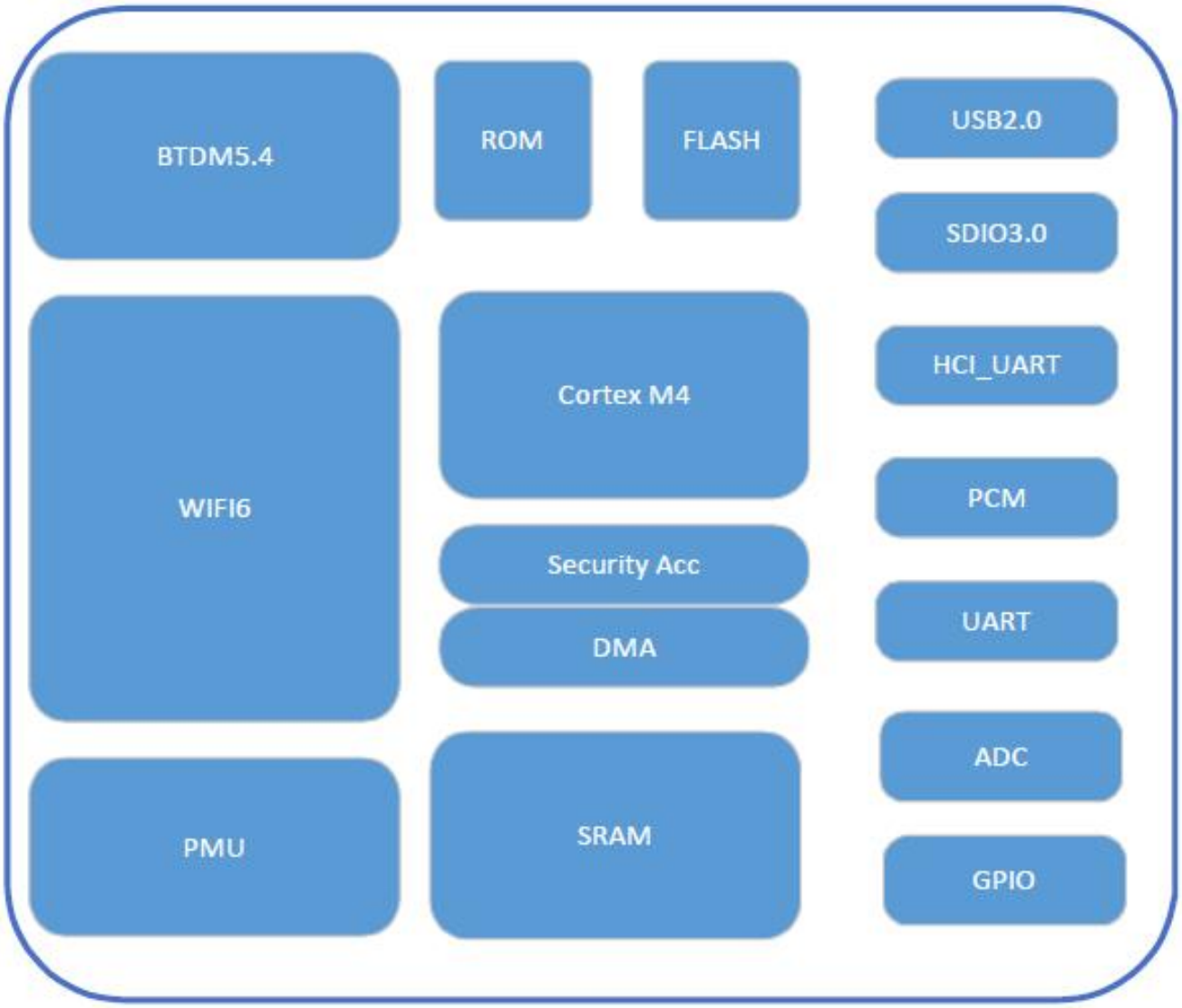
1.4 Other Features

- Supports SDIO3.0/USB2.0/PCIE(D80P)/HCI_UART/PCM interface
- Integrated low power timer and watchdog
- 512 bits eFuse

