



# **WMX6218**

**Wi-Fi 5 802.11ac 2x2 dual-band  
Mini PCIe Module**

## **Product Datasheet**

Version: 1.0.3

2022/11/11



## Release Note

| Version | Date       | Description                        | Editor    |
|---------|------------|------------------------------------|-----------|
| v0.1.0  | 2021/8/19  | Initial draft                      | Eddie Lin |
| v0.1.1  | 2021/9/11  | Fixed incorrect word               | Eddie Lin |
| v0.1.2  | 2022/2/17  | Add certification and change label | Eddie Lin |
| V1.0.3  | 2022/11/11 | 1. Add Tx Power<br>2. Add Package  | Eddie Lin |
|         |            |                                    |           |
|         |            |                                    |           |
|         |            |                                    |           |
|         |            |                                    |           |

## Contents

|     |                                  |    |
|-----|----------------------------------|----|
| 1   | Overview .....                   | 1  |
| 2   | Feature .....                    | 1  |
| 2.1 | WLAN .....                       | 1  |
| 2.2 | Bluetooth .....                  | 1  |
| 2.3 | Security .....                   | 2  |
| 3   | System Specification .....       | 2  |
| 3.1 | Block Diagram .....              | 2  |
| 3.2 | Chip Solution .....              | 2  |
| 3.3 | Protocol & Interface .....       | 2  |
| 3.4 | Temperature .....                | 3  |
| 3.5 | Humidity .....                   | 3  |
| 4   | WLAN Specification .....         | 3  |
| 4.1 | WLAN Standard .....              | 3  |
| 4.2 | Band Width .....                 | 3  |
| 4.3 | Data Rate .....                  | 3  |
| 4.4 | Modulation .....                 | 3  |
| 4.5 | Features .....                   | 4  |
| 4.1 | Output Power & Sensitivity ..... | 4  |
| 5   | Mechanical Specification .....   | 5  |
| 5.1 | Mechanical Outline Drawing ..... | 5  |
| 5.2 | Dimension .....                  | 6  |
| 5.3 | Connector .....                  | 6  |
| 5.4 | Pin Assignment .....             | 7  |
|     | Pin Define .....                 | 8  |
| 5.5 | Product Picture .....            | 9  |
| 5.6 | Label Define .....               | 9  |
| 6   | Electrical characteristics ..... | 9  |
| 6.1 | Power Consumption .....          | 9  |
| 6.2 | Operating Voltage .....          | 9  |
| 7   | Software & Driver .....          | 10 |
| 7.1 | Driver Support .....             | 10 |
| 7.2 | Platform Support List .....      | 10 |
| 7.3 | RF Tool .....                    | 10 |
| 8   | Certification .....              | 10 |
| 9   | Package .....                    | 10 |

|      |                            |    |
|------|----------------------------|----|
| 10   | Ordering Information ..... | 11 |
| 10.1 | Main Parts .....           | 11 |
| 10.2 | Accessories .....          | 11 |

EmWicon Confidential

## 1 Overview

WMX6218 is a highly integrated Dual-band WLAN + bluetooth5.0 2T2R MINI PCIE module designed base on Realtek RTL8822CE chipset. This module supports IEEE 802.11a/b/g/n/ac standard and provides the maximum PHY data rate up to 867Mbps, and supports 802.11ac MU-MIMO and 802.11n MIMO for 2.4/5G band, it can offer feature-rich wireless connectivity and reliable throughput from an extended distance. WMX6218 is designed by MINI PCIE form factor, the interface complies with PCI Express Base Specification Revision 2.1, and USB2.0 FS-mode for Bluetooth.

## 2 Feature

### 2.1 WLAN

- Compliant with IEEE 802.11a/b/g/n/ac
- 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
- Seamless antenna sharing with Bluetooth
- IEEE 802.11e QoS Enhancement (WMM)
- IEEE 802.11i (WPA, WPA2, WPA3). Open, shared key, and pair-wise key authentication services
- IEEE 802.11h DFS, TPC, Spectrum Measurement
- IEEE 802.11k Radio Resource Measurement
- WAPI (Wireless Authentication Privacy Infrastructure)

