



|                                                                        |       |
|------------------------------------------------------------------------|-------|
| Module Name: FRX-M8800DS1-A                                            |       |
| Module Type: 802.11a/b/g/n/ac/ax 287Mbps WLAN +BT v5.4 SDIO/USB Module |       |
| Revision: V1.0                                                         |       |
| Customer Approval:                                                     |       |
| Company:                                                               |       |
| Title:                                                                 |       |
| Signature:                                                             | Date: |
| FRX Approval:                                                          |       |
| Title:                                                                 |       |
| Signature:                                                             | Date: |

Revision History

| Revision | Summary          | Release Date | Revised By |
|----------|------------------|--------------|------------|
| 1.0      | Official release | 2025-04-20   |            |

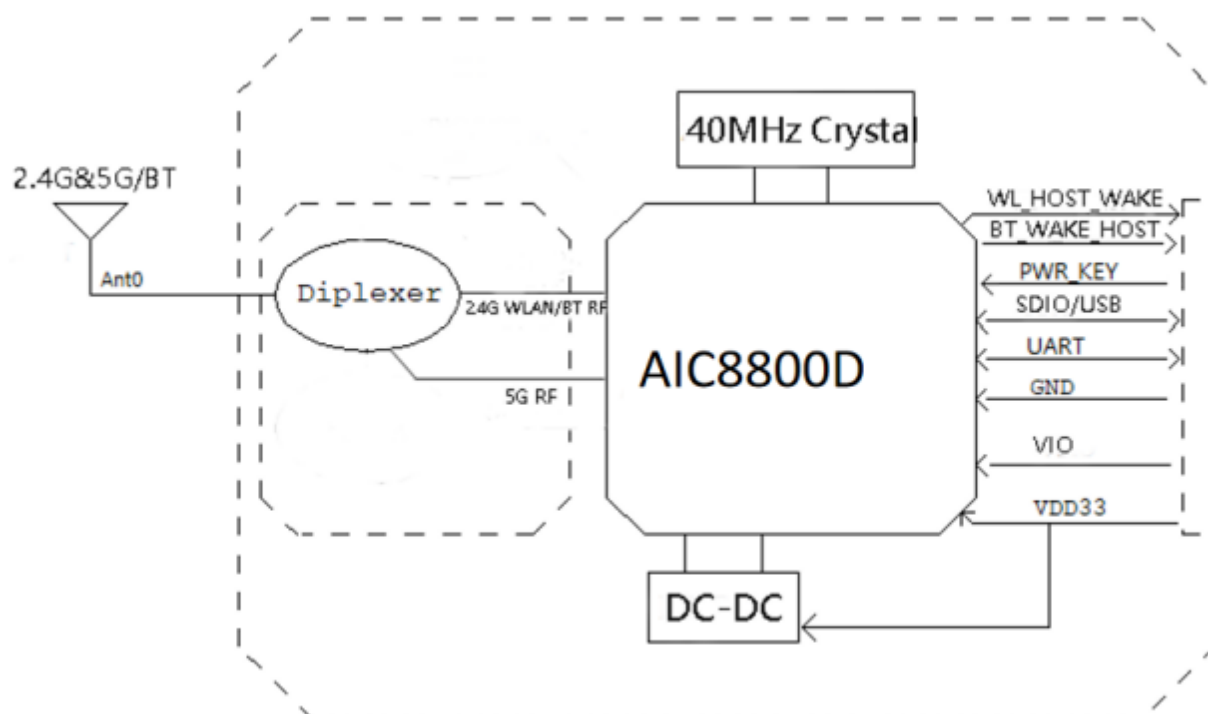
## 1. Introduction

FRX-M8800DS1-A is a highly integrated Dual-band WLAN + Bluetooth Combo module. It combines a 1T1R Dual-band WLAN subsystem and a Bluetooth v5.4 subsystem. This module compatible IEEE 802.11 a/b/g/n/ac/ax standard and provides the maximum PHY rate up to 287Mbps, offering feature-rich wireless connectivity at high standards, and delivering reliable, cost-effective, high throughput from an extended distance.

### 1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Wireless PHY rate can reach up to 287Mbps with 20/40MHz bandwidth
- Host Interfaces are SDIO 3.0 or USB2.0 (Two interfaces cannot be used simultaneously)
- Support STA, AP, WLAN Direct modes concurrently
- Support BT Low Energy mode only

