



# **WMX7207**

**Wi-Fi 6 802.11ax 2x2 Dual-band  
M.2 2230 Module**

## **Product Datasheet**

Version: 0.1.2

2022/11/14



## Release Note

[illegible]

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## 1 Overview

The WMX7207 module is a highly integrated wireless local area network (WLAN) mini PCIe module, the module based-on Realtek RTL8852BE and that is supporting 802.11ax Wi-Fi and Bluetooth (BT).

## 2 Feature

### 2.1 WLAN

- Compliant with IEEE 802.11a/b/g/n/ac/ax
- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO)
- Dual-band 2.4 GHz/5 GHz support
- 20 MHz/40 MHz channel bandwidth for 2.4 GHz
- 20 MHz/40 MHz/80 MHz channel bandwidth for 5 GHz
- Dynamic Frequency Selection (DFS, radar detection)

### 2.2 Bluetooth

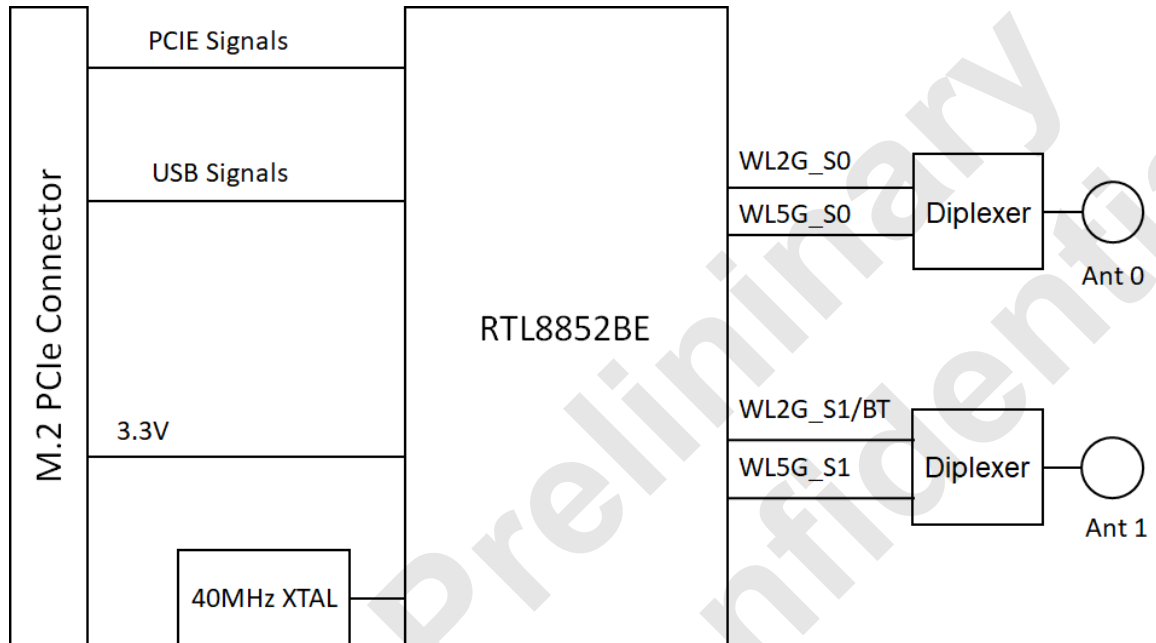
- Bluetooth V5.2, V4.2, V3.0+HS, V2.1+EDR

### 2.3 Security

- 802.1x, WEP, WPA TKIP and WPA2 AES/Mixed mode for PSK and TLS (Radius)
- WPA3-SAE (Personal)
- WPS - PIN and PBC Methods

## 3 System Specification

### 3.1 Block Diagram



### 3.2 Chip Solution

- Realtek RTL8852BE-CG

### 3.3 Protocol & Interface

- PCIe v2.1 interface for WLAN
- USB 2.0 interface for Bluetooth
- Antenna Port: MHF4 connector x2 for 2T2R

### 3.4 Temperature

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +105°C

### 3.5 Humidity

- Operating Humidity (non-condensing): 10% ~ 95%
- Storage Humidity (non-condensing): 10% ~ 90%

## 4 WLAN Specification

### 4.1 WLAN Standard

- IEEE 802.11a/b/g/n/ac/ax

### 4.2 Frequency Range

- Support 2.4GHz frequency range: 2412MHz ~ 2483MHz
- Support 5GHz frequency range: 5150MHz - 5835MHz

