WiFi 6 (802.11ax) 2x2 MU-MIMO OFDMA 2.4/5GHz Dual Band Selectable Wireless Module

Model: WLE3002HX

KEY FEATURES

- Qualcomm QCN6024/9024 'Pine' series for Commercial grade
- Qualcomm QCN9074 'Pine' series for Industrial grade
- 2.4GHz, 2x2 MU-MIMO OFDMA Technology, up to 573Mbps physical data rate
- 5GHz, 2x2 MU-MIMO OFDMA Technology, up to 2402Mbps physical data rate
- Dual band selectable 2.4/5GHz 2x2 WiFi 6 (802.11ax)
- Supports Dynamic Frequency Selection (DFS)
- Heat sink allows free air operation
- Supports IEEE 802.11d, e, h, i, j, k, r, u, v time stamp, w standard
- Designed for High Bandwidth Enterprise Wireless Access Points
- MiniPCIe interface with PCIe 3.0

Specifications

Chipset	Qualcomm QCN6024/9024 'Pine' series for Commercial grade Qualcomm QCN9074 'Pine' series for Industrial grade
System Memory	2Mbit serial I²C bus EEPROM
Reference Design	PN03.1
Host Interface	MiniPCIe interface with PCIe 3.0
Operating Voltage	3.3V
Power Consumption	6.6W (max)
Wireless	2.4GHz 802.11b/g/n/ax, max 20dBm per chain 5GHz 802.11a/n/ac/ax, max 20dBm per chain 2x U.FL Connectors
Frequency Range	2.4GHz: 2.412~2.472GHz 5GHz (QCN6024/9024): 5.150~5.850GHz 5GHz (QCN9074): 4.920~5.850GHz
Modulation Techniques	OFDMA: BPSK, QPSK, DBPSK, DQPSK,16-QAM, 64-QAM, 256-QAM,1024-QAM
Channel Spectrum Widths for WLAN	Supports 20/40MHz at 2.4GHz Supports 20/40/80/160MHz at 5GHz
Operating Systems	Linux
Certification	FCC, CE Certified, REACH & RoHS Compliance
Environmental Temperature	Operating (Commercial Grade): -20°C to 70°C, Storage: -40°C to 90°C Operating (Industrial Grade): -40°C to 85°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	50.8 X 30 X 8.5mm

Configurations are subject to change without notifications.

**Can be requested from respective sales executive.*

RF Performance Table at 2.4GHz

Data Rate		TX Power (per chain)	TX Power (2 chains)	Tolerance
2.4GHz 802.11b	1Mbps	20dBm	23dBm	±2dB
	2Mbps	20dBm	23dBm	±2dB
	5.5Mbps	20dBm	23dBm	±2dB
	11Mbps	20dBm	23dBm	±2dB
2.4GHz 802.11g	6Mbps	20dBm	23dBm	±2dB
	9Mbps	20dBm	23dBm	±2dB
	12Mbps	20dBm	23dBm	±2dB
	18Mbps	20dBm	23dBm	±2dB
	24Mbps	19dBm	22dBm	±2dB
	36Mbps	19dBm	22dBm	±2dB
	48Mbps	18dBm	21dBm	±2dB
	54Mbps	18dBm	21dBm	±2dB
2.4GHz 802.11n HT20	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
2.4GHz 802.11n HT40	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
2.4GHz 802.11ax HE20	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
	MCS 9	14dBm	17dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	13dBm	16dBm	±2dB