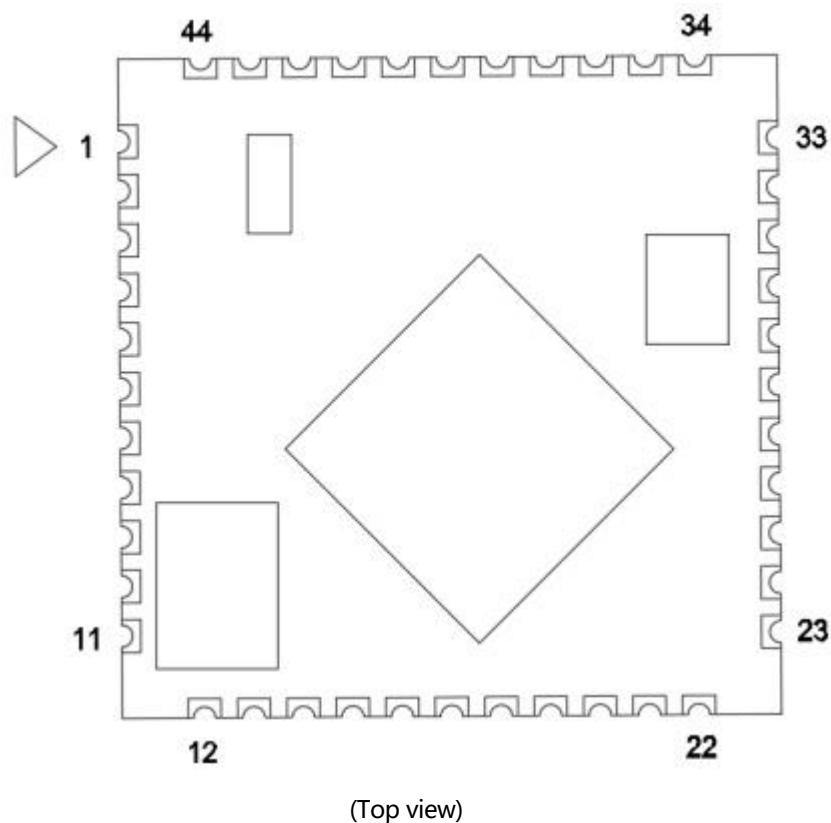
### 1.2 Block Diagram



## 1.3 General Specifications

|                       |                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------|
| Module Name           | FRX-M8800DS1-A                                                                      |
| Chipset               | AIC8800D                                                                            |
| WLAN Standards        | IEEE802.11a/b/g/n/ac/ax                                                             |
| BT Specification      | Bluetooth Core Specification v5.4/4.2                                               |
| Host Interface        | SDIO for WLAN & UART for Bluetooth or USB for WLAN + Bluetooth                      |
| Antenna               | Connect to the external antenna through half hole pad                               |
| Dimension             | 12.0*12.0*1.8mm (L*W*H)                                                             |
| Power Supply          | 3.3V±0.2V main power supply @600mA (Max)<br>3.3V±0.2V or 1.8V±0.1V I/O power supply |
| Operation Temperature | -20°C to +70°C                                                                      |
| 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          | RF    | /         | RF Ground connections                                                                                                                                                                                                                                                                                                       |
| 2  | ANT0         | RF    | /         | RF Pad for 2.4G WLAN/5G WLAN/2.4G BT ANT                                                                                                                                                                                                                                                                                    |
| 3  | GND          | RF    | /         | RF Ground connections                                                                                                                                                                                                                                                                                                       |
| 4  | NC           | /     | /         | NC (Reserved BT_RF PAD for BT ANT)                                                                                                                                                                                                                                                                                          |
| 5  | NC           | /     | /         | NC                                                                                                                                                                                                                                                                                                                          |
| 6  | BT_WAKE_HOST | I/O   | VIO       | 1.General Purpose Input / Output Pin GPIOB2<br>2.Bluetooth device to wake-up Host output                                                                                                                                                                                                                                    |
| 7  | HOST_WAKE_BT | I/O   | VIO       | 1.General Purpose Input / Output Pin GPIOB3<br>2.Host to wake-up this Bluetooth device input                                                                                                                                                                                                                                |
| 8  | NC           | /     | /         | NC                                                                                                                                                                                                                                                                                                                          |
| 9  | VDD33        | P     | /         | 3.3V Main power supply                                                                                                                                                                                                                                                                                                      |
| 10 | USB_DM       | A I/O | /         | USB 2.0 Device High Speed Interface differential pair                                                                                                                                                                                                                                                                       |
| 11 | USB_DP       | A I/O | /         | USB 2.0 Device High Speed Interface differential pair                                                                                                                                                                                                                                                                       |
| 12 | PWR_KEY      | I     | VDD33     | Enable signal input, it can externally shut down the module by pulled low. When VDD33 and VIO are ready, PWR_KEY goes to high level exceeds 1.1V and lasts for 6mS, the module starts up, then the level of PWR_KEY must be maintained at VDD33. (internal pull up to VDD33 by 47K and pull down to GND by 200K resistors ) |
| 13 | WL_HOST_WAKE | I/O   | VIO       | 1.General Purpose Input / Output Pin GPIOB1<br>2.WLAN device to wake-up Host output                                                                                                                                                                                                                                         |
| 14 | SD_D2        | I/O   | VIO       | SDIO data line                                                                                                                                                                                                                                                                                                              |
| 15 | SD_D3        | I/O   | VIO       | SDIO data line                                                                                                                                                                                                                                                                                                              |
| 16 | SD_CMD       | I/O   | VIO       | SDIO command line                                                                                                                                                                                                                                                                                                           |
| 17 | SD_CLK       | I     | VIO       | SDIO clock line                                                                                                                                                                                                                                                                                                             |
| 18 | SD_D0        | I/O   | VIO       | SDIO data line                                                                                                                                                                                                                                                                                                              |
| 19 | SD_D1        | I/O   | VIO       | SDIO data line                                                                                                                                                                                                                                                                                                              |
| 20 | GND          | P     | /         | Ground connections                                                                                                                                                                                                                                                                                                          |
| 21 | NC           | /     | /         | NC                                                                                                                                                                                                                                                                                                                          |
| 22 | VIO          | P     | /         | 1.8V or 3.3V power supply for digital inputs/outputs, power-up timing requires VIO's power on time $\geq$ VDD33's. (USB application is recommended to use 3.3V or 1.8V I/O; SDIO 3.0 application must use 1.8V I/O )                                                                                                        |
| 23 | GPIOB4       | I/O   | /         | GPIOB4                                                                                                                                                                                                                                                                                                                      |

|    |           |     |     |                                                                                                          |
|----|-----------|-----|-----|----------------------------------------------------------------------------------------------------------|
| 24 | NC        | I/O | VIO | NC                                                                                                       |
| 25 | NC        | I/O | VIO | NC                                                                                                       |
| 26 | NC        | I/O | VIO | NC                                                                                                       |
| 27 | NC        | I/O | VIO | NC                                                                                                       |
| 28 | NC        | I/O | VIO | NC                                                                                                       |
| 29 | UART0_TX  | O   | VIO | High-Speed UART Data Out (Debug pin)                                                                     |
| 30 | UART0_RX  | I   | VIO | High-Speed UART Data In (Debug pin)                                                                      |
| 31 | GND       | P   | /   | Ground connections                                                                                       |
| 32 | NC        | /   | /   | NC                                                                                                       |
| 33 | GND       | P   | /   | Ground connections                                                                                       |
| 34 | BT_DIS    | I/O | /   | GPIOB7 ( Bluetooth is enabled by default, Customers can disable or enable BT functionality by software ) |
| 35 | GPIOB6    | I/O | /   | GPIOB6                                                                                                   |
| 36 | GND       | P   | /   | Ground connections                                                                                       |
| 37 | NC        | /   | /   | NC                                                                                                       |
| 38 | NC        | /   | /   | NC                                                                                                       |
| 39 | NC        | /   | /   | NC                                                                                                       |
| 40 | NC        | /   | /   | NC                                                                                                       |
| 41 | UART1_RTS | O   | VIO | Bluetooth UART interface RTS                                                                             |
| 42 | UART1_TX  | O   | VIO | Bluetooth UART interface TX                                                                              |
| 43 | UART1_RX  | I   | VIO | Bluetooth UART interface RX                                                                              |
| 44 | UART1_CTS | I   | VIO | Bluetooth UART interface CTS                                                                             |