### 4.3 Band Width

- 20 MHz/40 MHz channel bandwidth for 2.4 GHz
- 20 MHz/40 MHz/80 MHz channel bandwidth for 5 GHz

### 4.4 Data Rate

- 2.4GHz  
802.11n HT40 2SS: 300Mbps (Maximum)  
802.11ax HE40 2SS: 573Mbps (Maximum)
- 5GHz/6GHz  
802.11n HT40 2SS: 300Mbps (Maximum)  
802.11ac VHT80 2SS: 866.7Mbps (Maximum)  
802.11ax HE80 2SS: 1201Mbps (Maximum)

### 4.5 Modulation

- 802.11n:  
OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
- 802.11ac:  
OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
- 802.11ax:  
OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM)

## 4.6 Software Features

(on Linux based platform)

- IEEE 802.11 b/g/n/ac/ax WiFi compliant
- 802.1x, WEP, WPA TKIP and WPA2 AES/Mixed mode for PSK and TLS (Radius)
- WPA3-SAE (Personal)
- WPS - PIN and PBC Methods
- IEEE 802.11b/g/n/ac/ax Client mode
  - Support wireless security for WEP, WPA TKIP and WPA2 AES PSK
  - Support site survey scan and manual connect
  - Support WPA/WPA2 TLS client
- Soft AP mode
- WiFi-Direct
- Miracast
- BT-COEXIST

## 4.7 Output Power & Sensitivity

### 2.4GHz

| 2.4GHz 802.11b |              |                          |
|----------------|--------------|--------------------------|
| Data Rate      | Tx $\pm$ 2dB | Rx Sensitivity $\pm$ 2dB |
| 1M             | 18.0dBm      | -94dBm                   |
| 11M            | 18.0dBm      | -87dBm                   |

| 2.4GHz 802.11g |              |                          |
|----------------|--------------|--------------------------|
| Data Rate      | Tx $\pm$ 2dB | Rx Sensitivity $\pm$ 2dB |
| 6M             | 18.0dBm      | -92dBm                   |
| 54M            | 17.0dBm      | -74dBm                   |

| 2.4GHz 802.11n |       |              |                   |                          |
|----------------|-------|--------------|-------------------|--------------------------|
| Data Rate      |       | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HT20           | MCS 0 | 18dBm        | 21dBm             | -92dBm                   |
|                | MCS 7 | 17dBm        | 20dBm             | -72dBm                   |
| HT40           | MCS 0 | 17dBm        | 20dBm             | -89dBm                   |
|                | MCS 7 | 16dBm        | 19dBm             | -69dBm                   |



| 2.4GHz 802.11ax |        |              |                   |                          |
|-----------------|--------|--------------|-------------------|--------------------------|
| Data Rate       |        | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HE20            | MCS 0  | 16dBm        | 19dBm             | -81dBm                   |
|                 | MCS 11 | 15dBm        | 18dBm             | -61dBm                   |
| HE40            | MCS 0  | 16dBm        | 19dBm             | -88dBm                   |
|                 | MCS 11 | 15dBm        | 18dBm             | -58dBm                   |

## 5GHz

| 2.4GHz 802.11g |              |                          |
|----------------|--------------|--------------------------|
| Data Rate      | Tx $\pm$ 2dB | Rx Sensitivity $\pm$ 2dB |
| 6M             | 18dBm        | -92dBm                   |
| 54M            | 17dBm        | -74dBm                   |

| 5GHz 802.11n |       |              |                   |                          |
|--------------|-------|--------------|-------------------|--------------------------|
| Data Rate    |       | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HT20         | MCS 0 | 17dBm        | 20dBm             | -92dBm                   |
|              | MCS 7 | 16dBm        | 19dBm             | -72dBm                   |
| HT40         | MCS 0 | 17dBm        | 20dBm             | -89dBm                   |
|              | MCS 7 | 16dBm        | 19dBm             | -69dBm                   |

| 5GHz 802.11ac |       |              |                   |                          |
|---------------|-------|--------------|-------------------|--------------------------|
| Data Rate     |       | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| VHT20         | MCS 0 | 17dBm        | 20dBm             | -92dBm                   |
|               | MCS 8 | 16dBm        | 19dBm             | -65dBm                   |
| VHT80         | MCS 0 | 17dBm        | 20dBm             | -85dBm                   |
|               | MCS 9 | 16dBm        | 19dBm             | -59dBm                   |

| 5GHz 802.11ax |        |              |                   |                          |
|---------------|--------|--------------|-------------------|--------------------------|
| Data Rate     |        | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HE20          | MCS 0  | 16dBm        | 19dBm             | -92dBm                   |
|               | MCS 11 | 15dBm        | 18dBm             | -61dBm                   |
| HE80          | MCS 0  | 16dBm        | 19dBm             | -86dBm                   |
|               | MCS 11 | 15dBm        | 18dBm             | -56dBm                   |