Data Rate		RX Specifications Sensitivity	Tolerance
2.4GHz 802.11b	1Mbps	-100	±2dB
	2Mbps	-99	±2dB
	5.5Mbps	-96	±2dB
	11Mbps	-94	±2dB
2.4GHz 802.11g	6Mbps	-97	±2dB
	9Mbps	-95	±2dB
	12Mbps	-92	±2dB
	18Mbps	-90	±2dB
	24Mbps	-88	±2dB
	36Mbps	-85	±2dB
	48Mbps	-83	±2dB
	54Mbps	-82	±2dB
2.4GHz 802.11n HT20	MCS 0	-96	±2dB
	MCS 1	-94	±2dB
	MCS 2	-92	±2dB
	MCS 3	-90	±2dB
	MCS 4	-87	±2dB
	MCS 5	-84	±2dB
	MCS 6	-81	±2dB
	MCS 7	-80	±2dB
2.4GHz 802.11n HT40	MCS 0	-93	±2dB
	MCS 1	-92	±2dB
	MCS 2	-90	±2dB
	MCS 3	-87	±2dB
	MCS 4	-85	±2dB
	MCS 5	-82	±2dB
	MCS 6	-80	±2dB
	MCS 7	-77	±2dB
2.4GHz 802.11ax HE20	MCS 0	-96	±2dB
	MCS 1	-94	±2dB
	MCS 2	-92	±2dB
	MCS 3	-89	±2dB
	MCS 4	-86	±2dB
	MCS 5	-83	±2dB
	MCS 6	-81	±2dB
	MCS 7	-79	±2dB
	MCS 8	-75	±2dB
	MCS 9	-73	±2dB
	MCS 10	-69	±2dB
	MCS 11	-66	±2dB

RF Performance Table at 2.4GHz

Data Rate	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
2.4GHz 802.11ax HE40	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
	MCS 9	14dBm	17dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	13dBm	16dBm	±2dB

Data Rate	Data Rate	RX Specifications Sensitivity	Tolerance
2.4GHz 802.11ax HE40	MCS 0	-94	±2dB
	MCS 1	-92	±2dB
	MCS 2	-89	±2dB
	MCS 3	-87	±2dB
	MCS 4	-84	±2dB
	MCS 5	-81	±2dB
	MCS 6	-79	±2dB
	MCS 7	-76	±2dB
	MCS 8	-73	±2dB
	MCS 9	-70	±2dB
	MCS 10	-67	±2dB
	MCS 11	-64	±2dB

RF Performance Table at 5GHz

Data Rate		TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11a	6Mbps	20dBm	23dBm	±2dB
	9Mbps	20dBm	23dBm	±2dB
	12Mbps	20dBm	23dBm	±2dB
	18Mbps	20dBm	23dBm	±2dB
	24Mbps	19dBm	22dBm	±2dB
	36Mbps	19dBm	22dBm	±2dB
	48Mbps	18dBm	21dBm	±2dB
	54Mbps	18dBm	21dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
	MCS 9	14dBm	17dBm	±2dB
5GHz 802.11ac VHT80	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
	MCS 9	14dBm	17dBm	±2dB

Data Rate		RX Specifications Sensitivity	Tolerance
5GHz 802.11a	6Mbps	-94	±2dB
	9Mbps	-93	±2dB
	12Mbps	-91	±2dB
	18Mbps	-89	±2dB
	24Mbps	-87	±2dB
	36Mbps	-85	±2dB
	48Mbps	-82	±2dB
	54Mbps	-79	±2dB
5GHz 802.11n/ac VHT20	MCS 0	-94	±2dB
	MCS 1	-93	±2dB
	MCS 2	-91	±2dB
	MCS 3	-88	±2dB
	MCS 4	-86	±2dB
	MCS 5	-83	±2dB
	MCS 6	-81	±2dB
	MCS 7	-79	±2dB
	MCS 8	-76	±2dB
5GHz 802.11n/ac VHT40	MCS 0	-92	±2dB
	MCS 1	-90	±2dB
	MCS 2	-88	±2dB
	MCS 3	-85	±2dB
	MCS 4	-83	±2dB
	MCS 5	-81	±2dB
	MCS 6	-79	±2dB
	MCS 7	-77	±2dB
	MCS 8	-74	±2dB
	MCS 9	-71	±2dB
5GHz 802.11ac VHT80	MCS 0	-90	±2dB
	MCS 1	-88	±2dB
	MCS 2	-85	±2dB
	MCS 3	-82	±2dB
	MCS 4	-80	±2dB
	MCS 5	-77	±2dB
	MCS 6	-75	±2dB
	MCS 7	-72	±2dB
	MCS 8	-69	±2dB
	MCS 9	-67	±2dB

