

Qualcomm's QCA6391 2.4GHz + 5GHz DBS Dual Band Dual Concurrent 802.11ax with Bluetooth Milan Designed for WLAN/BT and Low-Energy Communications

Model: WLT639



KEY FEATURES

- Qualcomm Atheros QCA6391
- 2.4GHz, 2x2 MU-MIMO OFDMA Technology, up to 573.6Mbps physical data rate
- 5GHz, 2x2 MU-MIMO OFDMA Technology, up to 1201Mbps physical data rate
- Dual Band Dual Concurrent 2.4/5GHz 2x2 WiFi 6 (802.11ax)
- M.2 E Key interface with PCIe 2.0
- 2 spatial streams (4SS)
- Enables seamless integration of WLAN/Bluetooth and low energy technology.
- Provides a highly integrated System-on-Chip (SoC) for 802.11ax WiFi, Bluetooth (BT) Milan.
- Supports Bluetooth 5.1 + ANT+ IC and Bluetooth Milan ready and backward compatibility with BT 1.2 and BT 2.X + enhanced data rate.
- Supports BT-WLAN coexistence and 5G/ISM coexistence

Specifications

| | |
|----------------------------------|--|
| Chipset | Qualcomm Atheros QCA6391 'Hastings' Series |
| Reference Design | Qualcomm Atheros HST04 |
| Host Interface | M.2 E Key interface with PCIe 2.0 |
| Bluetooth Host Interface | HCI UART Interface |
| Operating Voltage | 3.3V DC power supply and I/O supply of 1.8V or 3.3V |
| Power Consumption | TX: 798.12 mA, RX: 196.8 mA |
| Wireless | 2.4GHz 802.11b/g/n/ax, max 16dBm per chain 5GHz 802.11ba/n/ac/ax, max 15dBm per chain 2x MHF4 Connectors Support WiFi/ Bluetooth coexistence |
| Frequency Range | 2.412~2.483GHz, 5.150~5.850GHz, *Subject to local regulations |
| Modulation Techniques | 802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11a/g: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11n: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) 802.11ax: OFDMA (DPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM) |
| Channel Spectrum Widths for WLAN | Supports 20/40MHz at 2.4GHz, Supports 20/40/80MHz at 5GHz |
| Standards for Bluetooth | Bluetooth 5.1 |
| Data Rates for Bluetooth | 2Mbps |
| Driver Support | Linux, Windows 10 |

*Configurations are subject to change without notifications.

Specifications

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| Security | 64/128-bits WEP, WPA, WPA2, 802.1X |
| Environmental Temperature | Operating: -20°C to 70°C, Storage: -40°C to 85°C |
| Environmental Humidity, Non-Condensing | Operating: 5% to 95%, Storage: 5% to 90% |
| Dimensions (W x H x D) in mm | 22 x 30 x 2.8 |

*Configurations are subject to change without notifications.

