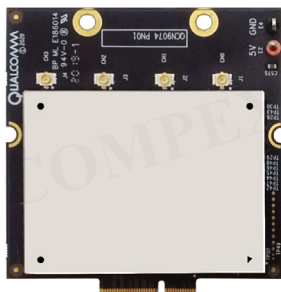


## WiFi 6 (802.11ax) 4x4 MU-MIMO OFDMA 2.4GHz Single Band Wireless Module

**Model: PN01.1**



### KEY FEATURES

- Qualcomm Atheros QCN9024/9074
- 2.4GHz, 4x4 MU-MIMO OFDMA Technology, up to 1376.4Mbps physical data rate
- Single Band 2.4GHz 4x4 WiFi 6 (802.11ax)
- M.2 E Key interface with PCIe 3.0
- 4 spatial streams (4SS)

## Specifications

|                                        |                                                                              |
|----------------------------------------|------------------------------------------------------------------------------|
| Chipset                                | Qualcomm Atheros QCN9024/9074 'PINE' Series                                  |
| System Memory                          | 2Mbit serial I <sup>2</sup> C bus EEPROM                                     |
| Reference Design                       | Qualcomm Atheros PN01.1                                                      |
| Host Interface                         | M.2 E Key interface with PCIe 3.0                                            |
| Operating Voltage                      | 5V                                                                           |
| Power Consumption                      | 15W                                                                          |
| Wireless                               | 2.4GHz 802.11b/g/n/ax, max 24dBm per chain<br>4x U.FL Connectors             |
| Frequency Range                        | 2.412~2.472GHz                                                               |
| Modulation Techniques                  | OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM |
| Channel Spectrum Widths for WLAN       | Supports 20/40MHz at 2.4GHz                                                  |
| 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 2.4GHz

|                            | Data Rate | TX Power<br>(per chain) | TX Power<br>(4 chains) | Tolerance |
|----------------------------|-----------|-------------------------|------------------------|-----------|
| 2.4GHz<br>802.11b          | 1Mbps     | 24dBm                   | 30dBm                  | ±2dB      |
|                            | 2Mbps     | 24dBm                   | 30dBm                  | ±2dB      |
|                            | 5.5Mbps   | 24dBm                   | 30dBm                  | ±2dB      |
|                            | 11Mbps    | 24dBm                   | 30dBm                  | ±2dB      |
| 2.4GHz<br>802.11g          | 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      |
| 2.4GHz<br>802.11n<br>HT20  | 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      |
| 2.4GHz<br>802.11n<br>HT40  | 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      |
| 2.4GHz<br>802.11ax<br>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     | 22dBm                   | 28dBm                  | ±2dB      |
|                            | MCS 9     | 22dBm                   | 28dBm                  | ±2dB      |
|                            | MCS 10    | 21dBm                   | 27dBm                  | ±2dB      |
|                            | MCS 11    | 21dBm                   | 27dBm                  | ±2dB      |
|                            | MCS 12    | 12dBm                   | 18dBm                  | ±2dB      |
|                            | MCS 13    | 12dBm                   | 18dBm                  | ±2dB      |

