# FRX-M7663BU6

## 802.11ac 2T2R 867Mbps WLAN + Bluetooth v5.1 Combo USB2.0 Module Specification


| | |
|---|---|
| Module Name: FRX-M7663BU6 | |
| Module Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth v5.1 Combo USB2.0 Module | |
| Revision: V0.1 | |
| Customer Approval: | |
| Company: | |
| Title: | |
| Signature: | Date: |
| B-link Approval: | |
| Title: | |
| Signature: | Date: |

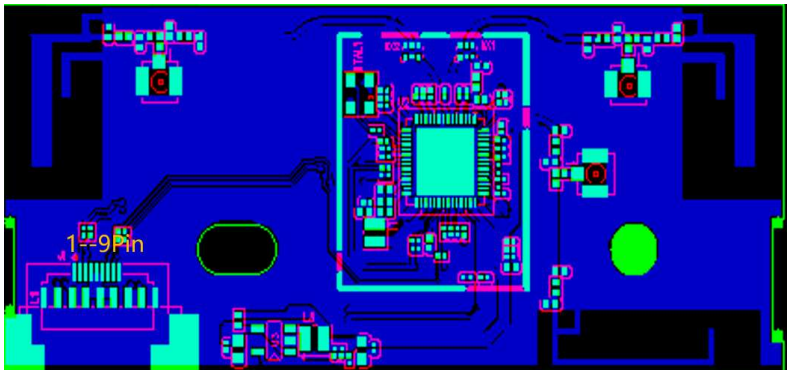
# Revision History

| Revision | Summary | Release Date | Revised By |
|---|---|---|---|
| V1.0 | Internal release | 2025-01-22 | Ch |
| | | | |

## 1.3 General Specifications

| | |
|---|---|
| Module Name | FRX-M7663BU6 |
| Chipset | MT7663BUN |
| WLAN Standards | IEEE802.11a/b/g/n/ac |
| Host Interface | USB2.0 for WLAN & BT |
| Antenna | On board PCB printed antennas |
| Dimension | 70.0mm x 30.0mm x 5. 4 mm (L*W*H) |
| Power Supply | DC 5V±0.3V 1500mA (Max) |
| Operation Temperature | -20℃ to +70℃ |
| Operation Humidity | 10% to 95% RH (Non-Condensing) |

# 2. Pin Assignments




## 2.1 Pin Definition

| No. | Pin Name | Type | I/O Level | Module Pin Description |
|---|---|---|---|---|
| 1 | GND | P | / | Ground for Power and I/O |
| 2 | D+ | I/O | / | USB Communicat ion signal USB-DP |
| 3 | D- | I/O | / | USB Communicat ion signal USB-DM |
| 4 | VCC | I | 5V | VCC5.0V |
| 5 | VCC | I | 5V | VCC5.0V |
| 6 | VCC | I | 5V | VCC5.0V |
| 7 | WL_HOST_WAKE | O | / | WL WAKEUP |
| 8 | RESET | I | / | Reset Controlled by main SOC |
| 9 | GND | P | / | Ground for Power and I/O |

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port, A I/O: Analog In/Output

# 3. Electrical and Thermal Specifications

## 3.1 Recommended Operating Conditions

| Parameters | | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Ambient Operating Temperature | | -20 | 25 | 70 | ℃ |
| Supply Voltage | VDD5V | 4.7 | 5 | 5.3 | V |

## 3.2 Digital I/O DC Specifications

| Symbol | Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| VIH | Input High Voltage | 2.0 | 3.3 | 3.6 | V |
| VIL | Input Low Voltage | -- | 0 | 0.9 | V |
| VOH | Output High Voltage | 2.97 | -- | 3.3 | V |
| VOL | Output Low Voltage | 0 | -- | 0.33 | V |