1.5 Applications

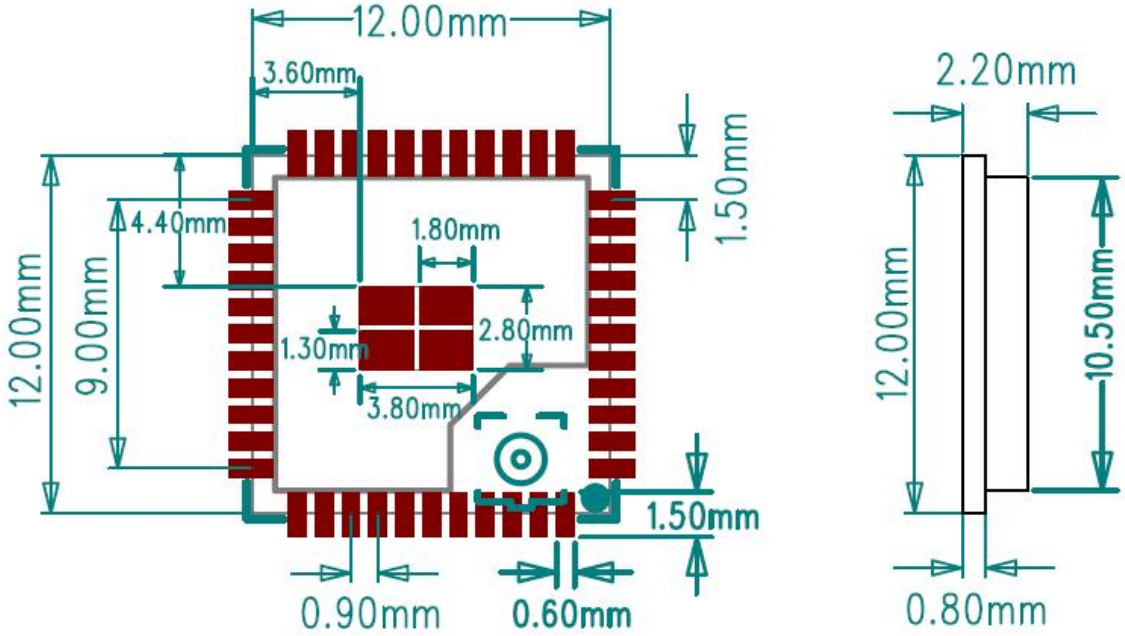
- IoT device
- Wireless device

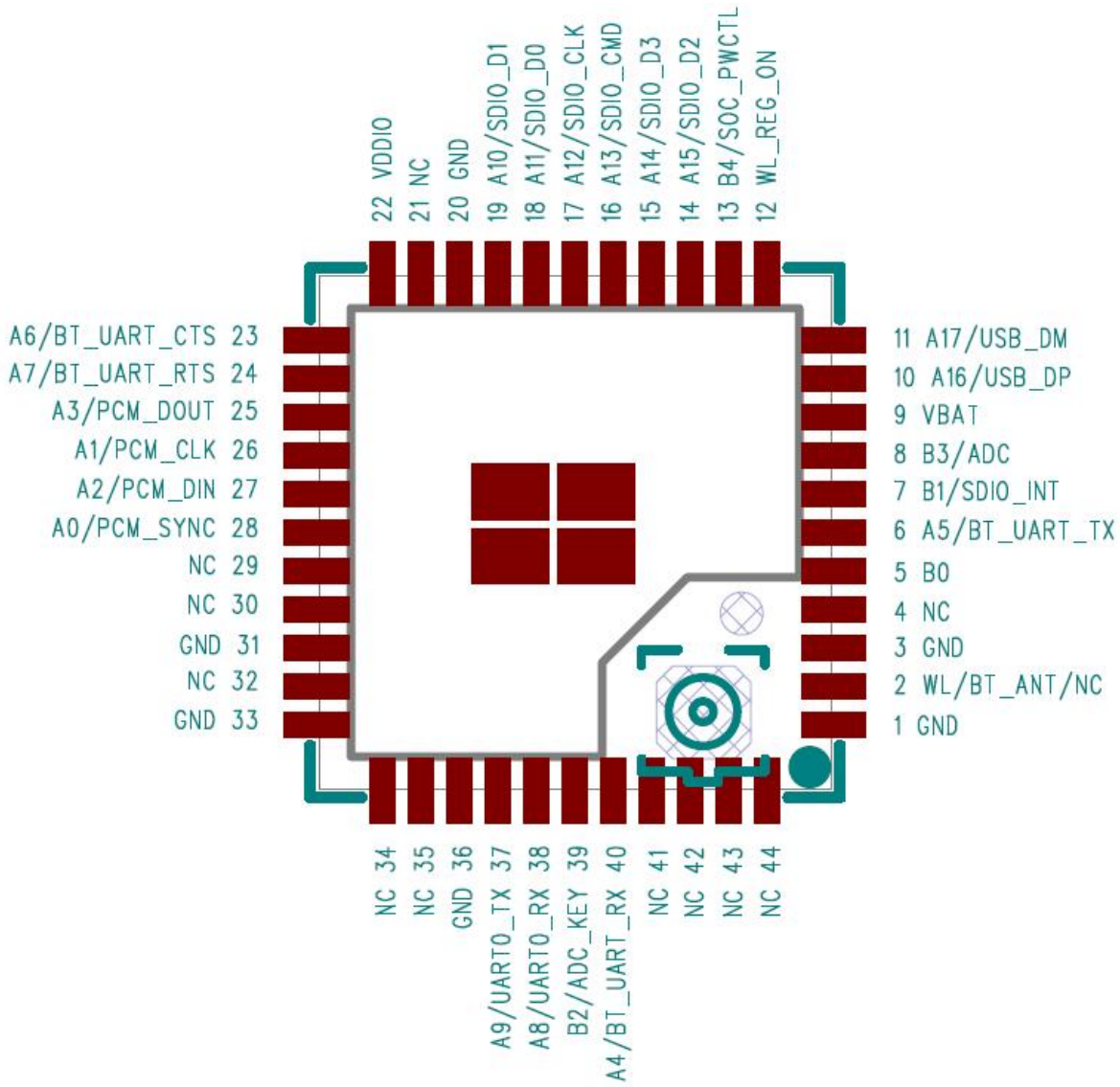
2 Platform Description



3 Dimensions (Units: mm) (Dimensional tolerance ±10%)

Note: The height of the module with a shielding cover is 2.2±0.2mm, while the overall height of the module without a shielding cover is 1.8±0.2mm.





There are 4 ground pads at the bottom of the module,
which are used to enhance grounding and heat dissipation.

C611L40 WiFi6 /BT /BLE Module

5 Module Pin Definition

A8800M40BSleep wake-up pin: wake-up from falling source：A0:A1,B0,B1. Rising edge wake-up pin：A2~A7,A10~A15;B2~B4.

Pin	Function	Type	Voltage	Description
1	GND	GND	-	GND
2	WL/BT_ANT/NC	ORF	-	WiFi/BLE RF input/outputif use IPEX,This Pin NC
3	GND	GND	-	GND
4	NC	NC	-	NC
5	B0	I/O	VDDIO	B0
6	A5/BT_UART_TX	I/O	VDDIO	A5/BT_UART_TX
7	B1/SDIO_INT	I/O	VDDIO	B1/SDIO_INT
8	B3_ADC	I/O	VDDIO	GPIOB3
9	3V3	IPMU	3.3V	3.3V power Supply
10	A16/USB_DP	I/O	VDDIO	A16/USB_DP
11	A17/USB_DM	I/O	VDDIO	A17/USB_DM
12	WL_EN	IANA	VDDIO	WiFi/BT Enable, highly effective.
13	B4/SOC_PWCTL	I/O	VDDIO	GPIOB4/SOC_PWCTL--->
