

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

Model: **WLE3002HX**



### KEY FEATURES

- Qualcomm Atheros QCN6023/6024/9024 for commercial grade
- Qualcomm Atheros QCN9074 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

## Specifications

Chipset	Qualcomm Atheros QCN6023/6024/9024 'PINE' Series for Commercial Grade Qualcomm Atheros QCN9074 'Pine' Series for Industrial Grade
System Memory	2Mbit serial I <sup>2</sup> C bus EEPROM
Reference Design	PN03.1
Host Interface	MiniPCIe interface with PCIe 3.0
Operating Voltage	3.3V
Power Consumption	8W (max)
Wireless	2.4GHz 802.11b/g/n/ax, max 20dBm per chain 5GHz 802.11a/n/ac/ax, max 19dBm per chain 2x U.FL Connectors
Frequency Range	2.4GHz: 2.412~2.472GHz 5GHz (QCN6023/6024): 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	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	**Please refer to Hardware Guide

\*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	24dBm	±2dB
	2Mbps	20dBm	24dBm	±2dB
	5.5Mbps	20dBm	24dBm	±2dB
	11Mbps	20dBm	24dBm	±2dB
2.4GHz 802.11g	6Mbps	20dBm	24dBm	±2dB
	9Mbps	20dBm	24dBm	±2dB
	12Mbps	20dBm	24dBm	±2dB
	18Mbps	20dBm	24dBm	±2dB
	24Mbps	19dBm	23dBm	±2dB
	36Mbps	19dBm	23dBm	±2dB
	48Mbps	18dBm	22dBm	±2dB
	54Mbps	18dBm	22dBm	±2dB
2.4GHz 802.11n HT20	MCS 0	20dBm	24dBm	±2dB
	MCS 1	20dBm	24dBm	±2dB
	MCS 2	20dBm	24dBm	±2dB
	MCS 3	20dBm	24dBm	±2dB
	MCS 4	20dBm	24dBm	±2dB
	MCS 5	19dBm	23dBm	±2dB
	MCS 6	19dBm	23dBm	±2dB
	MCS 7	19dBm	23dBm	±2dB
2.4GHz 802.11n HT40	MCS 0	20dBm	24dBm	±2dB
	MCS 1	20dBm	24dBm	±2dB
	MCS 2	20dBm	24dBm	±2dB
	MCS 3	20dBm	24dBm	±2dB
	MCS 4	20dBm	24dBm	±2dB
	MCS 5	19dBm	23dBm	±2dB
	MCS 6	19dBm	23dBm	±2dB
	MCS 7	19dBm	23dBm	±2dB
2.4GHz 802.11ax HE20	MCS 0	20dBm	24dBm	±2dB
	MCS 1	20dBm	24dBm	±2dB
	MCS 2	20dBm	24dBm	±2dB
	MCS 3	20dBm	24dBm	±2dB
	MCS 4	20dBm	24dBm	±2dB
	MCS 5	19dBm	23dBm	±2dB
	MCS 6	19dBm	23dBm	±2dB
	MCS 7	19dBm	23dBm	±2dB
	MCS 8	18dBm	22dBm	±2dB
	MCS 9	18dBm	22dBm	±2dB
	MCS 10	17dBm	20dBm	±2dB
	MCS 11	17dBm	20dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
2.4GHz 802.11b	1Mbps	TBD	±2dB
	2Mbps	TBD	±2dB
	5.5Mbps	TBD	±2dB
	11Mbps	TBD	±2dB
2.4GHz 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 802.11n 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 802.11n 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 802.11ax 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

## RF Performance Table at 2.4GHz

	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
2.4GHz 802.11ax HE40	MCS 0	20dBm	24dBm	±2dB
	MCS 1	20dBm	24dBm	±2dB
	MCS 2	20dBm	24dBm	±2dB
	MCS 3	20dBm	24dBm	±2dB
	MCS 4	20dBm	24dBm	±2dB
	MCS 5	19dBm	23dBm	±2dB
	MCS 6	19dBm	23dBm	±2dB
	MCS 7	19dBm	23dBm	±2dB
	MCS 8	18dBm	22dBm	±2dB
	MCS 9	18dBm	22dBm	±2dB
	MCS 10	17dBm	20dBm	±2dB
	MCS 11	17dBm	20dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
2.4GHz 802.11ax 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