## 3.3 Antenna Specifications

| Items | Frequency Range | Gain(max) | VSWR | polarization |
|---|---|---|---|---|
| WLAN ANT0 & WLAN ANT1 | 2.4~2.4835GHz(2.4GHz ISM Band) | 3.0dBi | <3 | Linear polarization |
| | 5.15~5.835GHz(5GHz ISM Band) | 3.0dBi | <3 | Linear polarization |
| BT ANT | 2.4~2.4835GHz(2.4GHz ISM Band) | 3.0dBi | <3 | Linear polarization |

## 3.4 Current Consumption

| Conditions : VDD5V=5V ; Ta:25℃ ; | | | |
|---|---|---|---|
| Use Case | VDD5V Current(average) | | |
| | Typ | Max | Units |
| WLAN & BT Unassociated (Linux Driver) | 62 | 120 | mA |
| 2.4G WLAN TCP throughput T/RX 99Mbps (Linux Drive, BT disable) | 366 | 780 | mA |
| 5G WLAN TCP throughput T/RX 315Mbps & BT LE 1Mbps MP3 | 448 | 1200 | mA |
| BT LE 1Mbps MP3 playback (Linux Driver, WLAN disable) | 102 | 140 | mA |
| 2.4G 11b@1Mbps TX 19dBm (1TX RF-Test) | 252 | 350 | mA |
| 2.4G 11b@11Mbps TX 19dBm (1TX RF-Test) | 253 | 340 | mA |
| 2.4G 11g@54Mbps TX 16dBm (1TX RF-Test) | 184 | 280 | mA |
| 2.4G 11n@HT20_MCS0 TX 17dBm ( 1TX RF-Test) | 224 | 320 | mA |
| 2.4G 11n@HT20_MCS7 TX 15.5dBm (1TX RF-Test) | 183 | 280 | mA |
| 2.4G 11n@HT40_MCS8 2TX 16dBm (2TX RF-Test) | 452 | 700 | mA |
| 2.4G 11n@HT40_MCS15 (2RX RF-Test) | 83 | 140 | mA |
| 5G 11a @6Mbps TX 18.5dBm (1TX RF test) | 270 | 360 | mA |
| 5G 11a @54Mbps TX 16dBm (1TX RF test) | 245 | 360 | mA |
| 5G 11a @54Mbps RX (1RX RF test) | 85 | 140 | mA |
| 5G 11n@HT40_MCS8 TX 16dBm (2TX RF test) | 474 | 800 | mA |
| 5G 11n@HT40_MCS8 RX (2RX RF test) | 86 | 140 | mA |
| 5G 11ac@VHT80 MCS9 TX 14dBm (2TX RF test) | 429 | 800 | mA |

| | | | |
|---|---|---|---|
| 5G 11ac@VHT80_MCS9 RX (2RX RF test) | 105 | 180 | mA |
| BT BR_1M TX@7dBm (BT RF test, WLAN disable) | 120 | 135 | mA |
| BT BR_1M RX Active (BT RF test, WLAN disable) | 70 | 90 | mA |
| BT EDR_3M TX@7dBm (BT RF test, WLAN disable) | 115 | 127 | mA |
| BT EDR_3M RX Active (BT RF test, WLAN disable) | 72 | 103 | mA |
| BT LE_1M TX@7dBm (BT RF test, WLAN disable) | 110 | 120 | mA |

# 4. WLAN & Bluetooth RF Specifications

## 4.1 2.4G WLAN RF Specification

| Conditions : VDD5V=5V ; Ta:25℃ | |
|---|---|
| **Features** | **Description** |
| WLAN Standard | IEEE 802.11b/g/n/ac CSMA/CA |
| Frequency Range | 2.4~2.4835GHz (2.4GHz ISM Band) |
| Channels | Ch1~Ch13 (For 20MHz Channels) |
| Modulation | 802.11b (DSSS): CCK, DQPSK, DBPSK;<br>802.11g (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; |
| Data Rate | 802.11b: 1, 2, 5.5, 11Mbps;<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps;<br>802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps;<br>802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps;<br>802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps;<br>802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; |
| Frequency Tolerance | ≦±20ppm |