14	A15/SDIO_D2	I/O	VDDIO	A15/SD_D2
15	A14/SDIO_D3	I/O	VDDIO	A14/SDIO_D3
16	A13/SDIO_CMD	I/O	VDDIO	A13/SDIO_CMD
17	A12/SDIO_CLK	I/O	VDDIO	A12/SDIO_CLK
18	A11/SDIO_D0	I/O	VDDIO	A11/SDIO_D0
19	A10/SDIO_D1	I/O	VDDIO	A10/SDIO_D1
20	GND	GND	-	GND
21	NC	NC	-	NC
22	VDDIO	IPMU	VDDIO	IO power, all IO level selection pins, supports 1.8V and 3.3V
23	A6/BT_UART_CTS	I/O	VDDIO	A6/BT_UART_CTS
24	A7/BT_UART_RTS	I/O	VDDIO	A7/BT_UART_RTS
25	A3/PCM_DOUT	O	VDDIO	A3/PCM_DOUT
26	A1/PCM_CLK	I/O	VDDIO	A1/PCM_CLK
27	A2/PCM_DIN	I	VDDIO	A2/PCM_DIN
28	A0/PCM_SYNC	I/O	VDDIO	A0/PCM_SYNC
29	NC	NC	-	NC
30	NC	NC	-	NC
31	GND	GND	-	GND
32	NC	NC	-	NC
33	GND	GND	-	GND
34	NC	NC	-	NC
35	NC	NC	-	NC
36	GND	GND	-	GND
37	A9/UART0_TX	I/O	VDDIO	A9/UART0_TX
38	A8/UART0_RX	I/O	VDDIO	A8/UART0_RX
39	B2/ADC_KEY	I/O	VDDIO	B2/ADC_KEY
40	A4/BT_UART_RX	I/O	VDDIO	A4/BT_UART_RX
41	NC	NC	-	NC
42	NC	NC	-	NC
43	NC	NC	-	NC
44	NC	NC	-	NC

Zone	Time	Heating Rate	Peak Temperature	Cooling Rate
Preheat zone(40～150℃)	60～150s	≤2.0℃/s	-	-
Soak zone(150～200℃)	60～120s	<1.0℃/s	-	-
Reflow zone(>217℃)	60～90s	-	230～260℃	-
Cooling zone(Tmax～180℃)	-	-	-	1.0℃/s≤Slope≤4.0℃/s