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

### 3. Electrical and Thermal Specifications

#### 3.1 Recommended Operating Conditions

| Parameters                    | Min | Typ | Max | Units |
|-------------------------------|-----|-----|-----|-------|
| Ambient Operating Temperature | -20 | 25  | 70  | °C    |

|                       |          |     |     |     |   |
|-----------------------|----------|-----|-----|-----|---|
| External Antenna VSWR |          |     | 1.7 | 2.1 | / |
| Supply Voltage        | VDD33    | 3.1 | 3.3 | 3.5 | V |
|                       | VIO_3.3V | 3.1 | 3.3 | 3.5 | V |
|                       | VIO_1.8V | 1.7 | 1.8 | 1.9 | V |

## 3.2 DC Electrical Specification

| Symbol | DESCRIPTION                   | Min     | Typ     | Max     | Units |
|--------|-------------------------------|---------|---------|---------|-------|
| VIL    | CMOS Low Level Input Voltage  | 0       | --      | 0.3*VIO | V     |
| VIH    | CMOS High Level Input Voltage | 0.7*VIO | --      | VIO     | V     |
| VTH    | CMOS Threshold Voltage        | --      | 0.5*VIO | --      | V     |

## 3.3 Current Consumption

| Conditions : SDIO for networking test under Linux, VDD33=3.3V, VIO=1.8V; USB for RF test under Windows, VDD33=3.3V, VIO=3.3V; Ta:25°C; |                        |                         |       |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|-------|
| Use Case                                                                                                                               | VDD33 Current          |                         |       |
|                                                                                                                                        | Typ(I <sub>RMS</sub> ) | Max(I <sub>Peak</sub> ) | Units |
| WLAN & BT Unassociated (Linux SDIO Driver)                                                                                             | 53                     | 75                      | mA    |
| 2.4G WLAN throughput 200Mbps (Linux SDIO Driver)                                                                                       | 185                    | 385                     | mA    |
| 5G WLAN throughput 250Mbps (Linux SDIO Driver)                                                                                         | 211                    | 413                     | mA    |
| 2.4G 11b 1Mbps TX@18dBm (1TX RF test)                                                                                                  | 195                    | 341                     | mA    |
| 2.4G 11g 6Mbps TX@18dBm (1TX RF test)                                                                                                  | 111                    | 367                     | mA    |
| 2.4G 11n HT20_MCS0 TX@17dBm (1TX RF test)                                                                                              | 176                    | 365                     | mA    |
| 2.4G 11ax HE_SU 40M_MCS0 TX@15dBm (1TX RF test)                                                                                        | 153                    | 341                     | mA    |
| 2.4G 11ax HE_SU 40M_MCS11 TX@13dBm (1TX RF test)                                                                                       | 64                     | 301                     | mA    |
| 2.4G 11ax HE_SU 40M_MCS11 RX (1RX RF test)                                                                                             | 45                     | 53                      | mA    |
| 5G 11a 6Mbps TX@17dBm (1TX RF test)                                                                                                    | 166                    | 425                     | mA    |
| 5G 11n HT20_MCS0 TX@17dBm (1TX RF test)                                                                                                | 254                    | 446                     | mA    |

|                                                |    |     |    |
|------------------------------------------------|----|-----|----|
| 5G VHT 80MHz MCS9 TX@14dBm (1TX RF test)       | 84 | 403 | mA |
| 5G 11ax HE_SU 80M_MCS11 TX@12dBm (1TX RF test) | 86 | 368 | mA |
| 5G 11ax HE_SU 80M_MCS11 RX (1RX RF test)       | 55 | 79  | mA |
| BT BR_1M TX@6dBm (BT RF test, WLAN disable)    | 37 | 46  | mA |
| BT BR_1M RX Active (BT RF test, WLAN disable)  | 33 | 48  | mA |
| BT EDR_3M TX@3dBm (BT RF test, WLAN disable)   | 36 | 45  | mA |
| BT EDR_3M RX Active (BT RF test, WLAN disable) | 45 | 49  | mA |
| BT LE_1M TX@6dBm (BT RF test, WLAN disable)    | 32 | 43  | mA |

## 4. WLAN & Bluetooth RF Specifications

### 4.1 2.4G RF Specification

| Conditions : USB for RF test under Windows, VDD33=3.3V, VIO=3.3V; Ta:25°C                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Features                                                                                                                                                                                                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                           |
| WLAN Standard                                                                                                                                                                                                                                                                          | IEEE 802.11b/g/n/ax                                                                                                                                                                                                                                                                                                                                                                                   |
| Frequency Range                                                                                                                                                                                                                                                                        | 2.4~2.4835GHz (2.4GHz ISM Band)                                                                                                                                                                                                                                                                                                                                                                       |
| Channels                                                                                                                                                                                                                                                                               | Ch1~Ch13 (For 20MHz Channels)                                                                                                                                                                                                                                                                                                                                                                         |
| Modulation                                                                                                                                                                                                                                                                             | 802.11b (DSSS): DBPSK, DQPSK, CCK;<br>802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM;<br>802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;<br>802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16, QAM16_DCM, QAM64, QAM256, QAM1024;                                                                                                                                                                           |
| 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 (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps;<br>802.11ax (HE_MU,OFDMA 26~242RU): MCS0~MCS11(1T1R) 0.4~143.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps; |
| Frequency Tolerance                                                                                                                                                                                                                                                                    | ≤ ±20ppm                                                                                                                                                                                                                                                                                                                                                                                              |
| 2.4G Transmitter Specifications ( TX power tolerance calibrated, customers can define the target TX power within recommended range by modifying configuration file of the driver software, Customers must define the TX power same or lower than recommended Target TX Power as below) |                                                                                                                                                                                                                                                                                                                                                                                                       |

| 2.4G Receiver Specifications |                           |                           |       |
|------------------------------|---------------------------|---------------------------|-------|
| RX Rate                      | Min Input Level (Typ dBm) | Max Input Level (Typ dBm) | PER   |
| 802.11b@1Mbps                | -96                       | -5                        | < 8%  |
| 802.11b@11Mbps               | -88                       | -5                        | < 8%  |
| 802.11g@6Mbps                | -92                       | -5                        | < 10% |
| 802.11g@54Mbps               | -76                       | -5                        | < 10% |
| 802.11n@HT20_MCS0            | -92                       | -5                        | < 10% |
| 802.11n@HT20_MCS7            | -74                       | -5                        | < 10% |
| 802.11n@HT40_MCS0            | -89                       | -5                        | < 10% |
| 802.11n@HT40_MCS7            | -71                       | -5                        | < 10% |
| 802.11ax@HE_SU 40M_MCS0      | -89                       | -5                        | < 10% |
| 802.11ax@HE_SU 40M_MCS11     | -60                       | -5                        | < 10% |