## 5 Bluetooth Specification

### 5.1 WLAN Standard

- Bluetooth v2.1+EDR/3.0+HS/4.2/5.2

### 5.2 Frequency Range

- 2.4~2.4835GHz(2.4GHz ISM Band)

### 5.3 Power Classes

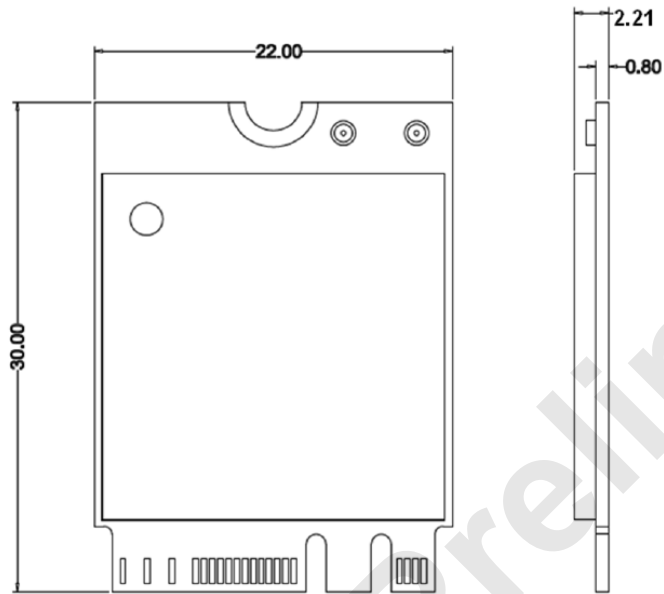
- Bluetooth Classic: Class1
- Bluetooth Low Energy: Class1.5

### 5.4 Data Rate & Modulation

- BR\_1Mbps: GFSK
- EDR\_2Mbps:  $\pi/4$ -DQPSK
- EDR\_3Mbps: 8DPSK
- LE\_125Kbps: GFSK (Coded\_S=8)
- LE\_500Kbps: GFSK (Coded\_S=2)
- LE\_1Mbps: GFSK (Uncoded)
- LE\_2Mbps: GFSK (Uncoded)

## 6 Mechanical Specification

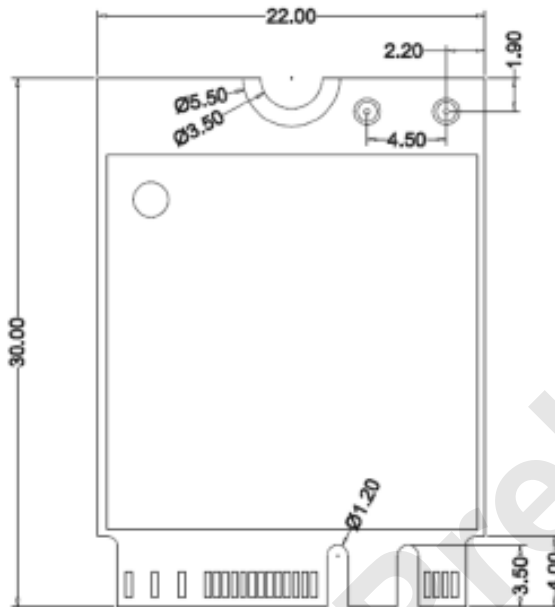
### 6.1 Mechanical Outline Drawing



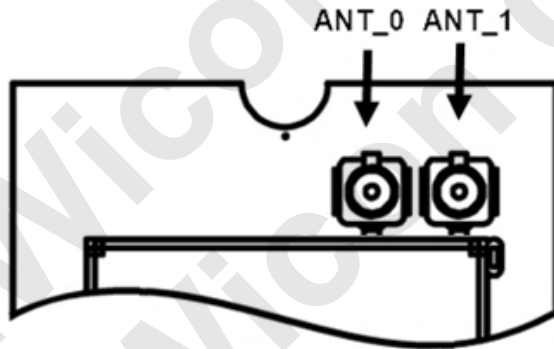
General tolerance:  $\pm 0.2\text{mm}$

## 6.2 Interface & Dimension

- Interface: M.2 2230 A+E Key
- Typical Dimension: (W)22.0mm x (L)30mm x (H)2.21mm