RF Performance Table for 2.4GHz

| | Data Rate | TX Power (per chain) | TX Power (2 chains) | Tolerance | | Data Rate | RX Specifications Sensitivity | Tolerance |
|---------------------------|-----------|----------------------|---------------------|-----------|---------------------------|-----------|-------------------------------|-----------|
| 2.4GHz 802.11b | 1 Mbps | 16dBm | 19dBm | ±2dB | 2.4GHz 802.11b | 1 Mbps | -99dBm | ±2dB |
| | 2 Mbps | 16dBm | 19dBm | ±2dB | | 2 Mbps | -95dBm | ±2dB |
| | 5.5 Mbps | 16dBm | 19dBm | ±2dB | | 5.5 Mbps | -93dBm | ±2dB |
| | 11 Mbps | 16dBm | 19dBm | ±2dB | | 11 Mbps | -90dBm | ±2dB |
| 2.4GHz 802.11g | 6 Mbps | 15dBm | 18dBm | ±2dB | 2.4GHz 802.11g | 6 Mbps | -95dBm | ±2dB |
| | 9 Mbps | 15dBm | 18dBm | ±2dB | | 9 Mbps | -92dBm | ±2dB |
| | 12 Mbps | 15dBm | 18dBm | ±2dB | | 12 Mbps | -91dBm | ±2dB |
| | 18 Mbps | 15dBm | 18dBm | ±2dB | | 18 Mbps | -89dBm | ±2dB |
| | 24 Mbps | 14dBm | 17dBm | ±2dB | | 24 Mbps | -86dBm | ±2dB |
| | 36 Mbps | 14dBm | 17dBm | ±2dB | | 36 Mbps | -83dBm | ±2dB |
| | 48 Mbps | 14dBm | 17dBm | ±2dB | | 48 Mbps | -79dBm | ±2dB |
| 2.4GHz 802.11n HT20 | 54 Mbps | 14dBm | 17dBm | ±2dB | 2.4GHz 802.11n HT20 | 54 Mbps | -77dBm | ±2dB |
| | MCS 0 | 15dBm | 18dBm | ±2dB | | MCS 0 | -94dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB | | MCS 1 | -93dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB | | MCS 2 | -90dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB | | MCS 3 | -87dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB | | MCS 4 | -84dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB | | MCS 5 | -80dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB | | MCS 6 | -77dBm | ±2dB |
| 2.4GHz 802.11n HT40 | MCS 7 | 14dBm | 17dBm | ±2dB | 2.4GHz 802.11n HT40 | MCS 7 | -75dBm | ±2dB |
| | MCS 0 | 15dBm | 18dBm | ±2dB | | MCS 0 | -91dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB | | MCS 1 | -90dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB | | MCS 2 | -87dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB | | MCS 3 | -84dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB | | MCS 4 | -81dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB | | MCS 5 | -77dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB | | MCS 6 | -75dBm | ±2dB |
| MCS 7 | 14dBm | 17dBm | ±2dB | MCS 7 | -73dBm | ±2dB | | |

RF Performance Table for 2.4GHz

| | Data Rate | TX Power (per chain) | TX Power (2 chains) | Tolerance |
|----------------------------|-----------|----------------------|---------------------|-----------|
| 2.4GHz 802.11ax HE20 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 10 | 12dBm | 15dBm | ±2dB |
| | MCS 11 | 12dBm | 15dBm | ±2dB |
| 2.4GHz 802.11ax HE40 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 10 | 12dBm | 15dBm | ±2dB |
| | MCS 11 | 12dBm | 15dBm | ±2dB |

| | Data Rate | RX Specifications Sensitivity | Tolerance |
|----------------------------|-----------|-------------------------------|-----------|
| 2.4GHz 802.11ax HE20 | MCS 0 | -94dBm | ±2dB |
| | MCS 1 | -92dBm | ±2dB |
| | MCS 2 | -90dBm | ±2dB |
| | MCS 3 | -87dBm | ±2dB |
| | MCS 4 | -83dBm | ±2dB |
| | MCS 5 | -79dBm | ±2dB |
| | MCS 6 | -78dBm | ±2dB |
| | MCS 7 | -76dBm | ±2dB |
| | MCS 8 | -72dBm | ±2dB |
| | MCS 9 | -69dBm | ±2dB |
| | MCS 10 | -66dBm | ±2dB |
| | MCS 11 | -65dBm | ±2dB |
| 2.4GHz 802.11ax HE40 | MCS 0 | -92dBm | ±2dB |
| | MCS 1 | -90dBm | ±2dB |
| | MCS 2 | -87dBm | ±2dB |
| | MCS 3 | -84dBm | ±2dB |
| | MCS 4 | -80dBm | ±2dB |
| | MCS 5 | -76dBm | ±2dB |
| | MCS 6 | -75dBm | ±2dB |
| | MCS 7 | -74dBm | ±2dB |
| | MCS 8 | -70dBm | ±2dB |
| | MCS 9 | -68dBm | ±2dB |
| | MCS 10 | -64dBm | ±2dB |
| | MCS 11 | -63dBm | ±2dB |