## 4.2 5G WLAN RF Specification

| Conditions: USB for RF test under Windows, VDD33=3.3V, VIO=3.3V; Ta:25°C |                                                         |
|--------------------------------------------------------------------------|---------------------------------------------------------|
| Features                                                                 | Description                                             |
| WLAN Standard                                                            | IEEE 802.11a/n/ac/ax                                    |
| Frequency Range                                                          | 5.15~5.25GHz; 5.725~5.85GHz (5GHz ISM Band)             |
| Channels                                                                 | Ch36, Ch40, Ch44, Ch48; Ch149~Ch165(For 20MHz Channels) |
| Modulation                                                               | 802.11a (OFDM): BPSK, QPSK, QAM16, QAM64;               |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           |       |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------|
|                            | 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256;<br>802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16, QAM16_DCM, QAM64, QAM256, QAM1024;                                                                                                                                                                                                                                                         |                           |       |
| Data Rate                  | 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps;<br>802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps;<br>802.11n (HT40): MCS0~MCS7 13.5~150Mbps;<br>802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps;<br>802.11ac (VHT40): MCS0~MCS9(1T1R) 13.5~200Mbps;<br>802.11ax (HE_MU,OFDMA 26~484RU): MCS0~MCS11(1T1R) 0.4~286.8Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps; |                           |       |
| Frequency Tolerance        | ≤ ±20ppm                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           |       |
| 5G Receiver Specifications |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           |       |
| RX Rate                    | Min Input Level (Typ dBm)                                                                                                                                                                                                                                                                                                                                                                                                                              | Max Input Level (Typ dBm) | PER   |
| 802.11a@6Mbps              | -92                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11a@54Mbps             | -75                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11n@HT20_MCS0          | -91                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11n@HT20_MCS7          | -73                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11n@HT40_MCS0          | -88                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11n@HT40_MCS7          | -70                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11ax@HE_SU 40M_MCS0    | -88                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |
| 802.11ax@HE_SU 40M_MCS11   | -59                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -5                        | < 10% |

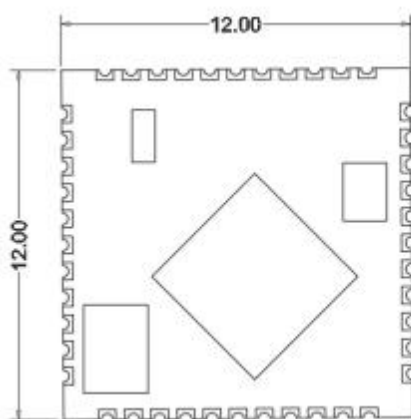
### 4.3 Bluetooth RF Specification

| Conditions: USB for RF test under Windows, VDD33=3.3V, VIO=3.3V; Ta:25°C |                                                     |  |  |
|--------------------------------------------------------------------------|-----------------------------------------------------|--|--|
| Features                                                                 | Description                                         |  |  |
| Bluetooth Specification                                                  | Bluetooth Core Specification v5.4/4.2               |  |  |
| Frequency Range                                                          | 2.4~2.4835GHz(2.4GHz ISM Band)                      |  |  |
| Channels                                                                 | Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels); |  |  |
| Power Classes                                                            | Bluetooth Low Energy: Class1.5;                     |  |  |
| Data Rate & Modulation                                                   | LE_1Mbps: GFSK (Uncoded);                           |  |  |
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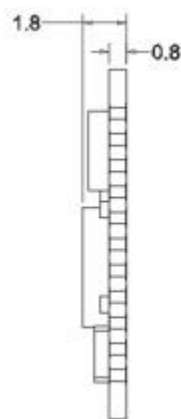
|                                   |                           |          |                           |     |
|-----------------------------------|---------------------------|----------|---------------------------|-----|
| Δf2max                            | 370KHz                    | 469.8KHz | /                         |     |
| Δf2avg/Δf1avg                     | 0.8                       | 0.9      | /                         |     |
| Bluetooth Receiver Specifications |                           |          |                           |     |
| Items                             | Sensitivity               |          | Maximum Input Level       |     |
|                                   | Input Level<br>(Typ. dBm) | PER      | Input Level<br>(Typ. dBm) | PER |
| LE_1M                             | -94                       | ≤5%      | -5dBm                     | ≤5% |

## 5. Mechanical Specifications

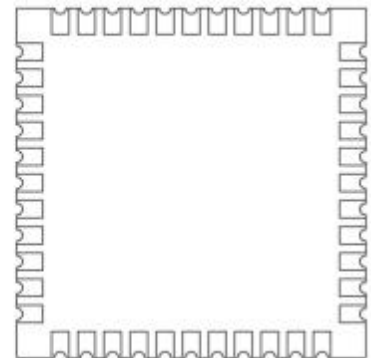
### 5.1 Module Outline Drawing (units:mm)



(Top View)

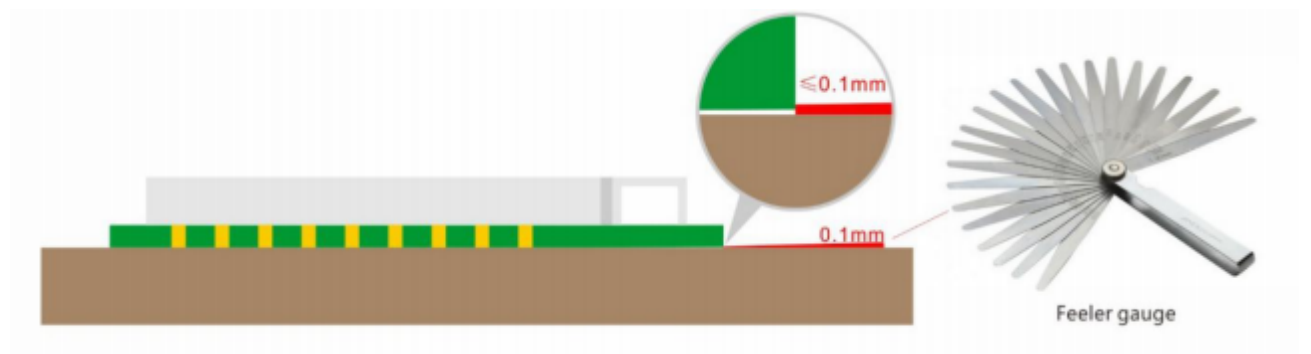


(Side View)