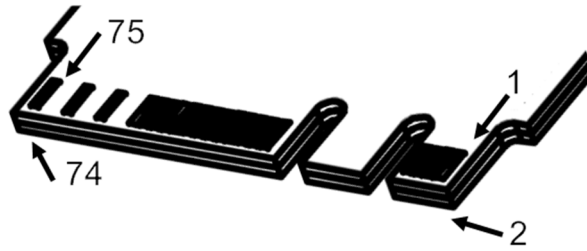


## 6.3 Antenna Connector



| Pin Name | Description                                   |
|----------|-----------------------------------------------|
| Ant_0    | RF Antenna for WiFi 2.4GHz/5GHz               |
| Ant_1    | RF Antenna for WiFi 2.4GHz/5GHz and Bluetooth |

## 6.4 Pin Assignment



| PIN | Pin Name      | Design Status | PIN | Pin Name       | Design Status |
|-----|---------------|---------------|-----|----------------|---------------|
| 1   | GND           | GND           |     |                |               |
| 3   | USB_D+        | BT_USB_DP     | 2   | 3.3V           | 3V3           |
| 5   | USB_D-        | BT_USB_DM     | 4   | 3.3V           | 3V3           |
| 7   | GND           | GND           | 6   | LED_1#         | WL_LED        |
| 9   | Module Key A  |               | 8   | Module Key A   |               |
| 11  |               |               | 10  |                |               |
| 13  |               |               | 12  |                |               |
| 15  |               |               | 14  |                |               |
| 17  | NC            | NC            | 16  | LED_2#         | BT_LED        |
| 19  | NC            | NC            | 18  | GND            | GND           |
| 21  | NC            | NC            | 20  | UART WAKE      | NC            |
| 23  | NC            | NC            | 22  | UART TX        | NC            |
| 25  | Module Key E  |               | 24  | Module Key E   |               |
| 27  |               |               | 26  |                |               |
| 29  |               |               | 28  |                |               |
| 31  |               |               | 30  |                |               |
| 33  | GND           | GND           | 32  | UART RX        | NC            |
| 35  | PERp0         | PCIE_RXP      | 34  | UART RTS       | NC            |
| 37  | PERn0         | PCIE_RXN      | 36  | UART CTS       | NC            |
| 39  | GND           | GND           | 38  | VENDOR DEFINED | NC            |
| 41  | PETp0         | PCIE_TXP      | 40  | VENDOR DEFINED | NC            |
| 43  | PETn0         | PCIE_TXN      | 42  | VENDOR DEFINED | NC            |
| 45  | GND           | GND           | 44  | COEX3(I/O)     | NC            |
| 47  | REFCLKp0      | PCIE_REFCLKP  | 46  | COEX2(I/O)     | NC            |
| 49  | REFCLKn0      | PCIE_REFCLKN  | 48  | COEX1(I/O)     | NC            |
| 51  | GND           | GND           | 50  | SUSCLK(32kHz)  | SUSCLK        |
| 53  | CLKREQ0#(I/O) | PCIE_CLKREQ   | 52  | PERST0#(I)     | PCIE_RST      |

|    |               |           |    |                |            |
|----|---------------|-----------|----|----------------|------------|
| 55 | PEWAKE0#(I/O) | PCIE_WAKE | 54 | W_DISABLE2#(I) | BT_DISABLE |
| 57 | GND           | GND       | 56 | W_DISABLE1#(I) | WL_DISABLE |
| 59 | PERp1         | NC        | 58 | I2C DATA(I)    | UART_TX    |
| 61 | PERn1         | NC        | 60 | I2C CLK(I)     | UART_RX    |
| 63 | GND           | GND       | 62 | ALERT#(O)      | UART_RTS   |
| 65 | PETp1         | NC        | 64 | RESERVED       | UART_CTS   |
| 67 | PETn1         | NC        | 66 | RESERVED       | NC         |
| 69 | GND           | GND       | 68 | RESERVED       | NC         |
| 71 | REFCLKp1      | NC        | 70 | RESERVED       | NC         |
| 73 | REFCLKn1      | NC        | 72 | 3.3Vaux        | 3V3        |
| 75 | GND           | GND       | 74 | 3.3Vaux        | 3V3        |