RF Performance Table for 5GHz

| | Data Rate | TX Power (per chain) | TX Power (2 chains) | Tolerance |
|-----------------------------|-----------|----------------------|---------------------|-----------|
| 5GHz 802.11a | 6Mbps | 15dBm | 18dBm | ±2dB |
| | 9Mbps | 15dBm | 18dBm | ±2dB |
| | 12Mbps | 15dBm | 18dBm | ±2dB |
| | 18Mbps | 15dBm | 18dBm | ±2dB |
| | 24Mbps | 14dBm | 17dBm | ±2dB |
| | 36Mbps | 14dBm | 17dBm | ±2dB |
| | 48Mbps | 14dBm | 17dBm | ±2dB |
| | 54Mbps | 14dBm | 17dBm | ±2dB |
| 5GHz 802.11n/ac VHT20 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| 5GHz 802.11n/ac VHT40 | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| 5GHz 802.11ac HT80 | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| MCS 9 | 13dBm | 16dBm | ±2dB | |

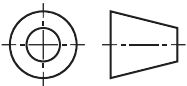
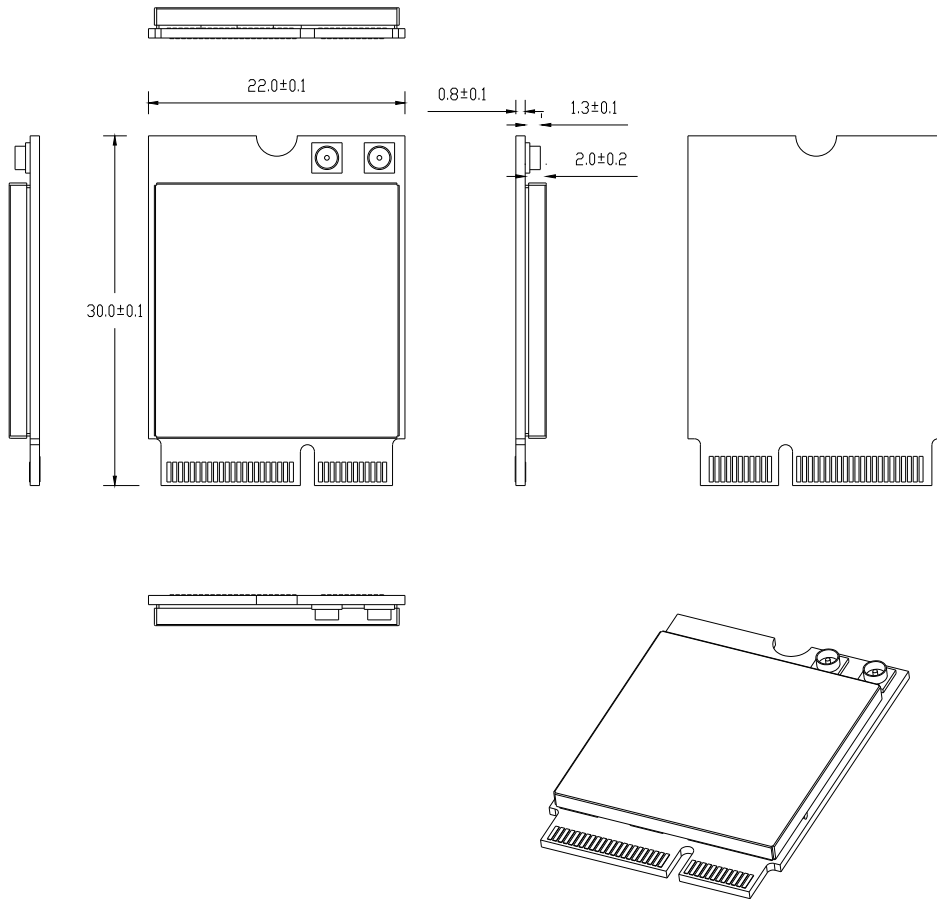
| | Data Rate | RX Specifications Sensitivity | Tolerance |
|-----------------------------|-----------|-------------------------------|-----------|
| 5GHz 802.11a | 6Mbps | -96dBm | ±2dB |
| | 9Mbps | -92dBm | ±2dB |
| | 12Mbps | -91dBm | ±2dB |
| | 18Mbps | -89dBm | ±2dB |
| | 24Mbps | -86dBm | ±2dB |
| | 36Mbps | -83dBm | ±2dB |
| | 48Mbps | -79dBm | ±2dB |
| | 54Mbps | -78dBm | ±2dB |
| 5GHz 802.11n/ac VHT20 | MCS 0 | -95dBm | ±2dB |
| | MCS 1 | -93dBm | ±2dB |
| | MCS 2 | -90dBm | ±2dB |
| | MCS 3 | -87dBm | ±2dB |
| | MCS 4 | -84dBm | ±2dB |
| | MCS 5 | -80dBm | ±2dB |
| | MCS 6 | -79dBm | ±2dB |
| | MCS 7 | -76dBm | ±2dB |
| 5GHz 802.11n/ac VHT40 | MCS 8 | -73dBm | ±2dB |
| | MCS 0 | -96dBm | ±2dB |
| | MCS 1 | -92dBm | ±2dB |
| | MCS 2 | -88dBm | ±2dB |
| | MCS 3 | -84dBm | ±2dB |
| | MCS 4 | -81dBm | ±2dB |
| | MCS 5 | -77dBm | ±2dB |
| | MCS 6 | -76dBm | ±2dB |
| | MCS 7 | -75dBm | ±2dB |
| | MCS 8 | -72dBm | ±2dB |
| 5GHz 802.11ac HT80 | MCS 9 | -70dBm | ±2dB |
| | MCS 0 | -90dBm | ±2dB |
| | MCS 1 | -87dBm | ±2dB |
| | MCS 2 | -84dBm | ±2dB |
| | MCS 3 | -81dBm | ±2dB |
| | MCS 4 | -78dBm | ±2dB |
| | MCS 5 | -74dBm | ±2dB |
| | MCS 6 | -73dBm | ±2dB |
| | MCS 7 | -71dBm | ±2dB |
| | MCS 8 | -67dBm | ±2dB |
| MCS 9 | -65dBm | ±2dB | |