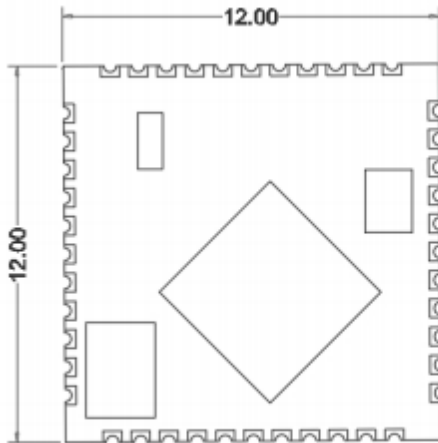
(Bottom View)

Module dimension: 12.0\*12.0\*1.8mm (L\*W\*H; Tolerance:  $\pm 0.3\text{mm}_L/W$ ,  $\pm 0.2\text{mm}_H$ )

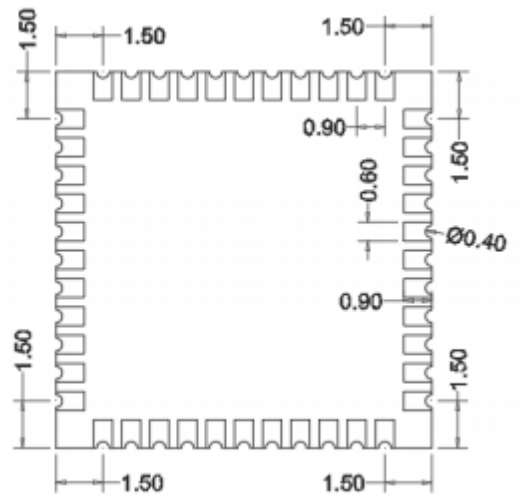


Module Bow and Twist:  $\leq 0.1\text{mm}$

## 5.2 Mechanical Dimensions (units:mm)



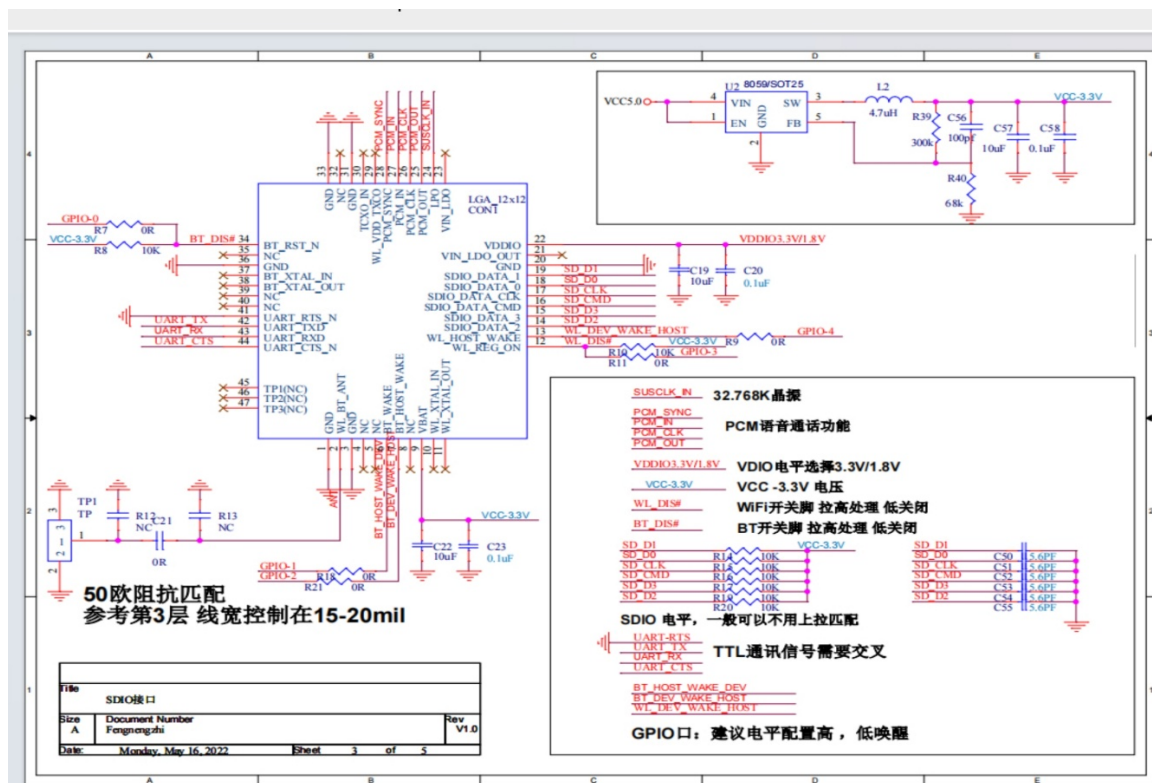
(Top View)



(Bottom View)

