

## WiFi 6 (802.11ax) 4x4 MU-MIMO OFDMA 5GHz Single Band Wireless Module

**Model: PN02.1**



### KEY FEATURES

- Qualcomm Atheros QCN9024/9074
- 5GHz, 4x4 MU-MIMO OFDMA Technology, up to 4804Mbps physical data rate
- Single Band 5GHz 4x4 WiFi 6 (802.11ax)
- M.2 E Key interface with PCIe 3.0
- 4 spatial streams (4SS)
- Supports Dynamic Frequency Selection (DFS)

## Specifications

Chipset	Qualcomm Atheros QCN9024/9074 'PINE' Series
System Memory	2Mbit serial I <sup>2</sup> C bus EEPROM
Reference Design	Qualcomm Atheros PN02.1
Host Interface	M.2 E Key interface with PCIe 3.0
Operating Voltage	5V
Power Consumption	16W
Wireless	5GHz 802.11a/n/ac/ax, max 24dBm per chain 4x U.FL Connectors
Frequency Range	5.15~5.95GHz
Modulation Techniques	OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
Channel Spectrum Widths for WLAN	Supports 20/40/80/160MHz at 5GHz
Operating Systems	OpenWRT
Certification	REACH and RoHS Compliance
Environmental Temperature	Operating: -20°C to 70°C, Storage: -40°C to 90°C
Environmental Humidity, Non-Condensing	Operating: 5% to 95% , Storage: Max. 90%
Dimensions (W x H x D) in mm	57 x 60 x 6.3

\*Configurations are subject to change without notifications.

## RF Performance Table for 5GHz

	Data Rate	TX Power (per chain)	TX Power (4 chains)	Tolerance
5GHz 802.11a	6Mbps	24dBm	30dBm	±2dB
	9Mbps	24dBm	30dBm	±2dB
	12Mbps	24dBm	30dBm	±2dB
	18Mbps	24dBm	30dBm	±2dB
	24Mbps	24dBm	30dBm	±2dB
	36Mbps	23dBm	29dBm	±2dB
	48Mbps	23dBm	29dBm	±2dB
	54Mbps	23dBm	29dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	24dBm	30dBm	±2dB
	MCS 1	24dBm	30dBm	±2dB
	MCS 2	24dBm	30dBm	±2dB
	MCS 3	24dBm	30dBm	±2dB
	MCS 4	23dBm	29dBm	±2dB
	MCS 5	23dBm	29dBm	±2dB
	MCS 6	23dBm	29dBm	±2dB
	MCS 7	23dBm	29dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 8	20dBm	26dBm	±2dB
	MCS 0	24dBm	30dBm	±2dB
	MCS 1	24dBm	30dBm	±2dB
	MCS 2	24dBm	30dBm	±2dB
	MCS 3	24dBm	30dBm	±2dB
	MCS 4	23dBm	29dBm	±2dB
	MCS 5	23dBm	29dBm	±2dB
	MCS 6	23dBm	29dBm	±2dB
	MCS 7	23dBm	29dBm	±2dB
	MCS 8	20dBm	26dBm	±2dB
5GHz 802.11n/ac VHT80	MCS 9	20dBm	26dBm	±2dB
	MCS 0	23dBm	29dBm	±2dB
	MCS 1	23dBm	29dBm	±2dB
	MCS 2	23dBm	29dBm	±2dB
	MCS 3	23dBm	29dBm	±2dB
	MCS 4	22dBm	28dBm	±2dB
	MCS 5	22dBm	28dBm	±2dB
	MCS 6	22dBm	28dBm	±2dB
	MCS 7	22dBm	28dBm	±2dB
	MCS 8	20dBm	26dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11a	6Mbps	-95dBm	±2dB
	9Mbps	-94dBm	±2dB
	12Mbps	-92dBm	±2dB
	18Mbps	-90dBm	±2dB
	24Mbps	-88dBm	±2dB
	36Mbps	-86dBm	±2dB
	48Mbps	-83dBm	±2dB
	54Mbps	-80dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	-95dBm	±2dB
	MCS 1	-94dBm	±2dB
	MCS 2	-92dBm	±2dB
	MCS 3	-89dBm	±2dB
	MCS 4	-86dBm	±2dB
	MCS 5	-84dBm	±2dB
	MCS 6	-82dBm	±2dB
	MCS 7	-80dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 8	-77dBm	±2dB
	MCS 0	-93dBm	±2dB
	MCS 1	-91dBm	±2dB
	MCS 2	-89dBm	±2dB
	MCS 3	-86dBm	±2dB
	MCS 4	-84dBm	±2dB
	MCS 5	-82dBm	±2dB
	MCS 6	-80dBm	±2dB
	MCS 7	-78dBm	±2dB
	MCS 8	-75dBm	±2dB
5GHz 802.11n/ac VHT80	MCS 9	-72dBm	±2dB
	MCS 0	-91dBm	±2dB
	MCS 1	-89dBm	±2dB
	MCS 2	-86dBm	±2dB
	MCS 3	-83dBm	±2dB
	MCS 4	-80dBm	±2dB
	MCS 5	-78dBm	±2dB
	MCS 6	-76dBm	±2dB
	MCS 7	-73dBm	±2dB
	MCS 8	-70dBm	±2dB