| 2.4G Receiver Specifications(WLAN_Ant0&WLAN_Ant1) | | | |
|---|---|---|---|
| RX Rate | Min Input Level(Typ, dBm) | Max Input Level(Typ, dBm) | PER |
| 802.11b@1Mbps | -91 | -5 | < 8% |
| 802.11b@11Mbps | -85 | -5 | < 8% |
| 802.11g@6Mbps | -90 | -5 | < 10% |
| 802.11g@54Mbps | -73 | -5 | < 10% |
| 802.11n@HT20_MCS0 | -86 | -5 | < 10% |
| 802.11n@HT20_MCS7 | -70 | -5 | < 10% |
| 802.11n@HT40_MCS0 | -86 | -5 | < 10% |
| 802.11n@HT40_MCS7 | -68 | -5 | < 10% |
| 802.11ac@VHT40_MCS9 | -63 | -5 | < 10% |

## 4.2 5G WLAN RF Specification

| Conditions: VDD5V=5V; Ta:25℃ | |
|---|---|
| Features | Description |
| WLAN Standard | IEEE 802.11a/n/ac, CSMA/CA |
| Frequency Range | 5.15~5.25GHz;  5.735~5.835GHz (5GHz ISM Band) |
| Channels | Ch36, Ch40, Ch44, Ch48; Ch149~Ch165 (For 20MHz Channels) |
| Modulation | 802.11a (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; |
| Data Rate | 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps;<br>802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps;<br>802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps;<br>802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps;<br>802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps;<br>802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps;<br>802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps;<br>802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps; |

| | |
|---|---|
| | 802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps;<br>802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps;<br>802.11ac (VHT80): MCS0~MCS9(2T2R)58.5~866.7Mbps; |
| Frequency Tolerance | ≦ ±20ppm |

| 5G Receiver Specifications(WLAN_Ant0&WLAN_Ant1) | | | |
|---|---|---|---|
| **RX Rate** | **Min Input Level(Typ, dBm)** | **Max Input Level(Typ, dBm)** | **PER** |
| 802.11a@6Mbps | -91 | -5 | < 10% |
| 802.11a@54Mbps | -72 | -5 | < 10% |
| 802.11n@HT20_MCS0 | -90 | -5 | < 10% |
| 802.11n@HT20_MCS7 | -71 | -5 | < 10% |
| 802.11n@HT40_MCS0 | -87 | -5 | < 10% |
| 802.11n@HT40_MCS7 | -68 | -5 | < 10% |
| 802.11ac@VHT80_MCS0 | -86 | -5 | < 10% |
| 802.11ac@VHT80_MCS9 | -61 | -5 | < 10% |

## 4.3 Bluetooth RF Specification

| Conditions: VDD5V=5V; Ta:25℃ | |
|---|---|
| **Features** | **Description** |

| | |
|---|---|
| Bluetooth Specification | Bluetooth Core Specification v5.1 |
| Frequency Range | 2.4~2.4835GHz (2.4GHz ISM Band) |
| Channels | Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels);<br>Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels); |
| Power Classes | Bluetooth Classic BR/EDR: Class1;<br>Bluetooth Classic Low Energy: Class1.5; |
| Data Rate & Modulation | BR_1Mbps: GFSK;<br>EDR_2Mbps: π/4-DQPSK;<br>EDR_3Mbps: 8DPSK;<br>LE_1Mbps: GFSK (Uncoded); |

