



WMX8402

**Wi-Fi 7 5-6GHz (Wide-Band)
Mini PCIe 4x4 Module**

Product Datasheet

Version: 0.1.1

2024/1/30



Release Note

Version	Date	Description	Editor
v0.1.0	2024/1/23	Initial draft	Eddie Lin
v0.1.1	2024/1/30	Add note for data rate limitation with PCIe 3.0 x1 of 8Gbps	Eddie Lin

EmWicon Confidential
EmWicon Preliminary

Contents

1	Overview	1
2	Feature	1
2.1	System	1
2.2	WLAN	1
3	System Specification.....	2
3.1	Block Diagram.....	2
3.2	Chip Solution	2
3.3	Protocol & Interface	2
4	WLAN Specification	2
4.1	WLAN Standard	2
4.2	Frequency Range	3
4.3	Band Width	3
4.4	Data Rate	3
4.5	Modulation.....	3
4.6	Security.....	3
4.7	Output Power & Sensitivity (TBD).....	4
5	Electrical Specification	5
5.1	Temperature	5
5.2	Humidity.....	5
5.3	Power Consumption	5
5.4	Operating Voltage.....	5
6	Pin Assignment.....	6
6.1	Module Pinout.....	6
6.2	Module Pin Define.....	6
6.3	Pin Description	7
7	Mechanical Specification.....	7
7.1	Module Outline Drawing (TBD)	7
7.2	Interface & Dimension.....	8
7.3	Antenna Connector	8
8	Product Appearance.....	8
8.1	Product Picture.....	8
8.2	Label Define.....	9
9	Software & Driver.....	9
9.1	Driver Support	9
9.2	Platform Support List.....	9

9.3	RF Tool	9
10	Certification	9
11	Package Information	10
12	Ordering Information	11
12.1	Main Parts	11
12.2	Accessories	11

EmWicon Confidential
EmWicon Preliminary

1 Overview

The WMX8402 is a Wi-Fi 7 PCIe module for enterprise-class applications. This module is built on the Qualcomm QCN9274 chip. It can operate as a single radio in 4x4 MIMO mode, the maximum bandwidth of each chain is 320 MHz

2 Feature

2.1 System

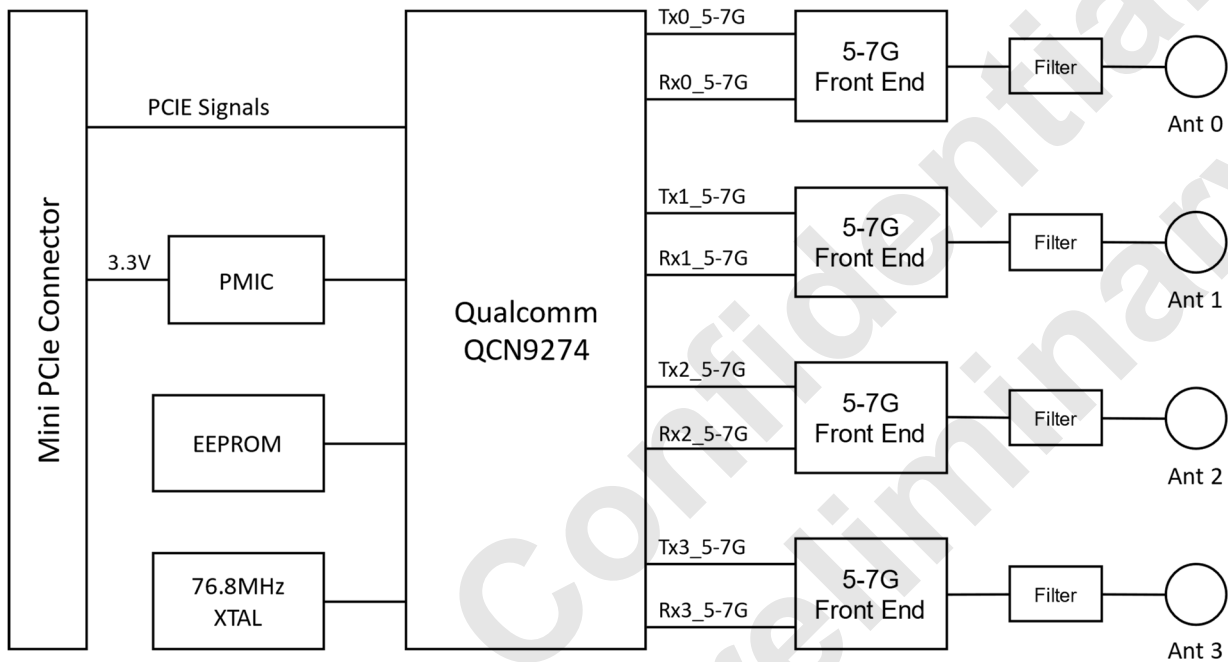
- Support PCIe Gen 3 (backward compatible)

