WMX6219

Wi-Fi 5 802.11ac 2x2 dual-band M.2 2230 Module

Product Datasheet

Version: 0.1.1

2021/9/11

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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

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1 Overview

WMX6219 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. WMX6219 is designed by M.2 2230 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

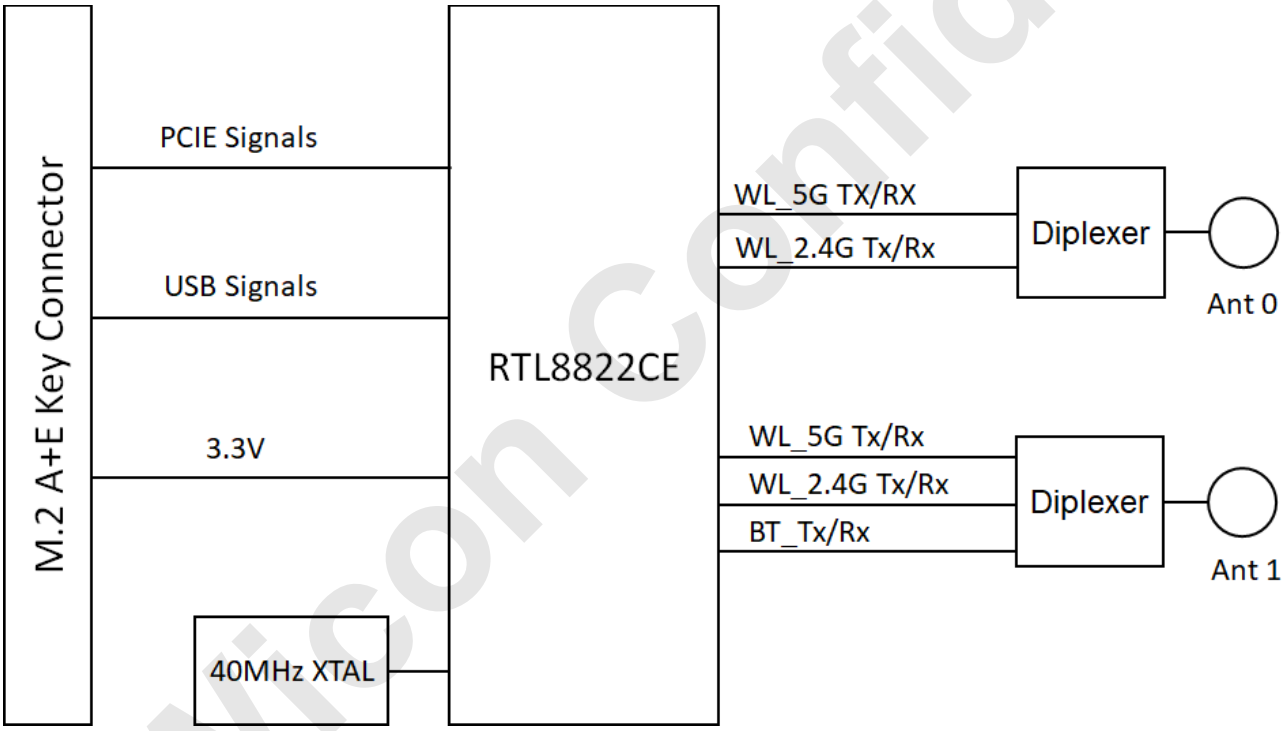
- Bluetooth V5.0, V4.2, V4.1, V4.0, V3.0, V2.1+EDR
- Integrated MCU to execute Bluetooth protocol stack
- Supports all packet types in basic rate and enhanced data rate
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different profiles
- Dual Mode support: Simultaneous LE and 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: MHF4 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 STA Mode Soft AP/Hotspot Mode 20/40/80 MHz Channel Width
Encryption/Decryption	WEP TKIP AES
Security Modes	Open / Shared Key WPA-PSK/WPA2-PSK WPA3-SAE (Personal)
Feature Set	P2P WiFi-Direct