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	Data Rate	TX Power (per chain)	TX Power (4 chains)	Tolerance
5GHz 802.11ax HE20	MCS 0	24dBm	30dBm	±2dB
	MCS 1	24dBm	30dBm	±2dB
	MCS 2	24dBm	30dBm	±2dB
	MCS 3	24dBm	30dBm	±2dB
	MCS 4	23dBm	29dBm	±2dB
	MCS 5	23dBm	29dBm	±2dB
	MCS 6	23dBm	29dBm	±2dB
	MCS 7	23dBm	29dBm	±2dB
	MCS 8	20dBm	26dBm	±2dB
	MCS 9	20dBm	26dBm	±2dB
	MCS 10	18dBm	24dBm	±2dB
	MCS 11	18dBm	24dBm	±2dB
5GHz 802.11ax HE40	MCS 0	24dBm	30dBm	±2dB
	MCS 1	24dBm	30dBm	±2dB
	MCS 2	24dBm	30dBm	±2dB
	MCS 3	24dBm	30dBm	±2dB
	MCS 4	23dBm	29dBm	±2dB
	MCS 5	23dBm	29dBm	±2dB
	MCS 6	23dBm	29dBm	±2dB
	MCS 7	23dBm	29dBm	±2dB
	MCS 8	20dBm	26dBm	±2dB
	MCS 9	20dBm	26dBm	±2dB
	MCS 10	18dBm	24dBm	±2dB
	MCS 11	18dBm	24dBm	±2dB
5GHz 802.11ax HE80	MCS 0	23dBm	29dBm	±2dB
	MCS 1	23dBm	29dBm	±2dB
	MCS 2	23dBm	29dBm	±2dB
	MCS 3	23dBm	29dBm	±2dB
	MCS 4	22dBm	28dBm	±2dB
	MCS 5	22dBm	28dBm	±2dB
	MCS 6	22dBm	28dBm	±2dB
	MCS 7	22dBm	28dBm	±2dB
	MCS 8	20dBm	26dBm	±2dB
	MCS 9	20dBm	26dBm	±2dB
	MCS 10	18dBm	24dBm	±2dB
	MCS 11	18dBm	24dBm	±2dB