### 2.2 Bluetooth

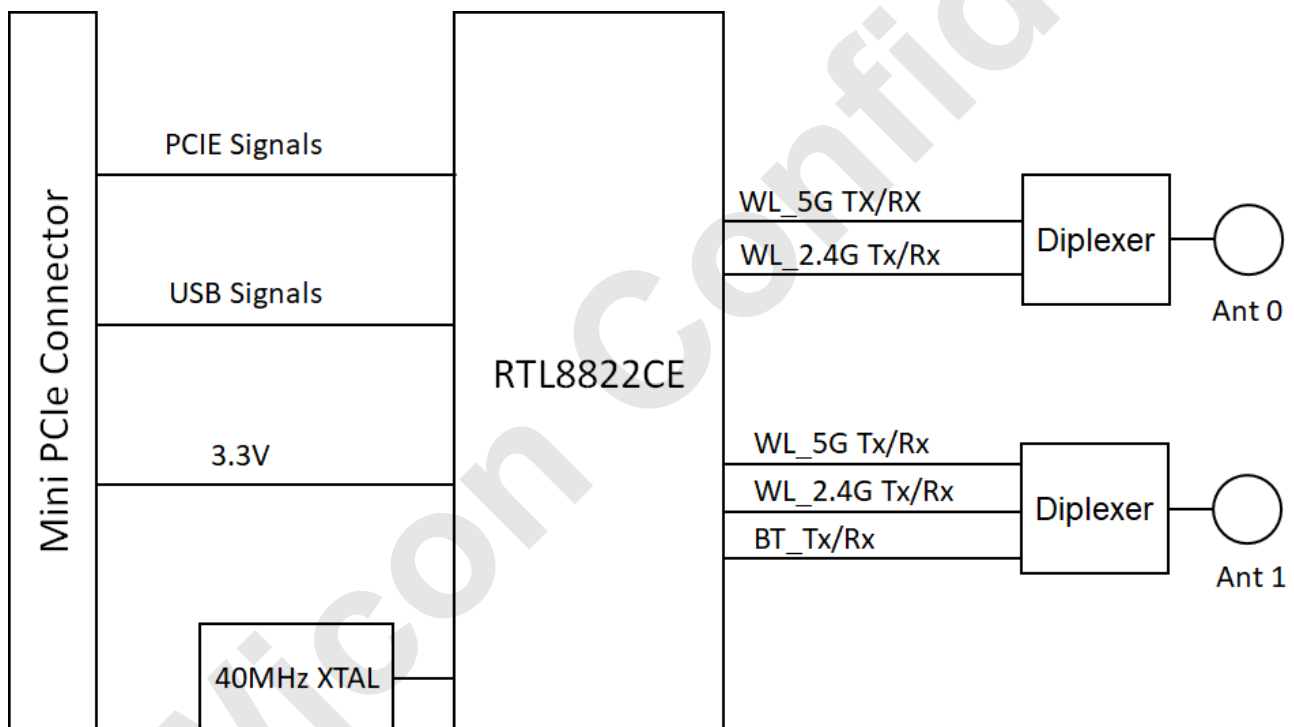
- Bluetooth V5.0, V4.2, V4.1, V4.0, V3.0, V2.1+EDR
- Integrated MCU to execute Bluetooth protocol stack
- Supports all packet types in basic rate and enhanced data rate
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different profiles
- Dual Mode support: Simultaneous LE and BR/EDR

## 2.3 Security

- WEP, Shared key support
- WPA/WPA2 PSK
- WPA3-SAE (Personal)
- AES/TKIP hardware encryption
- WAPI-2 hardware encryption

## 3 System Specification

### 3.1 Block Diagram



### 3.2 Chip Solution

- Realtek RTL8822CE

### 3.3 Protocol & Interface

- PCIe 2.1 interface for WLAN
- USB 2.0 interface for Bluetooth
- Antenna Port: U.FL/MHF1 compatible connector x2 for 2T2R

### 3.4 Temperature

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +135°C

### 3.5 Humidity

- Operating Humidity (non-condensing): 5% ~ 95%
- Storage Humidity (non-condensing): 5% ~ 90%

## 4 WLAN Specification

### 4.1 WLAN Standard

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

### 4.2 Band Width

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

### 4.3 Data Rate

- 2.4GHz  
802.11n HT40 2SS: 300Mbps
- 5GHz  
802.11n HT40 2SS: 300Mbps  
802.11ac VHT160 2SS: 866.7Mbps