RF Performance Table for 5GHz

| | Data Rate | TX Power (per chain) | TX Power (2 chains) | Tolerance |
|--------------------------|-----------|----------------------|---------------------|-----------|
| 5GHz 802.11ax HE20 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 10 | 12dBm | 15dBm | ±2dB |
| | MCS 11 | 12dBm | 15dBm | ±2dB |
| 5GHz 802.11ax HE40 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 10 | 12dBm | 15dBm | ±2dB |
| | MCS 11 | 12dBm | 15dBm | ±2dB |
| 5GHz 802.11ax HE80 | MCS 0 | 15dBm | 18dBm | ±2dB |
| | MCS 1 | 15dBm | 18dBm | ±2dB |
| | MCS 2 | 15dBm | 18dBm | ±2dB |
| | MCS 3 | 15dBm | 18dBm | ±2dB |
| | MCS 4 | 14dBm | 17dBm | ±2dB |
| | MCS 5 | 14dBm | 17dBm | ±2dB |
| | MCS 6 | 14dBm | 17dBm | ±2dB |
| | MCS 7 | 14dBm | 17dBm | ±2dB |
| | MCS 8 | 13dBm | 16dBm | ±2dB |
| | MCS 9 | 13dBm | 16dBm | ±2dB |
| | MCS 10 | 12dBm | 15dBm | ±2dB |
| | MCS 11 | 12dBm | 15dBm | ±2dB |