RF Performance Table at 5GHz

Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
MCS 0	20dBm	23dBm	±2dB
MCS 1	20dBm	23dBm	±2dB
MCS 2	20dBm	23dBm	±2dB
MCS 3	19dBm	22dBm	±2dB
MCS 4	19dBm	22dBm	±2dB
5GHz 802.11ax HE20 MCS 5	18dBm	21dBm	±2dB
MCS 6	17dBm	20dBm	±2dB
MCS 7	16dBm	19dBm	±2dB
MCS 8	15dBm	18dBm	±2dB
MCS 9	14dBm	17dBm	±2dB
MCS 10	13dBm	16dBm	±2dB
MCS 11	13dBm	16dBm	±2dB
MCS 0	20dBm	23dBm	±2dB
MCS 1	20dBm	23dBm	±2dB
MCS 2	20dBm	23dBm	±2dB
MCS 3	19dBm	22dBm	±2dB
MCS 4	19dBm	22dBm	±2dB
5GHz 802.11ax HE40 MCS 5	18dBm	21dBm	±2dB
MCS 6	17dBm	20dBm	±2dB
MCS 7	16dBm	19dBm	±2dB
MCS 8	15dBm	18dBm	±2dB
MCS 9	14dBm	17dBm	±2dB
MCS 10	13dBm	16dBm	±2dB
MCS 11	13dBm	16dBm	±2dB
MCS 0	20dBm	23dBm	±2dB
MCS 1	20dBm	23dBm	±2dB
MCS 2	20dBm	23dBm	±2dB
MCS 3	19dBm	22dBm	±2dB
MCS 4	19dBm	22dBm	±2dB
5GHz 802.11ax HE80 MCS 5	18dBm	21dBm	±2dB
MCS 6	17dBm	20dBm	±2dB
MCS 7	16dBm	19dBm	±2dB
MCS 8	15dBm	18dBm	±2dB
MCS 9	14dBm	17dBm	±2dB
MCS 10	13dBm	16dBm	±2dB
MCS 11	13dBm	16dBm	±2dB

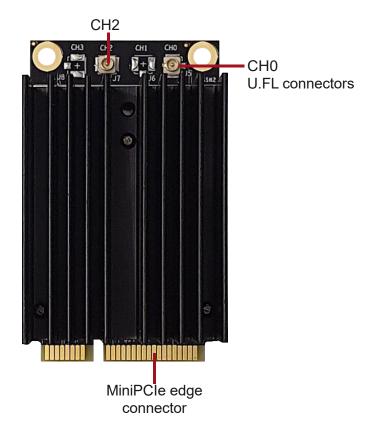| Data Rate	RX Specifications Sensitivity	Tolerance
MCS 0	-94	±2dB
MCS 1	-92	±2dB
MCS 2	-89	±2dB
MCS 3	-87	±2dB
MCS 4	-85	±2dB
5GHz 802.11ax HE20 MCS 5	-82	±2dB
MCS 6	-79	±2dB
MCS 7	-77	±2dB
MCS 8	-74	±2dB
MCS 9	-72	±2dB
MCS 10	-70	±2dB
MCS 11	-67	±2dB
MCS 0	-92	±2dB
MCS 1	-90	±2dB
MCS 2	-88	±2dB
MCS 3	-86	±2dB
MCS 4	-83	±2dB
5GHz 802.11ax HE40 MCS 5	-81	±2dB
MCS 6	-79	±2dB
MCS 7	-76	±2dB
MCS 8	-74	±2dB
MCS 9	-71	±2dB
MCS 10	-68	±2dB
MCS 11	-65	±2dB
MCS 0	-88	±2dB
MCS 1	-86	±2dB
MCS 2	-84	±2dB
MCS 3	-82	±2dB
MCS 4	-79	±2dB
5GHz 802.11ax HE80 MCS 5	-77	±2dB
MCS 6	-74	±2dB
MCS 7	-72	±2dB
MCS 8	-69	±2dB
MCS 9	-67	±2dB
MCS 10	-64	±2dB
MCS 11	-61	±2dB

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RF Performance Table at 5GHz

Data Rate	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11ax HE160	MCS 0	20dBm	23dBm	±2dB
	MCS 1	20dBm	23dBm	±2dB
	MCS 2	20dBm	23dBm	±2dB
	MCS 3	19dBm	22dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	18dBm	21dBm	±2dB
	MCS 6	17dBm	20dBm	±2dB
	MCS 7	16dBm	19dBm	±2dB
	MCS 8	15dBm	18dBm	±2dB
	MCS 9	14dBm	17dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	13dBm	16dBm	±2dB