### 4.4 Modulation

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

## 4.5 Features

| Category                                 | Description                                                                 |
|------------------------------------------|-----------------------------------------------------------------------------|
| Basic HT/VHT (802.11 a/b/g/n/ac) Support | 2.4/5 GHz<br>STA Mode<br>Soft AP/Hotspot Mode<br>20/40/80 MHz Channel Width |
| Encryption/Decryption                    | WEP<br>TKIP<br>AES                                                          |
| Security Modes                           | Open / Shared Key<br>WPA-PSK/WPA2-PSK<br>WPA3-SAE (Personal)                |
| Feature Set                              | P2P<br>WiFi-Direct                                                          |

## 4.1 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      | -86dBm                   |

| 2.4GHz 802.11g |              |                          |
|----------------|--------------|--------------------------|
| Data Rate      | Tx $\pm$ 2dB | Rx Sensitivity $\pm$ 2dB |
| 6M             | 17.0dBm      | -90dBm                   |
| 54M            | 17.0dBm      | -75dBm                   |

| 2.4GHz 802.11n |       |              |                   |                          |
|----------------|-------|--------------|-------------------|--------------------------|
| Data Rate      |       | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HT20           | MCS 0 | 16dBm        | 19dBm             | -92dBm                   |
|                | MCS 7 | 16dBm        | 19dBm             | -73dBm                   |
| HT40           | MCS 0 | 16dBm        | 19dBm             | -90dBm                   |
|                | MCS 7 | 16dBm        | 19dBm             | -70dBm                   |



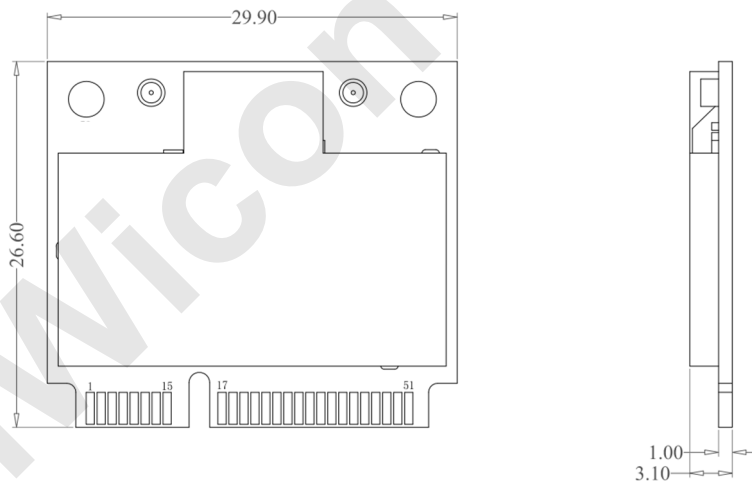
## 5GHz

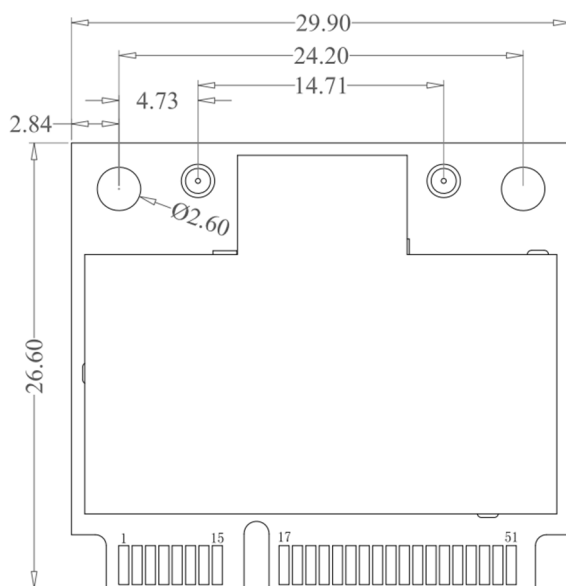
| 5GHz 802.11a |              |                          |
|--------------|--------------|--------------------------|
| Data Rate    | Tx $\pm$ 2dB | Rx Sensitivity $\pm$ 2dB |
| 6M           | 17.0dBm      | -92dBm                   |
| 54M          | 17.0dBm      | -75dBm                   |

| 5GHz 802.11an/ac |       |              |                   |                          |
|------------------|-------|--------------|-------------------|--------------------------|
| Data Rate        |       | Tx $\pm$ 2dB | Tx $\pm$ 2dB(2TX) | Rx Sensitivity $\pm$ 2dB |
| HT20             | MCS 0 | 16dBm        | 19dBm             | -91dBm                   |
|                  | MCS 7 | 16dBm        | 19dBm             | -70dBm                   |
| HT40             | MCS 0 | 16dBm        | 19dBm             | -88dBm                   |
|                  | MCS 7 | 16dBm        | 19dBm             | -68dBm                   |
| VHT80            | MCS 0 | 14dBm        | 16dBm             | -85dBm                   |
|                  | MCS 9 | 14dBm        | 16dBm             | -60dBm                   |