2.2 WLAN

- 802.11a/b/g/n/ac/be support
- 4x4/320MHz 5.15-7.125 GHz
- Single radio up to 320 MHz bandwidth per chain
- OFDM for IEEE802.11a
- SU MIMO for IEEE802.11n/ac/ax/be
- SU MIMO beamformer and beamformee support for IEEE802.11ac/ax/be
- DL/UL MU-MIMO for IEEE802.11ax/be
- DL MU-MIMO for IEEE802.11ac
- DL/UL OFDMA (single radio operation)
- DL/UL OFDMA (dual radio operation, per radio)

3 System Specification

3.1 Block Diagram



3.2 Chip Solution

- Qualcomm QCN9274

3.3 Protocol & Interface

- Support PCIe Gen 3 (backward compatible)
- Antenna Port: U.FL(Compatible) connector x4 for 5-7GHz 4T4R

4 WLAN Specification

4.1 WLAN Standard

- IEEE 802.11a/n/ac/ax/be
- IEEE 802.11d/e/h/i/j/k/r/u/v/w
- IEEE 802.11ba

4.2 Frequency Range

- Support 5-7GHz frequency range: 5180MHz - 7125MHz

4.3 Band Width

- 20, 40, 80, 160 or 320-80 MHz in 5 GHz
- 20, 40, 80, 160, 320-80 or 320 MHz in 6-7.125 GHz

4.4 Data Rate

- 11,530^[1] Mbps for 4 stream/320 MHz
- 8,647^[1] Mbps for 4 stream /240 MHz
- 5,765 Mbps for 4 stream /160 MHz
- 2,882 Mbps for 4 stream /80 MHz
- 1,376 Mbps for 4 stream/40 MHz
- 688 Mbps for 4 stream/20 MHz

Note:

*1: WMX8402 interface PCIe 3.0 x1 only, so the maximum speed limitation with PCIe 3.0 x1 of 8Gbps.

4.5 Modulation

- 802.11n:
BPSK, QPSK, 16-QAM, 64-QAM
- 802.11ac:
BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
- 802.11ax:
BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM
- 802.11be:
BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM

4.6 Security

- AES-CCMP at 128/256 bits
- AES-GCMP at 128/256 bits
- WEP, TKIP hardware encryption
- WAPI 1.0 and WAPI 2.0 hardware encryption
- WPA/WPA2-Personal/WPA2-Enterprise and WPA3 personal
- Federal Information Processing System (FIPS) Electronic Code Book (ECB)

4.7 Output Power & Sensitivity (TBD)

5GHz

5GHz 802.11be(dBm)				
Data Rate		Tx \pm 2dB	Tx \pm 2dB(2TX)	Rx Sensitivity \pm 2dB
ETH20	MCS 0	19.0	22.0	-96.0
	MCS 7	15.0	18.0	-77.0
	MCS 11	13.0	16.0	-64.0
	MCS 13	12.0	15.0	-58.0
ETH40	MCS 0	19.0	22.0	-92.0
	MCS 7	15.0	18.0	-74.0
	MCS 11	13.0	16.0	-62.0
	MCS 13	12.0	15.0	-56.0
ETH80	MCS 0	19.0	22.0	-90.0
	MCS 7	15.0	18.0	-70.0
	MCS 11	13.0	16.0	-58.0
	MCS 13	11.0	14.0	-52.0
ETH160	MCS 0	19.0	22.0	-87.0
	MCS 7	15.0	18.0	-66.0
	MCS 11	12.0	15.0	-54.0
	MCS 13	11.0	14.0	-50.0

6GHz

6GHz 802.11be(dBm)				
Data Rate		Tx \pm 2dB	Tx \pm 2dB(2TX)	Rx Sensitivity \pm 2dB
ETH20	MCS 0	19.0	22.0	-93.0
	MCS 7	14.0	17.0	-75.0
	MCS 11	12.0	15.0	-63.0
	MCS 13	11.0	14.0	-57.0
ETH40	MCS 0	19.0	22.0	-91.0
	MCS 7	14.0	17.0	-71.0
	MCS 11	12.0	15.0	-60.0
	MCS 13	11.0	14.0	-55.0
ETH80	MCS 0	19.0	22.0	-88.0
	MCS 7	14.0	17.0	-68.0
	MCS 11	12.0	15.0	-57.0
	MCS 13	11.0	14.0	-52.0

ETH160	MCS 0	19.0	22.0	-85.0
	MCS 7	14.0	17.0	-66.0
	MCS 11	12.0	15.0	-54.0
	MCS 13	11.0	14.0	-49.0
ETH320	MCS 0	19.0	22.0	-83.0
	MCS 7	14.0	17.0	-62.0
	MCS 11	12.0	15.0	-51.0
	MCS 13	11.0	14.0	-46.0