4.6 Output Power & Sensitivity

2.4GHz

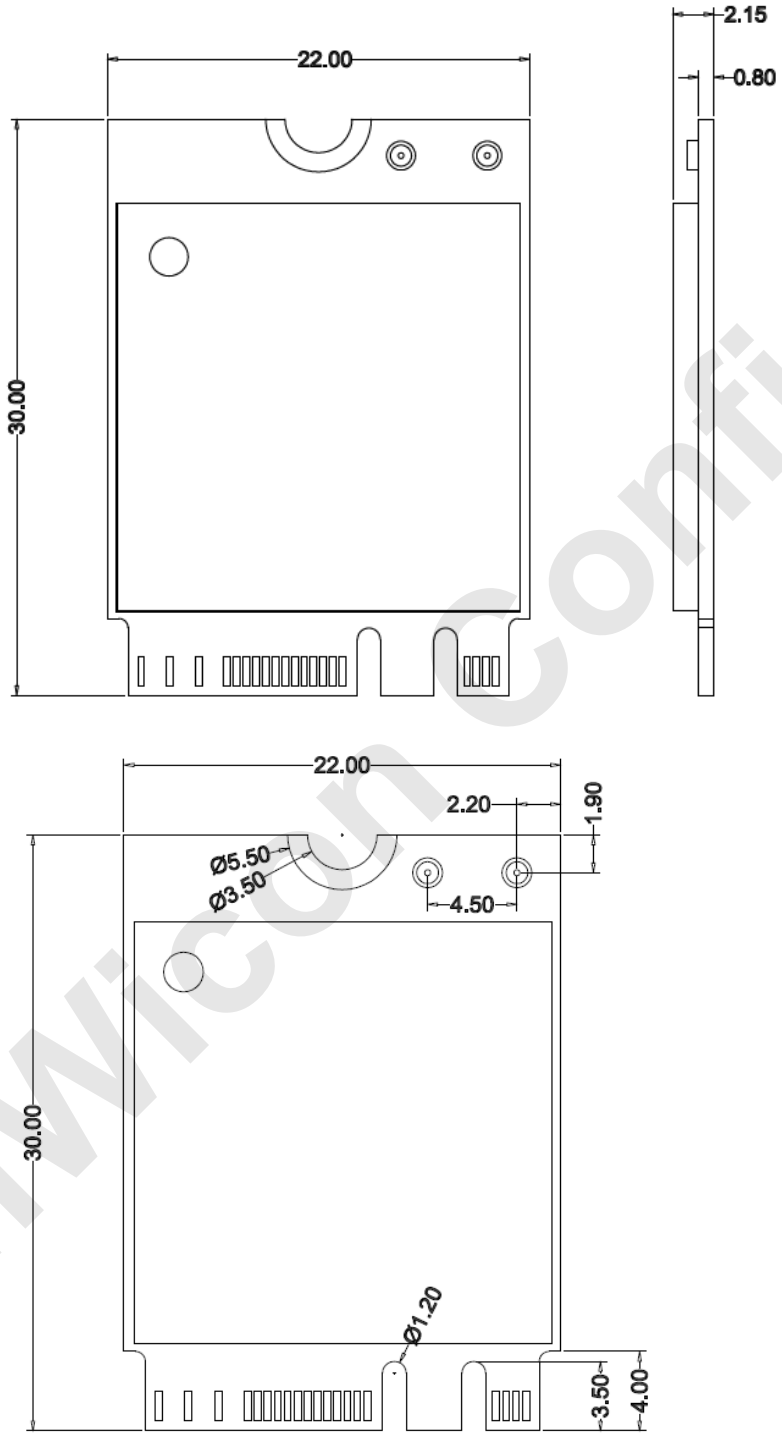
2.4GHz 802.11n				
Data Rate		**Tx ± 2dB**	**Tx ± 2dB(2TX)**	**Rx Sensitivity ± 2dB**
HT20	MCS 0	16dBm	19dBm	-92dBm
	MCS 7	16dBm	19dBm	-73dBm
HT40	MCS 0	16dBm	19dBm	-90dBm
	MCS 7	16dBm	19dBm	-70dBm

5GHz

5GHz 802.11an/ac				
Data Rate		**Tx ± 2dB**	**Tx ± 2dB(2TX)**	**Rx Sensitivity ± 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