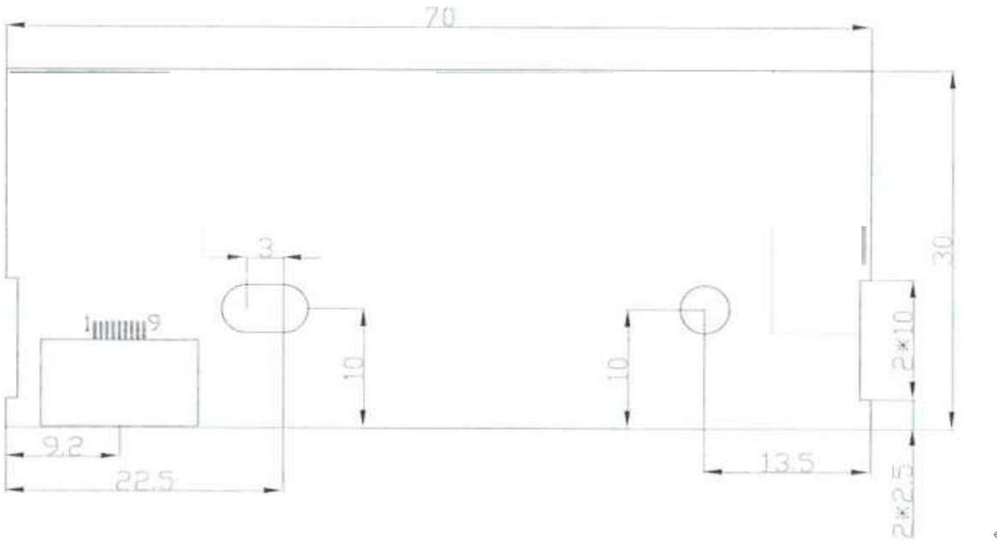
| **Bluetooth Transmitter Specifications (BT_Ant)** | | | |
|---|---|---|---|
| **Items** | **Min (dBm)** | **Typ (dBm)** | **Max (dBm)** |
| **TX Power** | | | |
| BR_1M | 5 | 8 | 11 |
| EDR_2/3M | 5 | 8 | 11 |
| LE_/1M | 2 | 5 | 8 |
| **Items** | **Min** | **Typ** | **Max** |
| **BR_1M (DH1) Modulation Characteristics** | | | |
| Δf1avg | 140KHz | 157.4KHz | 175KHz |
| Δf2avg | 115KHz | 161.5KHz | / |
| Δf2max | 115KHz | 168.8KHz | / |
| Δf2avg/Δf1avg | 0.8 | 1.02 | / |
| **Items** | **Min** | **Typ** | **Max** |
| **EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy** | | | |
| ωi | -75KHz | 7.53KHz | +75KHz |
| ωi+ωo | -75KHz | 7.56KHz | +75KHz |
| ωo | -10KHz | -0.39KHz | +10KHz |
| 8DPSK RMS DEVM | / | 0.042 | 0.13 |

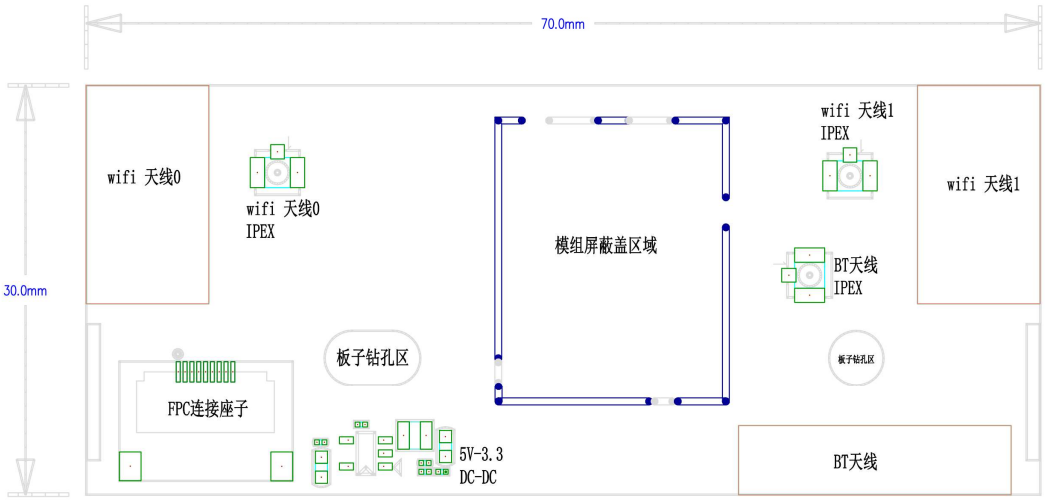
| | | | |
|---|---|---|---|
| 8DPSK Peak DEVM | / | 0.091 | 0.25 |
| **Items** | **Min** | **Typ** | **Max** |
| **LE_1M Modulation Characteristics** | | | |
| Δf1avg | 225KHz | 249KHz | 275KHz |
| Δf2avg | 185KHz | 240.2KHz | / |
| Δf2max | 185KHz | 247.5KHz | / |
| Δf2avg/Δf1avg | 0.8 | 0.96 | / |
| **Items** | **Min** | **Typ** | **Max** |