## 5 Mechanical Specification

### 5.1 Mechanical Outline Drawing



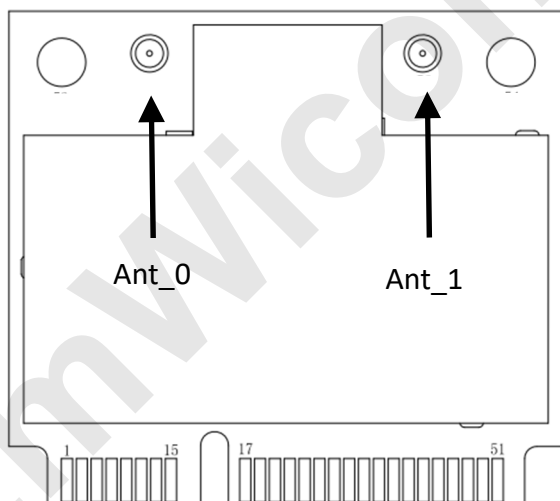


General tolerance:  $\pm 0.2\text{mm}$

## 5.2 Dimension

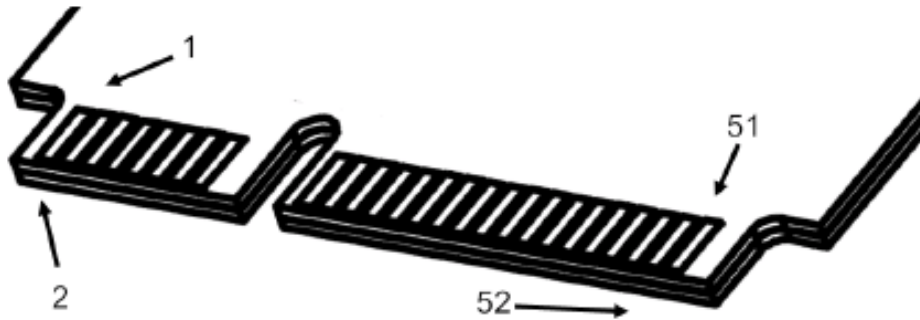
- Mini PCIe half-size
- Typical Dimension: (W)29.9mm x (L)26.6mm x (H)3.1mm

## 5.3 Connector



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

## 5.4 Pin Assignment



| PIN # | Pin Name | Design Status   | PIN # | Pin Name   | Design Status |
|-------|----------|-----------------|-------|------------|---------------|
| 1     | WAKE#    | WL_PCIE_WAKE    | 2     | +3.3Vaux   | 3V3           |
| 3     | COEX1    | NC              | 4     | GND        | GND           |
| 5     | COEX2    | NC              | 6     | +1.5V      | NC            |
| 7     | CLKREQ#  | WL_PCIE_CLKREQ  | 8     | UIM_PWR    | NC            |
| 9     | GND      | GND             | 10    | UIM_DATA   | NC            |
| 11    | REFCLK-  | WL_PCIE_REFCLKN | 12    | UIM_CLK    | NC            |
| 13    | REFCLK+  | WL_PCIE_REFCLKP | 14    | UIM_RESET  | NC            |
| 15    | GND      | GND             | 16    | UIM_VPP    | NC            |
| 17    | Reserved | NC              | 18    | GND        | GND           |
| 19    | Reserved | NC              | 20    | W_DISABLE# | WL_DISABLE    |
| 21    | GND      | GND             | 22    | PERST#     | WL_PCIE_RST   |
| 23    | PERn0    | WL_PCIE_RXN     | 24    | +3.3Vaux   | NC            |
| 25    | PERp0    | WL_PCIE_RXP     | 26    | GND        | GND           |
| 27    | GND      | GND             | 28    | +1.5V      | NC            |
| 29    | GND      | GND             | 30    | SMB_CLK    | NC            |
| 31    | PETn0    | WL_PCIE_TXN     | 32    | SMB_DATA   | NC            |
| 33    | PETp0    | WL_PCIE_TXP     | 34    | GND        | GND           |
| 35    | GND      | GND             | 36    | USB_D-     | BT_USB_DM     |
| 37    | Reserved | GND             | 38    | USB_D+     | BT_USB_DP     |
| 39    | +3.3Vaux | BT_DISABLE      | 40    | GND        | GND           |
| 41    | +3.3Vaux | SUSCLK          | 42    | LED_WWAN   | NC            |
| 43    | GND      | GND             | 44    | LED_WLAN   | WL_LED        |
| 45    | RESERVED | NC              | 46    | LED_WPAN   | BT_LED        |
| 47    | RESERVED | NC              | 48    | +1.5V      | NC            |
| 49    | RESERVED | NC              | 50    | GND        | GND           |
| 51    | RESERVED | NC              | 52    | +3.3Vaux   | 3V3           |