## 6. Application Information

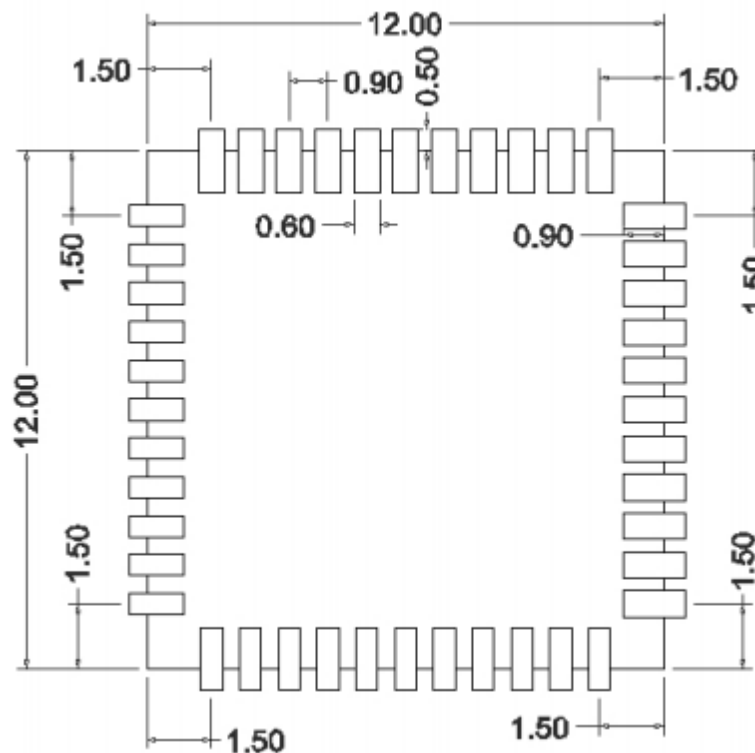
### 6.1 Typical Application Circuit



## 6.2 HW Application Note

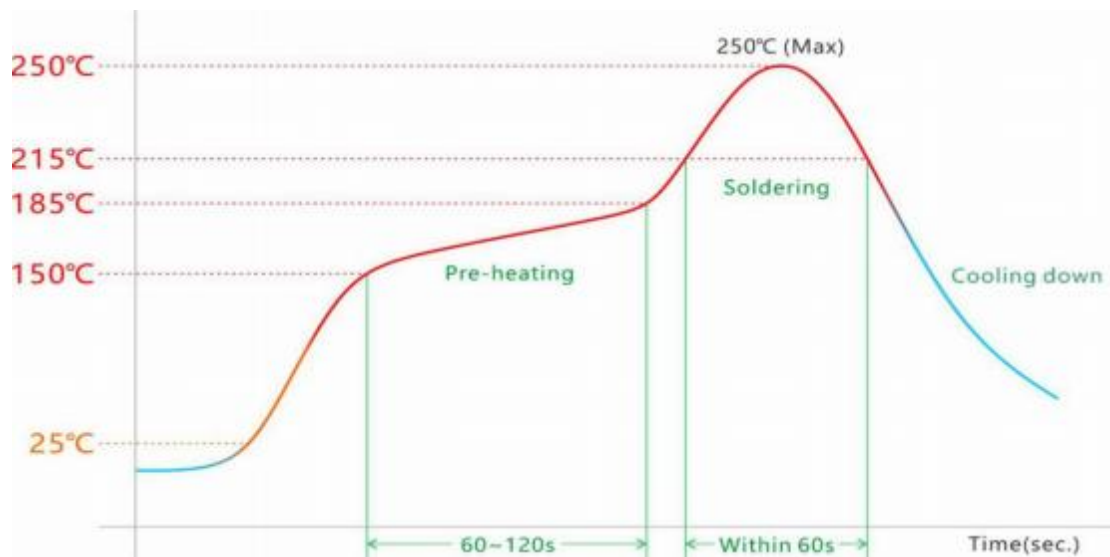
- a. On customer's motherboard, maintain a complete reference layer to reduce signal reflections and impedance changes.
- b. PCB traces of the RF path as short as possible, as far away from other signals as possible, avoid layer change, and should maintain continuous 50  $\Omega$  characteristic impedance, structure of "Coated Coplanar Waveguide With Ground" with the advantages of impedance control and GND surrounding isolation interference may be an ideal choice.
- c. RF Pin and antenna PAD/RF connector PAD on customer's motherboard are significantly wider than PCB traces of the RF path, which will cause RF impedance discontinuity. To improve this problem, in addition to adjusting the local impedance of these PADs, a " $\pi$ " circuit can be reserved near the antenna/RF connector which can match both RF path impedance and antenna impedance.
- d. PCB traces of the USB high-speed signal pair should maintain 90  $\Omega$  differential impedance, structure of "Differential Coated Coplanar Waveguide With Ground" may be an ideal choice.
- e. PCB traces of SDIO3.0 high-speed bus as short as possible, as equal length as possible.  
The SD\_CLK signal needs series-source termination and maintain 50  $\Omega$  characteristic impedance, GND surrounding isolation interference is recommended.
- f. For other SDIO signals, it is recommended to maintain 50~65  $\Omega$  characteristic impedance and a spacing >3W to avoid crosstalk.
- g. VDD33 main power supply: static ripple <80mV,  $I_{RMS} \geq 500mA$  and  $I_{Peak} \geq 600mA$ , for fast transient response, a current mode buck converter is recommended.  
Use 10uF and 100nF MLCC capacitors close to the module's VDD33 Pin for power input decoupling.
- h. VIO I/O power supply: Equivalent to the I/O level of customer's CPU platform, static ripple <50mV,  $I_{RMS} < 50mA$ , even simple LDO circuits can meet the requirements.  
Use 2.2uF and 100nF MLCC capacitors close to the module's VIO Pin for power input decoupling.

### 6.3 Recommend PCB Layout Footprint(units:mm)



(Design Unit: mm)

## 6.4 Reflow Soldering Standard Conditions



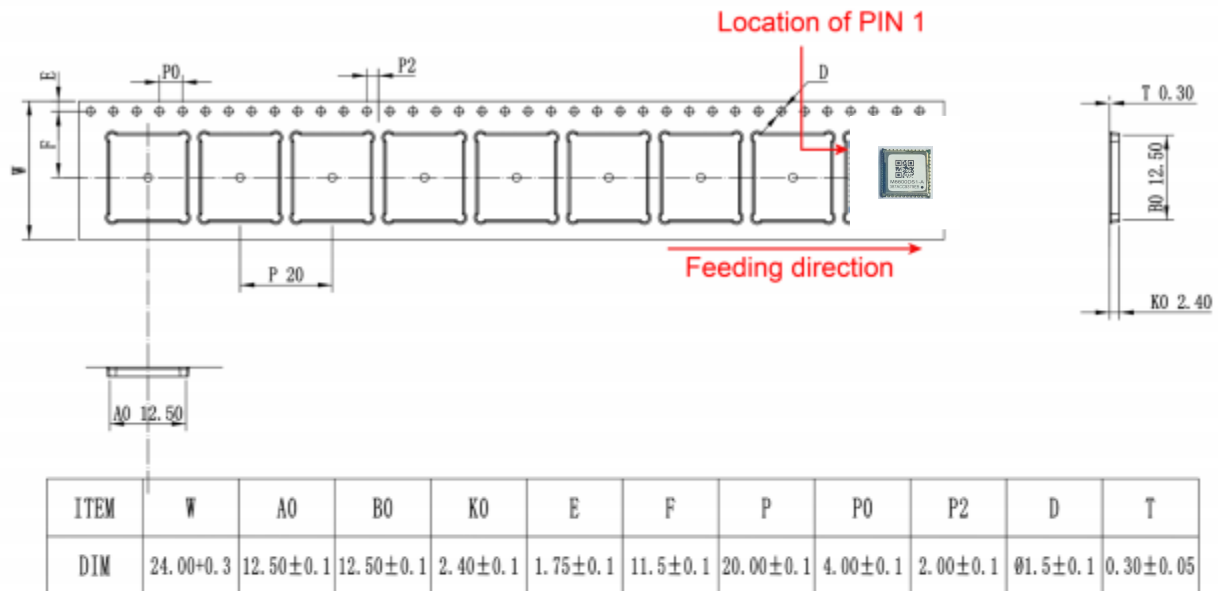
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components Of Module