Data Rate	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11ax HE160	MCS 0	-87	±2dB
	MCS 1	-84	±2dB
	MCS 2	-82	±2dB
	MCS 3	-80	±2dB
	MCS 4	-77	±2dB
	MCS 5	-75	±2dB
	MCS 6	-73	±2dB
	MCS 7	-70	±2dB
	MCS 8	-68	±2dB
	MCS 9	-67	±2dB
	MCS 10	-62	±2dB
	MCS 11	-59	±2dB

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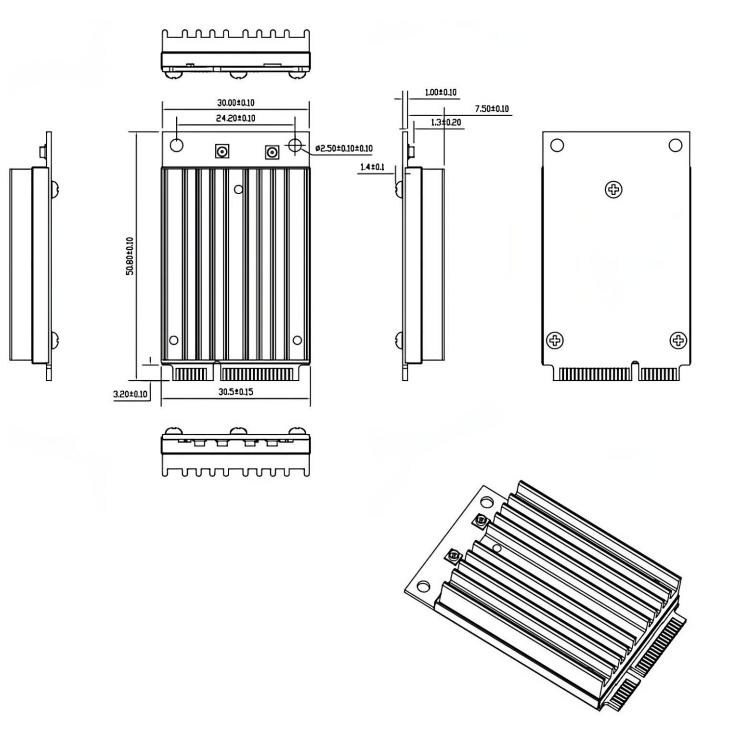
Component Map

CH2

CH0
U.FL connectors

MiniPCIe edge
connector

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Mechanical Dimensions for Commercial Grade

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Mechanical Dimensions for Industrial Grade

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Ordering Configuration

Item Code	Model	Description
WLE3002HX 7A0624S	WLE3002HX	QCN6024 2x2 802.11a/b/g/n/ac/ax support 2.4/5GHz Dual Band Selectable MiniPCIe interface with PCIe 3.0 Module
WLE3002HX 7A0924S	WLE3002HX	QCN9024 2x2 802.11a/b/g/n/ac/ax support 2.4/5GHz Dual Band Selectable MiniPCIe interface with PCIe 3.0 Module
WLE3002HX 7B0974S-I	WLE3002HX-I	QCN9074 2x2 802.11a/b/g/n/ac/ax support 2.4/5GHz Dual Band Selectable MiniPCIe interface with PCIe 3.0 Module

Chipsets Comparisons

		QCN6024	QCN9024	QCN9074
Bands	4.9GHz	-	-	✓
	6GHz	-	✓	✓
	165MHz	-	-	✓
	4k QAM	-	✓	✓
Advanced 11ax Features	#clients	128	256	512
	#OFDMA users	8	16	37
	#MU-MIMO users	4	4	4
	UL/DL OFDMA	✓	✓	✓
	DL OFDMA w/ TxBF	-	✓	✓
	DL MU-MIMO	✓	✓	✓
	UL MU-MIMO (R2)	✓	✓	✓
Management	Spectrum Scan	-	✓	✓
	aDFS/aSA	aDFS	aDFS/aSA	aDFS/aSA
Others	RF Sensing	✓	✓	✓
	FIPS L2	-	-	✓

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