| **Bluetooth Receiver Specifications (BT_Ant)** | | | | |
|---|---|---|---|---|
| **Items** | **Sensitivity** | | **Maximum Input Level** | |
| | **Input Level(dBm)** | **BER** | **Input Level(dBm)** | **BER** |
| BR_1M (DH1) | -90 | ≦ 0.1% | -5 | ≦ 0.1% |
| EDR_3M (3DH5) | -83 | ≦ 0.01% | -5 | ≦ 0.1% |
| | **Input Level(dBm)** | **PER** | **Input Level(dBm)** | **BER** |
| LE_1M | -91 | ≦ 5% | -5 | ≦ 5% |

# 5. Mechanical Specifications

## 5.1 Module Outline Drawing



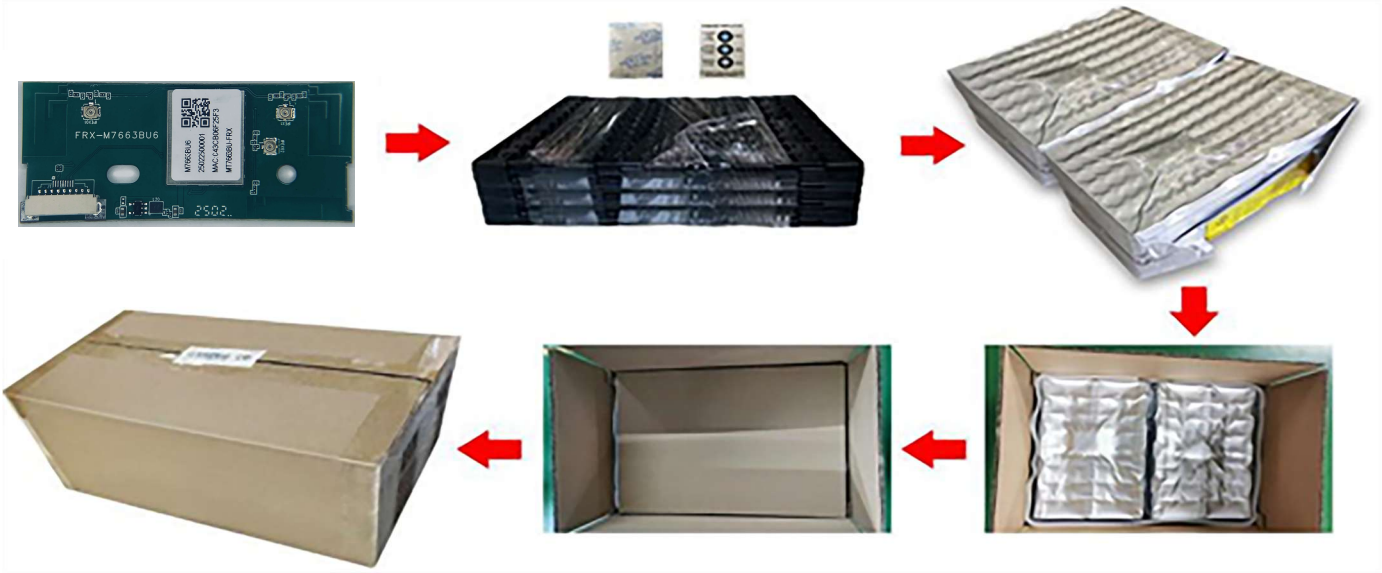

Module dimension: 70*30*5.4mm (L*W*H; Tolerance: ±0.3mm_L/W, ±0.5mm_H)

# 6. Key Components Of Module

| No. | Parts | Specification | Manufacturer | Note |
|---|---|---|---|---|
| 1 | Chipset | MT7663BUN | MediaTek Inc. | |
| 2 | PCB | FRX-M7663BU6 | ShenZhen Tie Fa Technology Limited | |
| | | | Huizhou Dayawan Kexiang Technology Circuit Board | |
| | | | SHEN ZHEN QILI ELECTRON CO.,LTD | |
| 3 | Crystal | 40MHz-10PPM-12PF-3225 | LUCKI CM ELECTRONICS CO.,LTD | |
| | | | Chengde oscillator Electronic Technology CO.,LTD | |
| | | | JinHua East Crystal Electronic CO.,LTD | |
| 4 | Diplexer | DP1608 | Advanced Ceramic X Corp. | |
| | | | Dongguan Hekang Electronics Co.,LTD | |
| | | | JIA XING GLEAD ELECTRONICS CO.,LTD | |

# 7. Package and Storage Information

## 7.1 Package Dimensions




Package specification:

1. 16 modules per blister plate and 448 modules per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) and 1 humidity card in each anti-static vacuum bag.
4. The outer box size is 43*35.5*16cm.

## 7.2 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.

ESD Sensitivity:
ESD Protection: 2KV(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**

## 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.

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.

This modular has been tested and found to comply with part 15 requirements for Modular Approval.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## 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 and Subpart F has been investigated. It is applicable to the modular transmitter

### 2.3 Specific Operational Use Conditions - Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

- The antenna must be installed such that 20cm is maintained between the antenna and users,