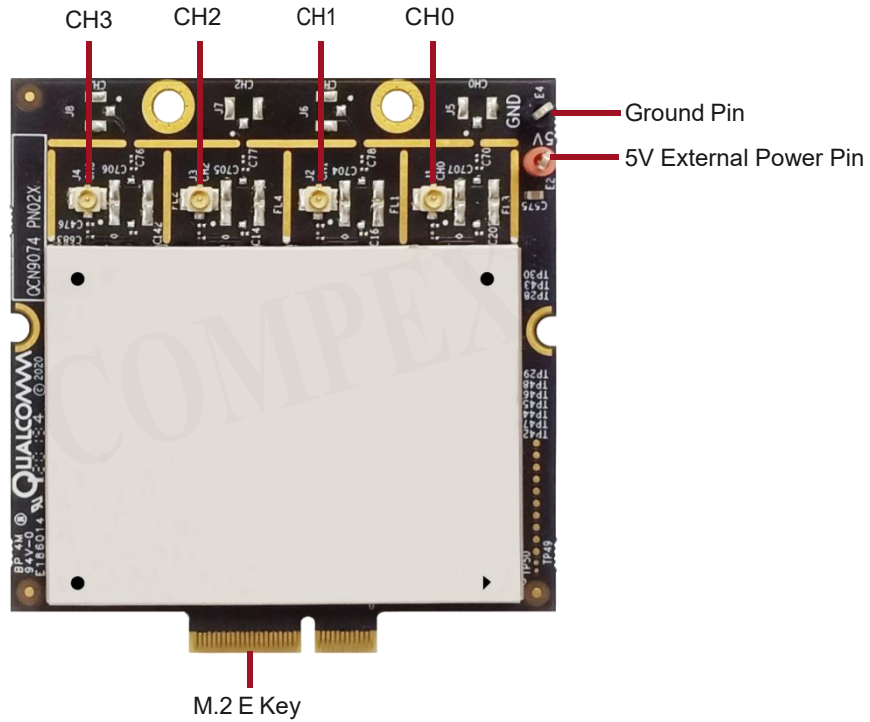
	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11ax HE20	MCS 0	-95dBm	±2dB
	MCS 1	-93dBm	±2dB
	MCS 2	-90dBm	±2dB
	MCS 3	-88dBm	±2dB
	MCS 4	-86dBm	±2dB
	MCS 5	-83dBm	±2dB
	MCS 6	-80dBm	±2dB
	MCS 7	-78dBm	±2dB
	MCS 8	-75dBm	±2dB
	MCS 9	-73dBm	±2dB
	MCS 10	-70dBm	±2dB
	MCS 11	-68dBm	±2dB
5GHz 802.11ax HE40	MCS 0	-93dBm	±2dB
	MCS 1	-91dBm	±2dB
	MCS 2	-89dBm	±2dB
	MCS 3	-87dBm	±2dB
	MCS 4	-84dBm	±2dB
	MCS 5	-82dBm	±2dB
	MCS 6	-80dBm	±2dB
	MCS 7	-77dBm	±2dB
	MCS 8	-75dBm	±2dB
	MCS 9	-72dBm	±2dB
	MCS 10	-69dBm	±2dB
	MCS 11	-66dBm	±2dB
5GHz 802.11ax HE80	MCS 0	-89dBm	±2dB
	MCS 1	-87dBm	±2dB
	MCS 2	-85dBm	±2dB
	MCS 3	-83dBm	±2dB
	MCS 4	-80dBm	±2dB
	MCS 5	-78dBm	±2dB
	MCS 6	-75dBm	±2dB
	MCS 7	-73dBm	±2dB
	MCS 8	-70dBm	±2dB
	MCS 9	-68dBm	±2dB
	MCS 10	-65dBm	±2dB
	MCS 11	-62dBm	±2dB