Note：

- Preheat zone: The temperate range is 40–150°C (104–302°F), the heating rate must be about 2.0°C/s (36°F/s), and the zone duration must be 60–150s.
- Soak zone: The temperature range is 150–200°C (302–392°F), the heating rate must be less than 1.0°C/s (34°F/s), and the zone duration must be 60–120s. Slow heating is required; otherwise, soldering is poor.
- Reflow zone: The zone temperature increases from 217°C (423°F) to Tmax and then decreases to 217°C (423°F) again. The zone duration must be 60–90s.
- Cooling zone: The zone temperature decreases from Tmax to 180°C (356°F). The cooling rate cannot exceed 4.0°C/s (39°F/s).
- It should take no more than 6 minutes for the ambient temperature to increase from 25°C (77°F) to 250°C (482°F).
- The thermal profile shown in the preceding figure provides recommended values. Customers need to adjust the values based on actual production.
- Typically, the duration of the reflow zone is 60–90s. For the boards with great heat capacity, the duration can be prolonged to 120s. For details about the requirements on package thermal resistance, see the IPC/JEDEC J-STD-020D standard. For details about the method of measuring the package temperature, see the JEP 140 standard.

Thermal resistance standard for the lead-free package

Package	Volume mm3	Volume mm3	Volume mm3
＜1.6mm	260℃	260℃	260℃
1.6mm～2.5mm	260℃	250℃	245℃
＞2.5mm	250℃	245℃	245℃

The component soldering terminals (such as the solder balls and pins) and external heat sinks are not considered for volume calculation.

The method of measuring the reflow soldering thermal profile is as follows:

According to the JEP140 standard, to measure the package temperature, you are advised to place the temperature probe of the thermocouple close to the chip surface if the chip package is thin, or to drill a hole on the package surface and place the temperature probe of the thermocouple into the hole if the chip

package is thick. The second method is recommended based on the thickness of most chip packages. However, this method is not applicable if the chip package is too thin to drill a hole.

10 Order Information

Module	Part number	Description
C611L40-4L	C611L40-4L-NI-NS	C611L40 SDIO 4 Line，WiFi/BLE Module，No IPEX，No Shield cover
C611L40-4L	C611L40-4L-NI-WS	C611L40 SDIO 4 Line，WiFi/BLE Module，No IPEX，With Shield cover
C611L40-4L	C611L40-4L-WI-NS	C611L40 SDIO 4 Line，WiFi/BLE Module，With IPEX，No Shield cover
C611L40-4L	C611L40-4L-WI-WS	C611L40 SDIO 4 Line，WiFi/BLE Module，With IPEX，With Shield cover

Federal Communication Commission Statement (FCC, U.S.)

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 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.

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.

FCC Caution:

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

FCC 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 & your body.

IMPORTANT NOTES

Co-location warning:

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

OEM integration instructions:

This device is intended only for OEM integrators 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 external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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 Transmitter Module FCC ID: 2BQYO1”.

Information that must be placed in the end user manual:
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 v01

List of applicable FCC rules
FCC Part 15 Subpart C 15.247 & 15.207 & 15.209&15.407

Specific operational use conditions
The module is a module with BR&EDR, BLE, WIFI 2.4G, and WIFI 5G function.

BR&EDR Specification：

Operation Frequency: 2402~2480MHz
Number of Channel: 79
Modulation: GFSK, π/4-DQPSK, 8DPSK

BLE Specification：

Operation Frequency: 2402~2480MHz
Number of Channel: 40
Modulation: GFSK

WiFi 2.4G Specification：

Operation Frequency: 2412-2462MHz
Number of Channel: 11
Modulation: DSSS, OFDM，OFDMA

WiFi 5G Specification：

Operation Frequency: 5G(UINII-1): 5180-5240MHz & 5G(UINII-3):5745-5825MHz
Number of Channel: 5
Modulation: OFDM，OFDMA

The module can be used for mobile or applications with a maximum antenna. 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 operaition. 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.

Limited module procedures

Not applicable.

Trace antenna designs

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

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

Antennas

Shenzhen Yunding Communication Electronics Co., Ltd./Room3015, Jinchi Center,AviationRoad,Bao'anDistrict,Shenzhen City

Antenna Specification are as follows:

Type: ANT 1: Rod-shaped Antenna

Gain:

2.4G Gain: 3.97dBi

5G(UINII-1) Gain: -2.93dBi

5G(UINII-3) Gain: 2.38dBi

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 employ a '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.).

Limited module procedures

Not applicable

Information on test modes and additional testing requirements

Host manufacturer must perfom 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.

Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15.207 & 15.209&15.407 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.

The frequency stability are maintained within the band of operation under all conditions of normal operation.