## 6.5 Pin Define

| Design Name  | I/O   | Description                                                                                                                                                                                                                        |
|--------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BT_USB_DP    | I/O   | High-Speed USB D+ Signal                                                                                                                                                                                                           |
| BT_USB_DM    | I/O   | High-Speed USB D- Signal                                                                                                                                                                                                           |
| PCIE_RST     | I     | PCI Express Reset Signal: active low.<br>When the PERST# is asserted at power-on state, the RTL8852BE returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST#. |
| PCIE_WAKE    | O/D   | Power Management Event: Open drain, active low.<br>Used to reactivate the PCI Express slot's main power rails and reference clocks.<br>This WAKE# can be shared with BT wake up host function via sideband signals.                |
| PCIE_CLKREQ  | I/O/D | Reference Clock Request Signal. Also used by L1 PM substates. This signal is used by the RTL8852BE to request for the PCI Express reference clock.                                                                                 |
| PCIE_REFCLKP | I     | PCI Express Differential Reference Clock Source: 100MHz $\pm$ 300ppm                                                                                                                                                               |
| PCIE_REFCLKN | I     |                                                                                                                                                                                                                                    |
| PCIE_RXP     | I     | PCI Express Receive Differential Pair                                                                                                                                                                                              |
| PCIE_RXN     | I     |                                                                                                                                                                                                                                    |
| PCIE_TXP     | O     | PCI Express Transmit Differential Pair                                                                                                                                                                                             |
| PCIE_TXN     | O     |                                                                                                                                                                                                                                    |
| BT_LED       | O     | Bluetooth LED (Active Low)                                                                                                                                                                                                         |
| WL_LED       | O     | WLAN LED (Active Low)                                                                                                                                                                                                              |

|            |   |                                                                                                                                                                                                                                       |
|------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BT_DISABLE | I | This pin can externally shut down the RTL8852BE BT function when BT_DIS# is pulled Low. When this pin is pulled low, USB interface will be also disabled. When this function is not required, external pull high is not required.     |
| WL_DISABLE | I | This pin can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN function will be Radio-off. When this function is not required, external pull high is not required. |
| SUSCLK     | I | 32KHz                                                                                                                                                                                                                                 |

## 7 Product Appearance

### 7.1 Product Picture



### 7.2 Label Define



| Item    | Description                  |
|---------|------------------------------|
| Model   | Product Model Name           |
| P/N     | Product Part Number          |
| Barcode | CODE 128, Value: Mac Address |
| S/N     | Product Serial Number        |

## 8 Electrical characteristics

### 8.1 Power Consumption

- Max power consumption 3.5W (25°C)

### 8.2 Operating Voltage

- M.2 Interface DC 3.3V  $\pm 5\%$

## 9 Software & Driver

### 9.1 Driver Support

- Windows:  
Windows 10/11 (32/64bit)
- Linux:  
Linux kernel 3.11 ~ 5.11
- Android:  
Android 4.4, 6x, 7.0, 8.0, 9.x and 10, 11

### 9.2 Platform Support List

- Intel x86(Verified)
- ARM/MIPS

### 9.3 RF Tool

- RF test tool consultant service available

## 10 Certification

CE/FCC/IC...

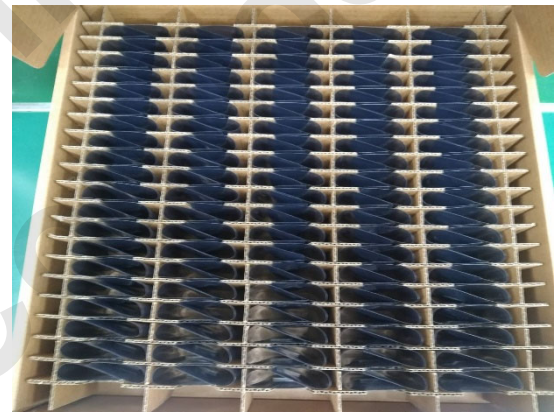


## 11 Package

- One module per one static bag



- Two static bags in one lattice and 200pcs per inner box



- 5 inner boxes per 1 carton and 1000pcs per carton



## 12 Ordering Information

### 12.1 Main Parts

| Part Number | Description                                |
|-------------|--------------------------------------------|
| WMX7207     | 802.11ax, 2x2, Wi-Fi 6 Dual-band, M.2 2230 |

### 12.2 Accessories

| Part Number | Description                            |
|-------------|----------------------------------------|
| ATD6251     | Dipole 2dBi 2.4GHz & 5GHz Antenna      |
| ATD6551     | Dipole 5dBi 2.4GHz & 5dBi 5GHz Antenna |
| AC42001     | Cable MHF4 to SMA, 200mm               |