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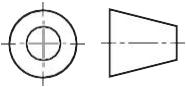
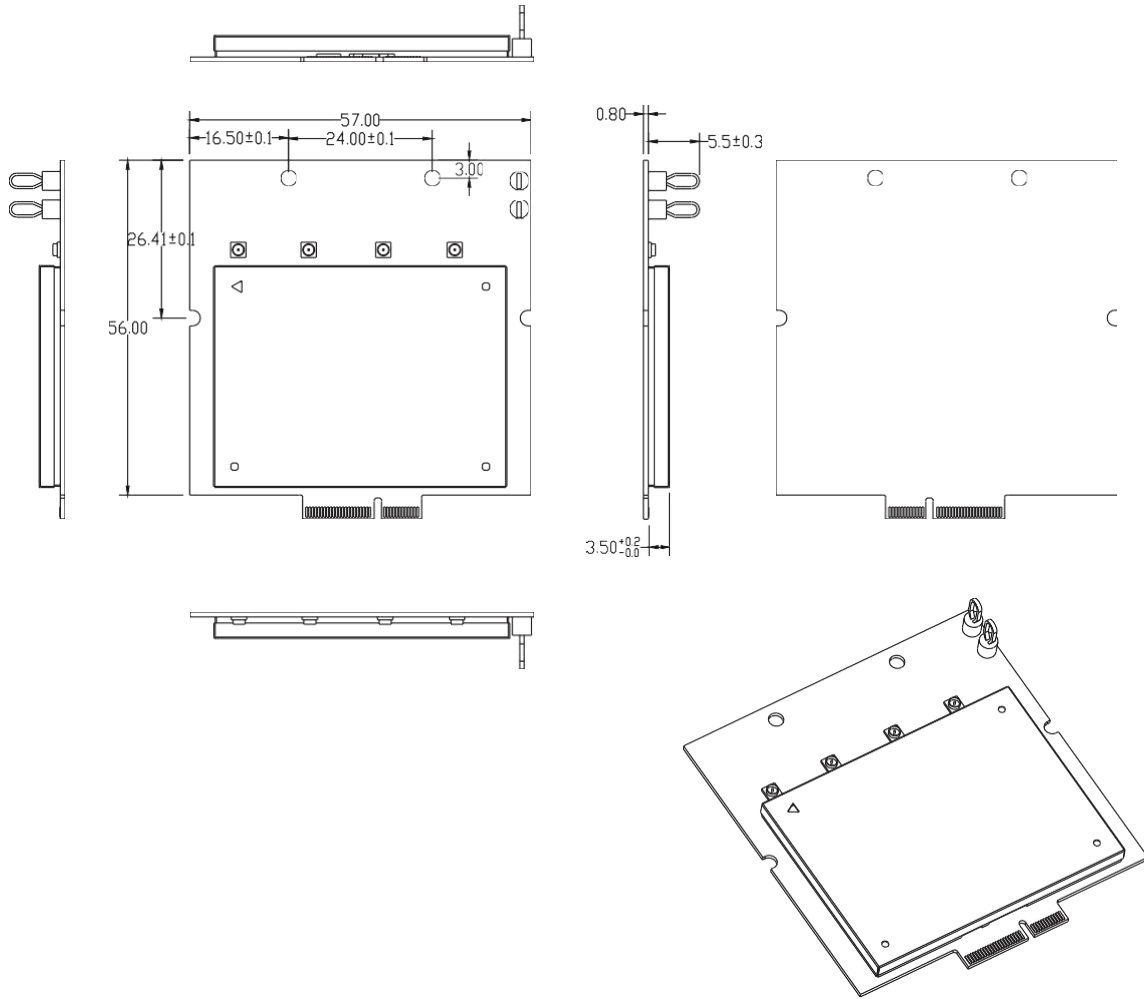
	Data Rate	TX Power (per chain)	TX Power (4 chains)	Tolerance
5GHz 802.11ax HE160	MCS 0	21dBm	27dBm	±2dB
	MCS 1	21dBm	27dBm	±2dB
	MCS 2	21dBm	27dBm	±2dB
	MCS 3	21dBm	27dBm	±2dB
	MCS 4	21dBm	27dBm	±2dB
	MCS 5	21dBm	27dBm	±2dB
	MCS 6	21dBm	27dBm	±2dB
	MCS 7	21dBm	27dBm	±2dB
	MCS 8	18dBm	24dBm	±2dB
	MCS 9	18dBm	24dBm	±2dB
	MCS 10	16dBm	22dBm	±2dB
	MCS 11	16dBm	22dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11ax HE160	MCS 0	-87dBm	±2dB
	MCS 1	-85dBm	±2dB
	MCS 2	-83dBm	±2dB
	MCS 3	-81dBm	±2dB
	MCS 4	-78dBm	±2dB
	MCS 5	-76dBm	±2dB
	MCS 6	-74dBm	±2dB
	MCS 7	-71dBm	±2dB
	MCS 8	-69dBm	±2dB
	MCS 9	-66dBm	±2dB
	MCS 10	-63dBm	±2dB
	MCS 11	-60dBm	±2dB

## Component Map



## Mechanical Dimensions



All dimensions are in mm.

Item Code	Model	Description
RA.PN02.1 8A00PML-TE	PN02.1	4x4 802.11a/n/ac/ax support 5GHz M.2 Module