5 Electrical Specification

5.1 Temperature

- Operating Temperature:
 C-Temp (WMX8401): -20°C to +85°C
 I-Temp (WMX8401-I): -40°C to +85°C (TBD)
- Storage Temperature: -40°C to +105°C

5.2 Humidity

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

5.3 Power Consumption

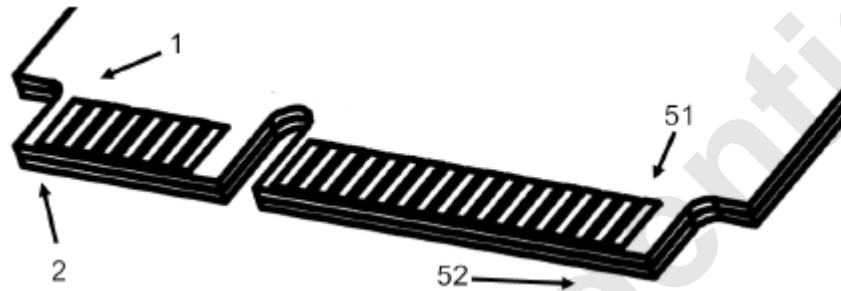
- Max power consumption 9W (25°C) (TBD)

5.4 Operating Voltage

- Mini PCIe 3.3V

6 Pin Assignment

6.1 Module Pinout



6.2 Module Pin Define

PIN	Pin Name	Design Status	PIN	Pin Name	Design Status
1	WAKE#	PCIE_WAKE_N	2	+3.3Vaux	3V3
3	COEX1	NC	4	GND	GND
5	COEX2	NC	6	+1.5V	NC
7	CLKREQ#	PCIE_CLKREQ_N	8	UIM_PWR	NC
9	GND	GND	10	UIM_DATA	NC
11	REFCLK-	PCIE_REFCLK_N	12	UIM_CLK	NC
13	REFCLK+	PCIE_REFCLK_P	14	UIM_RESET	NC
15	GND	GND	16	UIM_VPP	NC
17	Reserved	NC	18	GND	GND
19	Reserved	NC	20	W_DISABLE#	NC
21	GND	GND	22	PERST#	PCIE_PERST
23	PETn0	PCIE_TX_N	24	+3.3Vaux	3V3
25	PETp0	PCIE_TX_P	26	GND	GND
27	GND	GND	28	+1.5V	NC
29	GND	GND	30	SMB_CLK	NC
31	PERn0	PCIE_RX_N	32	SMB_DATA	NC
33	PERp0	PCIE_RX_P	34	GND	GND
35	GND	GND	36	USB_D-	NC
37	Reserved	GND	38	USB_D+	NC
39	+3.3Vaux	3V3	40	GND	GND
41	+3.3Vaux	3V3	42	LED_WWAN	PCIE_LED1
43	GND	GND	44	LED_WLAN	PCIE_LED0

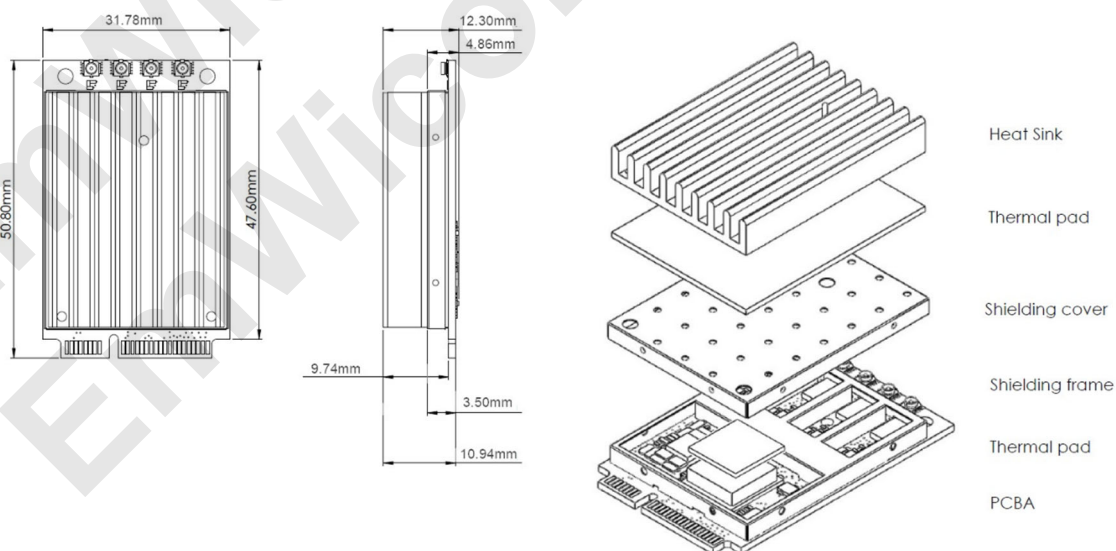
45	RESERVED	NC	46	LED_WPAN	NC
47	RESERVED	NC	48	+1.5V	NC
49	RESERVED	NC	50	GND	GND
51	RESERVED	NC	52	+3.3Vaux	3V3