- The transmitter module may not be co-located with any other transmitter or antenna.

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.

### 2.4 Limited Module Procedures

Not applicable

### 2.5 Trace Antenna Designs

Not applicable

### 2.6 RF Exposure Considerations

This device 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 Antenna Type and Gain

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

| Model | Type | Connector | Peak gain ( dBi ) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2400-2483.5 MHz | 5150-5250 MHz | 5250-5350 MHz | 5470-5725 MHz | 5725-5850 MHz |
| / | External Antenna | SMA | 3.00dBi | 3.00dBi | / | / | 3.00dBi |
| / | External Antenna | SMA | 3.00dBi | 3.00dBi | / | / | 3.00dBi |
| / | External Antenna | SMA | 3.00dBi | / | / | / | / |

### 2.8 End Product Labelling Compliance Information

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: **2AVEDFRX-M7663BU6**”. The FCC ID can be used only when all FCC compliance requirements are met.

### 2.9 Information on Test Modes and Additional Testing Requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new FCC authorization.
Host manufacturer installed this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C, Part 15E, 15.209, 15.207 requirement, only if the test result comply with FCC part 15C, Part 15E, 15.209, 15.207 requirement, then the host can be sold legally.

### 2.10 Additional testing, Part 15 Subpart B Disclaimer

This transmitter modular us tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rules requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rules requirements if applicable.
As long as all 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 modular installed.

### 2.11 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 host integrator must follow the integration instructions provided in this document and ensure that the composite system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.
The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB Publication 996369.

### OEM/Host Manufacturer Responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market.

This includes reassessing the transmitter module for compliance with the Radio and RF Exposure essential requirements of the FCC rules.

### 2.12 How to Make Changes - 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.