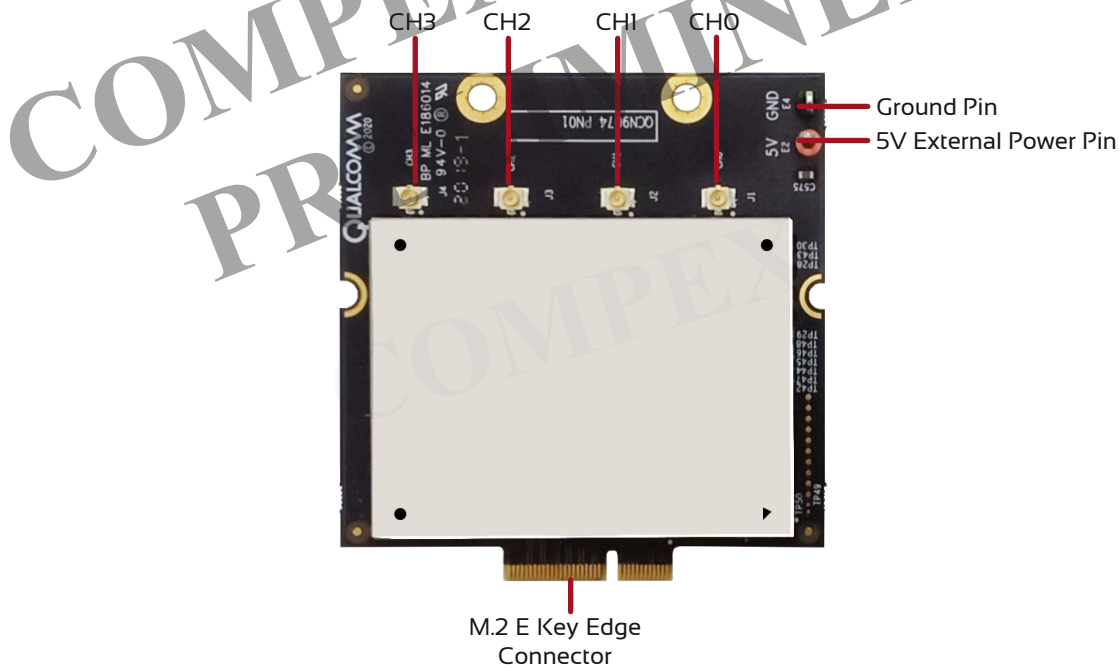
|                            | Data Rate | RX Specifications<br>Sensitivity | Tolerance |
|----------------------------|-----------|----------------------------------|-----------|
| 2.4GHz<br>802.11b          | 1Mbps     | TBD                              | ±2dB      |
|                            | 2Mbps     | TBD                              | ±2dB      |
|                            | 5.5Mbps   | TBD                              | ±2dB      |
|                            | 11Mbps    | TBD                              | ±2dB      |
| 2.4GHz<br>802.11g          | 6Mbps     | TBD                              | ±2dB      |
|                            | 9Mbps     | TBD                              | ±2dB      |
|                            | 12Mbps    | TBD                              | ±2dB      |
|                            | 18Mbps    | TBD                              | ±2dB      |
|                            | 24Mbps    | TBD                              | ±2dB      |
|                            | 36Mbps    | TBD                              | ±2dB      |
|                            | 48Mbps    | TBD                              | ±2dB      |
|                            | 54Mbps    | TBD                              | ±2dB      |
| 2.4GHz<br>802.11n<br>HT20  | MCS 0     | TBD                              | ±2dB      |
|                            | MCS 1     | TBD                              | ±2dB      |
|                            | MCS 2     | TBD                              | ±2dB      |
|                            | MCS 3     | TBD                              | ±2dB      |
|                            | MCS 4     | TBD                              | ±2dB      |
|                            | MCS 5     | TBD                              | ±2dB      |
|                            | MCS 6     | TBD                              | ±2dB      |
|                            | MCS 7     | TBD                              | ±2dB      |
| 2.4GHz<br>802.11n<br>HT40  | MCS 0     | TBD                              | ±2dB      |
|                            | MCS 1     | TBD                              | ±2dB      |
|                            | MCS 2     | TBD                              | ±2dB      |
|                            | MCS 3     | TBD                              | ±2dB      |
|                            | MCS 4     | TBD                              | ±2dB      |
|                            | MCS 5     | TBD                              | ±2dB      |
|                            | MCS 6     | TBD                              | ±2dB      |
|                            | MCS 7     | TBD                              | ±2dB      |
| 2.4GHz<br>802.11ax<br>HE20 | MCS 0     | TBD                              | ±2dB      |
|                            | MCS 1     | TBD                              | ±2dB      |
|                            | MCS 2     | TBD                              | ±2dB      |
|                            | MCS 3     | TBD                              | ±2dB      |
|                            | MCS 4     | TBD                              | ±2dB      |
|                            | MCS 5     | TBD                              | ±2dB      |
|                            | MCS 6     | TBD                              | ±2dB      |
|                            | MCS 7     | TBD                              | ±2dB      |
|                            | MCS 8     | TBD                              | ±2dB      |
|                            | MCS 9     | TBD                              | ±2dB      |
|                            | MCS 10    | TBD                              | ±2dB      |
|                            | MCS 11    | TBD                              | ±2dB      |
|                            | MCS 12    | TBD                              | ±2dB      |
|                            | MCS 13    | TBD                              | ±2dB      |