6.3 Pin Description

Design Name	I/O	Description
PCIE_WAKE_N	B	This WLAN PCIe wake-up open-drain signal
PCIE_CLKREQ_N	B	This WLAN PCIe clock
PCIE_REFCLK_N	I	WLAN PCIe reference clock input differential signals
PCIE_REFCLK_P	I	
PCIE_PERST	I	WLAN PCIe reset signal driven from host (active low)
PCIE_TX_N	O	WLAN PCIe L0 TX output differential signals
PCIE_TX_P	O	
PCIE_RX_N	I	WLAN PCIe L0 RX input differential signals
PCIE_RX_P	I	
PCIE_LED0	O	LED interface (define by driver)
PCIE_LED1	O	LED interface (define by driver)

7 Mechanical Specification

7.1 Module Outline Drawing (TBD)

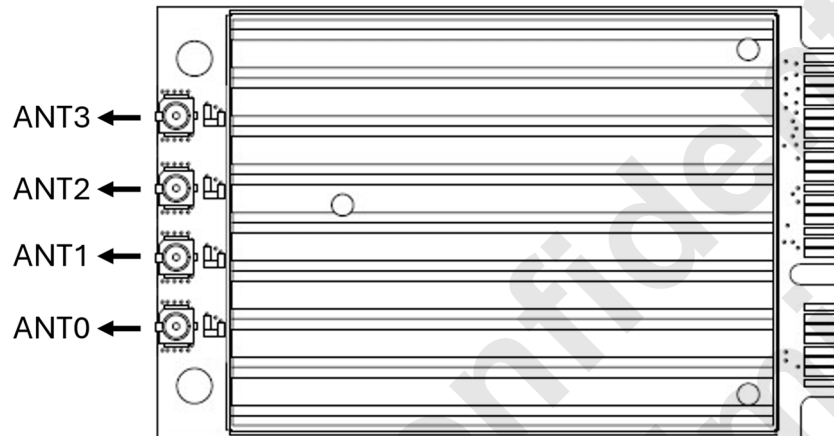


General tolerance: $\pm 0.2\text{mm}$

7.2 Interface & Dimension

- Mini PCIe full size
- Typical Dimension (TBD): (W)31.78mm x (L)50.80mm x (H)12.30mm

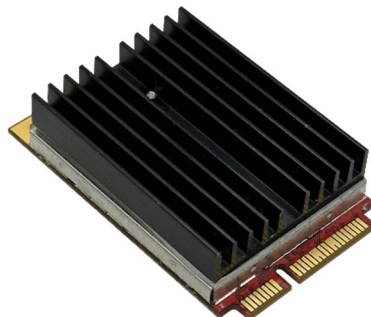
7.3 Antenna Connector



Pin Name	Description
ANT0	RF Antenna 0 for Wi-Fi 5-7GHz
ANT1	RF Antenna 1 for Wi-Fi 5-7GHz
ANT2	RF Antenna 2 for Wi-Fi 5-7GHz
ANT3	RF Antenna 3 for Wi-Fi 5-7GHz

8 Product Appearance

8.1 Product Picture



8.2 Label Define

Model: WMX8402 MAC: 00156128BFE1 SN: 01WMX8402000065	
--	---

Item	Description
Size	30x5mm
Model	Product Model Name
MAC	Wi-Fi Mac Address
SN	Product Serial Number

9 Software & Driver

9.1 Driver Support

- Qualcomm platform with QSDK
- Open driver ATH12K

9.2 Platform Support List

- IPQ9574 (Verified)
- Other...(TBD)

9.3 RF Tool

- RF test tool consultant service available

10 Certification

CE/FCC/IC(TBD)

11 Package Information

- One module per one static bag



- One static bags in one lattice and 100pcs per inner box



- 5 inner boxes per 1 carton and 500pcs per carton



12 Ordering Information

12.1 Main Parts

Part Number	Description
WMX8402	Wi-Fi 7 2.4GHz + 5GHz (DBS) Mini PCIe 2x2 Module, (C-Temp)
WMX8402-I	Wi-Fi 7 2.4GHz + 5GHz (DBS) Mini PCIe 2x2 Module, (I-Temp) (TBD)

12.2 Accessories

Part Number	Description
ATD7351	Dipole Antenna 3dBi 2.4GHz/5GHz
AC11501	Cable IPEX to SMA, 150mm