| No. | Parts    | Specification  | Manufacturer                                                | Note |
|-----|----------|----------------|-------------------------------------------------------------|------|
| 1   | Chipset  | AIC8800D       | AIC Semiconductor (Shanghai) CO.,LTD                        |      |
| 2   | PCB      | FRX-M8800DS1-A | SHEN ZHEN QILI ELECTRON CO.,LTD                             |      |
|     |          |                | Quzhou Sunlord Electronics Co.,LTD                          |      |
| 3   | Crystal  | 40MHz-3225     | LUCKI CM ELECTRONICS CO.,LTD                                |      |
|     |          |                | Chengde oscillator Electronic Technology CO.,LTD            |      |
|     |          |                | JinHua East Crystal Electronic CO.,LTD                      |      |
|     |          |                | HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD |      |
| 4   | Diplexer | DIP1608        | Shenzhen Sunlord Electronics Co.,LTD                        |      |
|     |          |                | Dongguan Hekang Electronics Co.,LTD                         |      |
|     |          |                | Shenzhen FTR Technologies CO., LTD                          |      |
|     |          |                | Walsin Technology Corporation                               |      |

## 8. Package and Storage Information

### 8.1 Package Dimensions



Package specification:

- 1,000 modules per roll and 5,000 modules per box.
- Outer box size: 37.5\*36\*29cm.
- 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).
- Put 1 package of dry agent (20g) and 1 humidity card in each anti-static vacuum bag.
- Each carton is packed with 5 boxes.

## 8.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C

Storage humidity: 10% to 95% RH ( Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C

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°C, 24hours, 1time.

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**

Warning

1) This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 20cm must be maintained between the user's body and the handset, including the antenna.

2) This product can be used across EU member states.

BT frequency range: 2402-2480MHz, Maximum E.I.R.P:7.89dBm

BLE frequency range: 2402-2480MHz, Maximum E.I.R.P:7.85dBm

2.4GWi-Fi frequency range: 2412-2472MHz, Maximum E.I.R.P: 14.99dBm

5.2GWi-Fi frequency range: 5180-5240MHz, Maximum E.I.R.P: 15.99dBm

5.8GWi-Fi frequency range: 5745-5825MHz, Maximum E.I.R.P: 11.99dBm

RED 2014/53/EU

Declaration Of Conformity

This product can be used across EU member states .

Hereby, Shenzhen Feng Rui Xiang Intelligent Technology Co., Ltd. declares that this 802.11a/b/g/n/ac/ax 287Mbps WLAN +BT V5.4 SDIO/USB Module is in compliance with the essential requirements and other relevant provisions of directive 2014/53/EU.

This equipment may be operated in all European countries. The 5150-5250 MHz of Wi-Fi 5GHz can be used indoors only when the equipment is not attached to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed outdoor antenna.

# DECLARATION OF CONFORMITY

I hereby declare that the product

802.11a/b/g/n/ac/ax 287Mbps WLAN +BT V5.4 SDIO/USB Module / FRX-M8800DS1-A

(Name of product, type or model, batch or serial number)

satisfies all the technical regulations applicable to the product within the scope of Council Directives 2014/53/EU, 2014/35/EU and 2014/30/EU: and declare that the same application has not been lodged with any other notified body.

EMC ETSI EN 301 489-1 V2.2.3 (2019-11)  
ETSI EN 301 489-3 V2.3.2 (2023-01)  
ETSI EN 301 489-17 V3.3.1 (2024-09)  
EN 55032:2015+A11:2020+A1:2020/ EN 55035:2017+A11:2020

RF ETSI EN 300 328 V2.2.2 (2019-07)  
ETSI EN 301 893 V2.2.1 (2024-11)  
ETSI EN 300 440 V2.2.1 (2018-07)

EMF EN IEC 62311:2020  
EN 50665:2017

LVD EN IEC 62368-1:2020 + A11:2020

(Title(s) of regulations, standards, etc.)

**All essential radio test suites have been carried out.**

Model No: FRX-M8800DS1-A

Hardware Version: N/A

Software Version: N/A

Support equipment List

|     |                 |
|-----|-----------------|
| • / | M/N: /          |
|     | Manufacturer: / |

**NOTIFIED BODY:** MiCOM Labs Inc

– **Address:**

575 Boulder Court,  
Pleasanton, California 94566  
USA  
Identification Number: 2280

**MANUFACTURER or AUTHORISED REPRESENTATIVE:** Shenzhen Feng Rui Xiang Intelligent Technology Co., Ltd.

– **Address:**

2108 Longhu Junhui, No. 4745 Longhua Avenue,  
Qinghua Community, Longhua Street, Longhua  
District,  
Shenzhen  
China

This declaration is issued under the sole responsibility of the manufacturer and, if applicable, his authorised representative.