## RF Performance Table for 2.4GHz

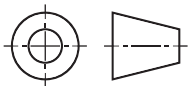
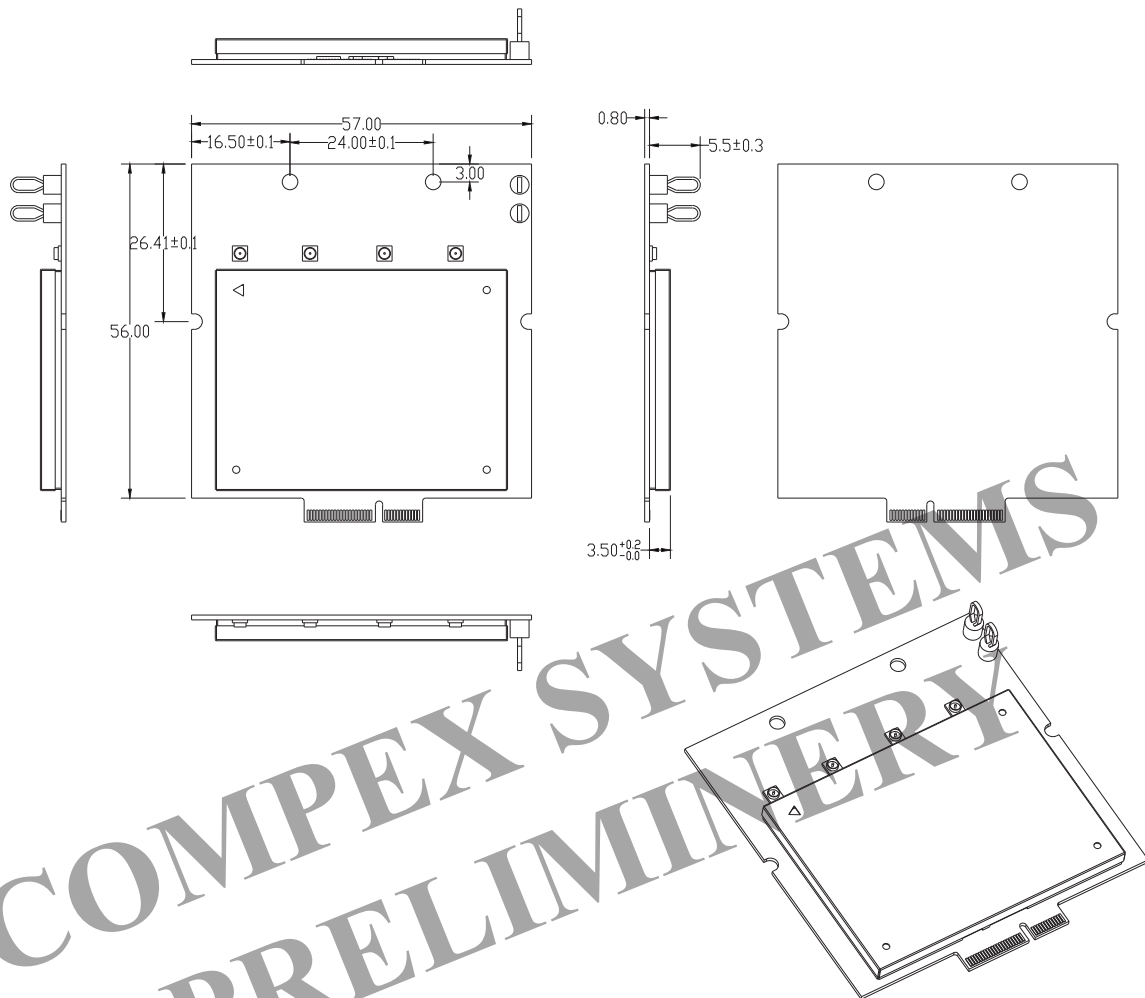
|                            | Data Rate | TX Power (per chain) | TX Power (4 chains) | Tolerance |
|----------------------------|-----------|----------------------|---------------------|-----------|
| 2.4GHz<br>802.11ax<br>HE40 | MCS 0     | 24dBm                | 30dBm               | ±2dB      |
|                            | 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     | 22dBm                | 28dBm               | ±2dB      |
|                            | MCS 9     | 22dBm                | 28dBm               | ±2dB      |
|                            | MCS 10    | 21dBm                | 27dBm               | ±2dB      |
|                            | MCS 11    | 21dBm                | 27dBm               | ±2dB      |
|                            | MCS 12    | 12dBm                | 18dBm               | ±2dB      |
|                            | MCS 13    | 12dBm                | 18dBm               | ±2dB      |

|                            | Data Rate | RX Specifications Sensitivity | Tolerance |
|----------------------------|-----------|-------------------------------|-----------|
| 2.4GHz<br>802.11ax<br>HE40 | MCS 0     | TBD                           | ±2dB      |
|                            | MCS 1     | TBD                           | ±2dB      |
|                            | MCS 2     | TBD                           | ±2dB      |
|                            | MCS 3     | TBD                           | ±2dB      |
|                            | MCS 4     | TBD                           | ±2dB      |
|                            | MCS 5     | TBD                           | ±2dB      |
|                            | MCS 6     | TBD                           | ±2dB      |
|                            | MCS 7     | TBD                           | ±2dB      |
|                            | MCS 8     | TBD                           | ±2dB      |
|                            | MCS 9     | TBD                           | ±2dB      |
|                            | MCS 10    | TBD                           | ±2dB      |
|                            | MCS 11    | TBD                           | ±2dB      |
|                            | MCS 12    | TBD                           | ±2dB      |
|                            | MCS 13    | TBD                           | ±2dB      |

## Component Map



## Mechanical Dimensions



All dimensions are in mm.

## Ordering Configuration

| Item Code            | Model  | Description                                  |
|----------------------|--------|----------------------------------------------|
| RA.PN01.1 8A00PML-TE | PN01.1 | 4x4 802.11b/g/n/ax support 2.4GHz M.2 Module |