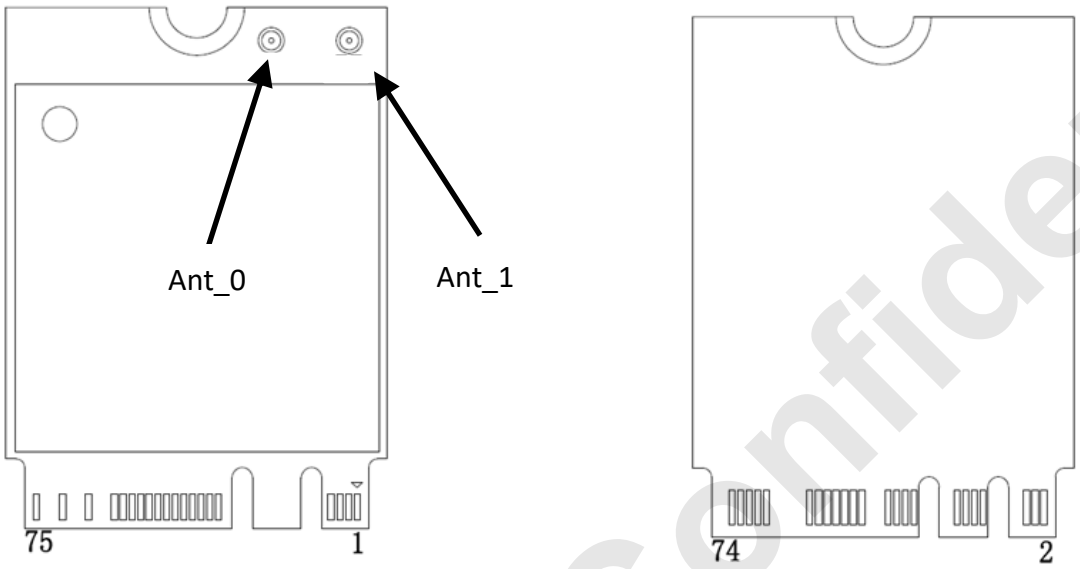


General tolerance: ±0.2mm

5.2 Dimension

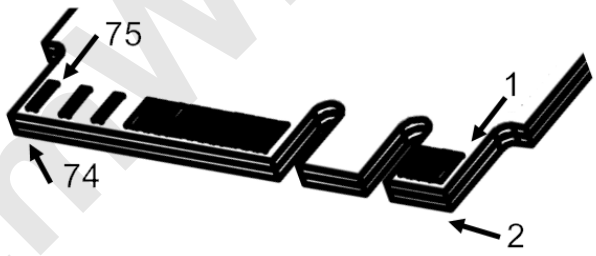
- M.2 2230 A+E Key
- Typical Dimension: (W)22.0mm x (L)30.0mm x (H)2.15mm

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	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	Module Key A		10	Module Key A	
13	Module Key A		12	Module Key A	
15	Module Key A		14	Module Key A	
17	NC	NC	16	LED_2#	BT_LED
19	NC	NC	18	GND	GND
21	NC	NC	20	UART WAKE	BT_WAKEUP_HOST
23	NC	NC	22	UART TX	NC
25	Module Key E		24	Module Key E	
27	Module Key E		26	Module Key E	
29	Module Key E		28	Module Key E	
31	Module Key E		30	Module Key E	
33	GND	GND	32	UART RX	NC
35	PERp0	WL_PCIE_RXP	34	UART RTS	NC
37	PERn0	WL_PCIE_RXN	36	UART CTS	NC
39	GND	GND	38	VENDOR DEFINED	HOST _WAKE_BT
41	PETp0	WL_PCIE_TXP	40	VENDOR DEFINED	NC
43	PETn0	WL_PCIE_TXN	42	VENDOR DEFINED	NC
45	GND	GND	44	COEX3(I/O)	NC
47	REFCLKp0	WL_PCIE_REFCLKP	46	COEX2(I/O)	NC
49	REFCLKn0	WL_PCIE_REFCLKN	48	COEX1(I/O)	NC
51	GND	GND	50	SUSCLK(32kHz)	SUSCLK
53	CLKREQ0#(I/O)	WL_PCIE_CLKREQ	52	PERST0#(I)	WL_PCIE_RST
55	PEWAKE0#(I/O)	WL_PCIE_WAKE	54	W_DISABLE2#(I)	BT_DISABLE
57	GND	GND	56	W_DISABLE1#(I)	WL_DISABLE
59	PERp1	NC	58	I2C DATA(I)	NC
61	PERn1	NC	60	I2C CLK(I)	NC
63	GND	GND	62	ALERT#(O)	NC
65	PETp1	NC	64	RESERVED	NC
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

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. This signal is used by the system to disable radio operation. When implemented, this signal requires a pull-up resistor on the card
BT_LED	O	Bluetooth LED
WL_LED	O	WLAN LED
BT_WAKEUP_HOST	O	Bluetooth device to wake up HOST
HOST _WAKE_BT	I	HOST to wake up BT

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/TELEC/100+ countries certifications (For more information please contact EmWicon)

9 Package

TBD

10 Ordering Information

10.1 Main Parts

Part Number	Description
WMX6219	WiFi 5 802.11ac 2x2 dual-band M.2 PCIe Module

10.2 Accessories

Part Number	Description
ATD6251	Dipole 2dBi 2.4GHz & 5GHz Antenna
ATD6551	Dipole 3dBi 2.4GHz & 5dBi 5GHz Antenna
AC42001	Cable MHF4 to SMA, 200mm