**Point of contact:**

|       |                                  |
|-------|----------------------------------|
| Phone | 13662644686                      |
|       | (Name, telephone and fax number) |
| Fax   | 0755-28164675                    |

Haiyun Peng

|       |                        |       |                |
|-------|------------------------|-------|----------------|
|       | (Place, date of issue) |       | (Signature)    |
| Date  | 2025/12/20             | Name  | Haiyun Peng    |
| Title | sales director         | Email | J31228@126.com |

### **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

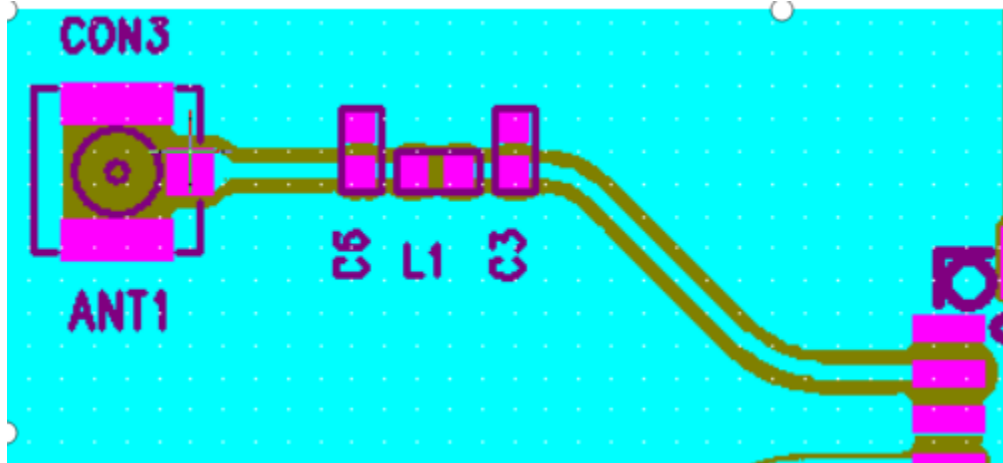
### 2.5 Trace Antenna Designs

Users should connect antennas to half hole pad through copper tube structure or FP types of RF trace and the trace impedance must be controlled in 50Ω. recommends that the total insertion loss between the antenna pads and antennas should meet the following requirements:

Trace loss

| Frequency       | Loss   |
|-----------------|--------|
| 700MHz-960MHz   | <0.5dB |
| 1710MHz-2170MHz | <0.9dB |
| 2300MHz-2650MHz | <1.2dB |

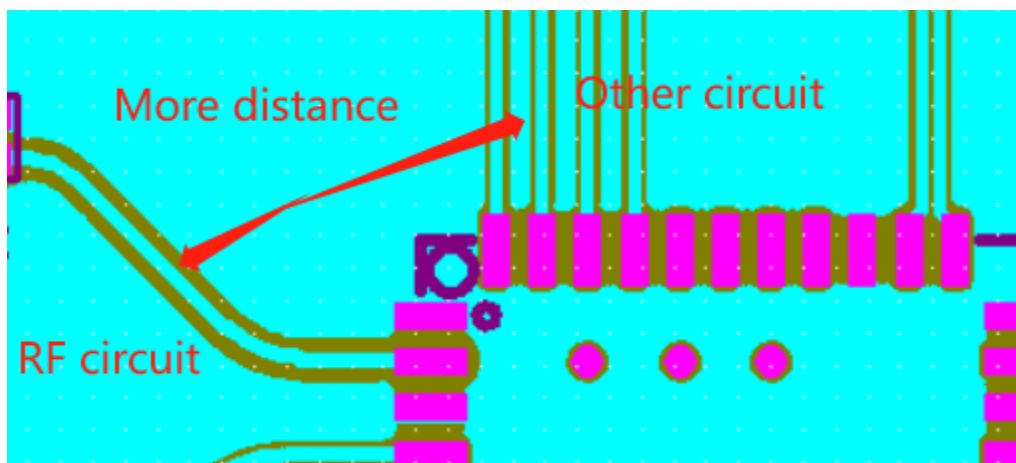
To facilitate the antenna tuning and certification test, a RF connector and an antenna matching circuit should be added. The following figure is the recommended circuit.



The module needs to be attached to the PCB board and connected to the external antenna through the solder joint of the circuit on the PCB. The gain of the external antenna is 2dBi (Max.), the internal structure is copper tube structure or FPC. A resistance of 0R is added between the module and the antenna at L1 to ensure that the impedance of the connection between the module and the antenna reaches 50R. The ANT1 position on the PCB is where the external antenna is connected.

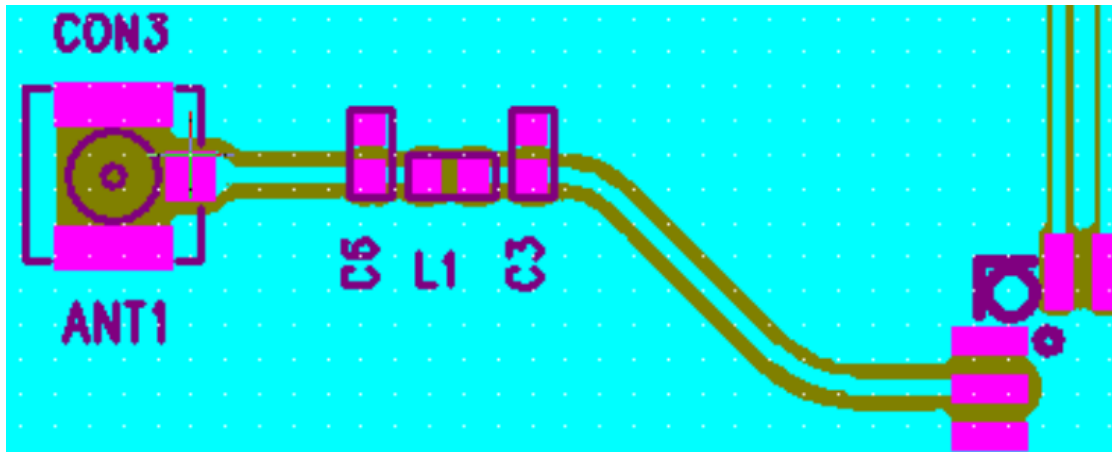
RF traces layout

1. Keep the RF trace from module ant pin to antenna as short as possible
2. RF trace should be 50  $\Omega$  either on the top layer or in the inner layer
3. RF trace should be avoided right angle and sharp angle.
4. Put enough GND vias around RF traces.
5. RF trace should be far away from other high speed signal lines.



Avoiding the paroling rout of other system antennas nearly.

There should be some distance from The GND to the inner conductor of the IPEX connector. It is better to keep out all the layers from inner to the outer conductor.



External Antenna VSWR

| Parameters            | Min | Typ | Max | Units |
|-----------------------|-----|-----|-----|-------|
| External Antenna VSWR |     | 1.7 | 2.0 | /     |

## 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 |
| FRX-M8800DS1-A | External Antenna | /         | 3.00dBi           | 3.00dBi       | /             | /             | 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-M8800DS1A". 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 is 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 Note EMI Considerations**

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.