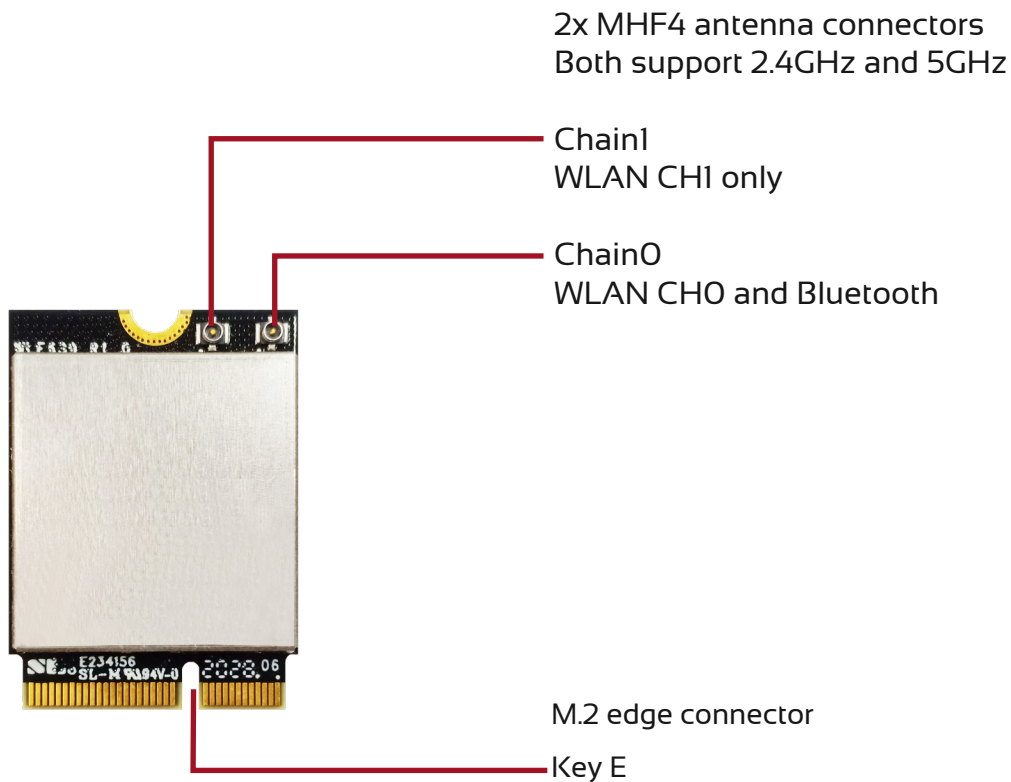
| | Data Rate | RX Specifications Sensitivity | Tolerance |
|--------------------------|-----------|-------------------------------|-----------|
| 5GHz 802.11ax HE20 | MCS 0 | -94dBm | ±2dB |
| | MCS 1 | -92dBm | ±2dB |
| | MCS 2 | -90dBm | ±2dB |
| | MCS 3 | -87dBm | ±2dB |
| | MCS 4 | -83dBm | ±2dB |
| | MCS 5 | -79dBm | ±2dB |
| | MCS 6 | -78dBm | ±2dB |
| | MCS 7 | -76dBm | ±2dB |
| | MCS 8 | -72dBm | ±2dB |
| | MCS 9 | -69dBm | ±2dB |
| | MCS 10 | -66dBm | ±2dB |
| | MCS 11 | -64dBm | ±2dB |
| 5GHz 802.11ax HE40 | MCS 0 | -93dBm | ±2dB |
| | MCS 1 | -90dBm | ±2dB |
| | MCS 2 | -87dBm | ±2dB |
| | MCS 3 | -84dBm | ±2dB |
| | MCS 4 | -81dBm | ±2dB |
| | MCS 5 | -76dBm | ±2dB |
| | MCS 6 | -75dBm | ±2dB |
| | MCS 7 | -74dBm | ±2dB |
| | MCS 8 | -70dBm | ±2dB |
| | MCS 9 | -69dBm | ±2dB |
| | MCS 10 | -64dBm | ±2dB |
| | MCS 11 | -63dBm | ±2dB |
| 5GHz 802.11ax HE80 | MCS 0 | -90dBm | ±2dB |
| | MCS 1 | -86dBm | ±2dB |
| | MCS 2 | -84dBm | ±2dB |
| | MCS 3 | -81dBm | ±2dB |
| | MCS 4 | -77dBm | ±2dB |
| | MCS 5 | -73dBm | ±2dB |
| | MCS 6 | -72dBm | ±2dB |
| | MCS 7 | -70dBm | ±2dB |
| | MCS 8 | -68dBm | ±2dB |
| | MCS 9 | -66dBm | ±2dB |
| | MCS 10 | -62dBm | ±2dB |
| | MCS 11 | -60dBm | ±2dB |

Mechanical Dimensions



All dimensions are in mm.

Component Map



Ordering Configuration

| Item Code | Model | Description |
|-------------------|--------|--|
| WLT639 6A0000R1.0 | WLT639 | 2x2 802.11 a/b/g/n/ac/ax support dual band dual concurrent PCIe M.2 module |