## Pin Define

| Design Name     | I/O | Description                                                                                                                                                            |
|-----------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WL_PCIE_RST     | I   | Input signal for functional reset to the card                                                                                                                          |
| WL_PCIE_WAKE    | O   | This signal is used to request the system from a sleep / suspended state to service a function-initiated wake event                                                    |
| WL_PCIE_CLKREQ  | O   | Output for reference clock request signal                                                                                                                              |
| WL_PCIE_REFCLKP | I   | Input signal for PCIe differential reference clock (100MHz)                                                                                                            |
| WL_PCIE_REFCLKN | I   |                                                                                                                                                                        |
| WL_PCIE_RXP     | I   | PCIe x1 differential receive pair                                                                                                                                      |
| WL_PCIE_RXN     | I   |                                                                                                                                                                        |
| WL_PCIE_TXP     | O   | PCIe x1 differential transmit pair                                                                                                                                     |
| WL_PCIE_TXN     | O   |                                                                                                                                                                        |
| SUSCLK          | I   | 32.768KHz clock supply input that is provided by PCH to reduce power and cost for the module.                                                                          |
| BT_USB_DP       | I/O | USB Transmitter/Receiver Differential Pair for BT                                                                                                                      |
| BT_USB_DM       | I/O |                                                                                                                                                                        |
| BT_DISABLE      | I   | Reserved for definition with future revisions of this specification.                                                                                                   |
| WL_DISABLE      | I   | Input and active low signal.<br>This signal is used by the system to disable radio operation.<br>When implemented, this signal requires a pull-up resistor on the card |
| BT_LED          | O   | Bluetooth LED                                                                                                                                                          |
| WL_LED          | O   | WLAN LED                                                                                                                                                               |

## 5.5 Product Picture



## 5.6 Label Define



## 6 Electrical characteristics

### 6.1 Power Consumption

- Max power consumption 3W(25°C)

### 6.2 Operating Voltage

- 3.3V

## 7 Software & Driver

### 7.1 Driver Support

- Windows:  
Windows 10 (32bit/64bit)
- Linux:  
Kernel 2.6.24 ~ 5.4
- Android  
4.4, 6.x, 7.0, 8.0, 9.x and 10.x

### 7.2 Platform Support List

- x86
- ARM
- MIPS

### 7.3 RF Tool

- RF test tool consultant service available

## 8 Certification

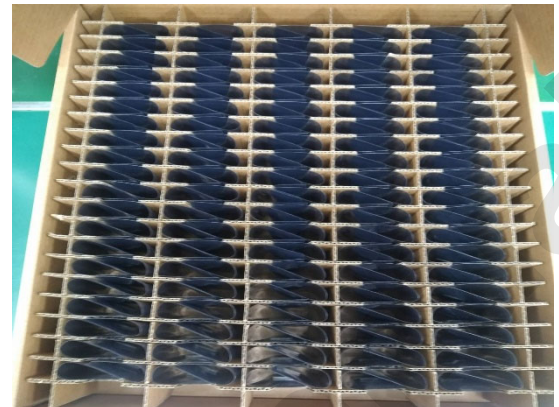
CE/FCC/IC

## 9 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



## 10 Ordering Information

### 10.1 Main Parts

| Part Number | Description                                    |
|-------------|------------------------------------------------|
| WMX6218     | WiFi 5 802.11ac 2x2 dual-band Mini PCIe Module |

### 10.2 Accessories

| Part Number | Description                     |
|-------------|---------------------------------|
| ATD6251     | Dipole 2dBi Antenna 2.4GHz/5GHz |
| AC12001     | Cable U.FL/MHF1 to SMA, 200mm   |