COMPEX SYSTEMS  
PRELIMINARY

## RF Performance Table at 5GHz

	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11a	6Mbps	19dBm	23dBm	±2dB
	9Mbps	19dBm	23dBm	±2dB
	12Mbps	19dBm	23dBm	±2dB
	18Mbps	19dBm	23dBm	±2dB
	24Mbps	18dBm	22dBm	±2dB
	36Mbps	18dBm	22dBm	±2dB
	48Mbps	18dBm	22dBm	±2dB
	54Mbps	18dBm	22dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 8	13dBm	16dBm	±2dB
	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
5GHz 802.11ac VHT80	MCS 9	13dBm	16dBm	±2dB
	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
MCS 9	13dBm	16dBm	±2dB	

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11a	6Mbps	TBD	±2dB
	9Mbps	TBD	±2dB
	12Mbps	TBD	±2dB
	18Mbps	TBD	±2dB
	24Mbps	TBD	±2dB
	36Mbps	TBD	±2dB
	48Mbps	TBD	±2dB
	54Mbps	TBD	±2dB
5GHz 802.11n/ac VHT20	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
5GHz 802.11n/ac VHT40	MCS 8	TBD	±2dB
	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
5GHz 802.11ac VHT80	MCS 9	TBD	±2dB
	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	

## RF Performance Table at 5GHz

	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11ac VHT160	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
	MCS 9	13dBm	16dBm	±2dB
5GHz 802.11ax HE20	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
	MCS 9	13dBm	16dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	10dBm	13dBm	±2dB
5GHz 802.11ax HE40	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
	MCS 9	13dBm	16dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	10dBm	13dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11ac VHT160	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
5GHz 802.11ax 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
5GHz 802.11ax 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

## RF Performance Table at 5GHz

	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11ax HE80	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
	MCS 9	13dBm	16dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	10dBm	13dBm	±2dB
5GHz 802.11ax HE160	MCS 0	18dBm	22dBm	±2dB
	MCS 1	18dBm	22dBm	±2dB
	MCS 2	18dBm	22dBm	±2dB
	MCS 3	18dBm	22dBm	±2dB
	MCS 4	18dBm	22dBm	±2dB
	MCS 5	16dBm	19dBm	±2dB
	MCS 6	16dBm	19dBm	±2dB
	MCS 7	15dBm	18dBm	±2dB
	MCS 8	13dBm	16dBm	±2dB
	MCS 9	13dBm	16dBm	±2dB
	MCS 10	13dBm	16dBm	±2dB
	MCS 11	10dBm	13dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11ax HE80	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
5GHz 802.11ax HE160	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

## Component Map



## Ordering Configuration

Item Code	Model	Description
COMMERCIAL GRADE (-20°C to 70°C)		
WLE3002HX 7A0000S	WLE3002HX	QCN6023/6024/9024 2x2 802.11a/b/g/n/ac/ax support 2.4/5GHz Dual Band Selectable MiniPCIe interface with PCIe 3.0 Module
INDUSTRIAL GRADE (-40°C to 85°C)		
WLE3002HX 7B000S-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

		QCN6023	QCN6024	QCN9024	QCN9074	
Bands	4.9GHz	-	-	-	✓	
	6GHz	-	-	✓	✓	
	165MHz	-	-	-	✓	
	4k QAM	-	-	✓	✓	
Advanced 11ax Features	#clients	96	128	256	512	
	#OFDMA users	6	8	16	37	
	#MU-MIMO users	3	4	4	4	
	UL/DL OFDMA	✓	✓	✓	✓	
	DL OFDMA w/ TxBF	-	-	✓	✓	
	DL MU-MIMO	✓	✓	✓	✓	
	UL MU-MIMO (R2)	✓	✓	✓	✓	
	Spectrum Scan	-	-	✓	✓	
	Management	aDFS/aSA	aDFS	aDFS	aDFS/aSA	aDFS/aSA
		RF Sensing	✓	✓	✓	✓
Others	FIPS L2	-	-	-	✓	