



WLE3000HX

Wi-Fi 6 (802.11ax) Dual Band Selectable Wireless Module

Hardware User Guide

Wi-Fi 6 / 802.11ax
2.4GHz + 5GHz

QCN6024/9024 / QCN9074
Qualcomm Pine Series

MiniPCle Interface
PCIe 3.0 Compatible

4×4 MU-MIMO
Up to 4804 Mbps (5GHz)

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1. Introduction

Thank you for choosing the Compex WLE3000HX. This document provides complete hardware integration guidance for engineers and system developers deploying the WLE3000HX Wi-Fi 6 wireless module in embedded, industrial, and networking platforms.

The WLE3000HX is a dual band selectable Wi-Fi 6 (802.11ax) wireless module based on the Qualcomm QCN6024/9024 'Pine' series chipset (commercial grade) or the QCN9074 'Pine' series chipset (industrial grade). Built on the PN02.1 reference design, the module delivers 4×4 MU-MIMO operation on either the 2.4GHz or 5GHz band (selectable) through a standard MiniPCle (PCIe 3.0) host interface.

Key Highlights

- Qualcomm QCN6024/9024 'Pine' series chipset for commercial-grade deployments.
- Qualcomm QCN9074 'Pine' series chipset for industrial-grade deployments.
- 2.4GHz, 4×4 MU-MIMO, up to 1376.4 Mbps physical data rate.
- 5GHz, 4×4 MU-MIMO, up to 4804 Mbps physical data rate.
- Dual Band Selectable 2.4GHz + 5GHz Wi-Fi 6 (802.11ax) operation.
- MiniPCle interface with PCIe 3.0 host connectivity.
- Based on the PN02.1 reference design.
- Supports up to 1024-QAM modulation with OFDMA technology.
- Operating temperature: -20°C to 70°C (commercial grade); -40°C to 85°C (industrial grade). Storage: -40°C to 90°C.
- FCC, CE & IC Certified; REACH and RoHS compliant for global deployment.

2. Package Contents

Verify the following items are included in the package before proceeding with installation:

Checklist

- 1 × WLE3000HX Wi-Fi 6 wireless module

⚠ Note: External antennas (U.FL pigtail cables), host carrier board, and power supply are not included unless specified in the order. Contact sales@compex.com.sg for accessory options.

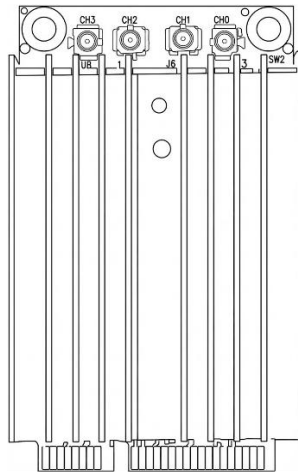
If any item is missing or damaged, contact Compex Technical Support (see Chapter 10) before proceeding.

3. Hardware Overview

The WLE3000HX is a radio-only Wi-Fi 6 module designed to be installed into a host platform's MiniPCIe slot. To install on another slot such as an M.2 key slot, an M.2 key to MiniPCIe adapter may be used. All wireless baseband and RF processing is handled onboard the module; the host platform supplies power and exchanges data over the PCIe 3.0 interface.

3.1 Module Layout

The WLE3000HX features the following major components and connectors:

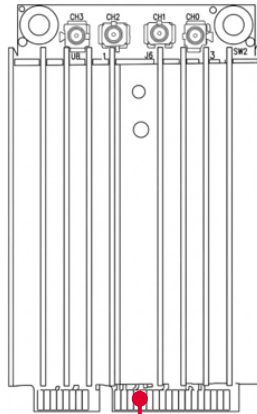


Chipset	Qualcomm QCN6024/9024 'Pine' series (Commercial grade) Qualcomm QCN9074 'Pine' series (Industrial grade)
Reference Design	PN02.1
Host Interface	MiniPCIe Interface with PCIe 3.0
RF Connectors	4× U.FL Connectors (CH0, CH1, CH2, CH3)
System Memory	2Mbit serial I ² C bus EEPROM
Dimensions (W × H × D)	30mm × 50.8mm × 13.4mm (Commercial grade) 30mm × 50.8mm × 25.4mm (Industrial grade)

3.2 Connector Descriptions

MiniPCle Edge Connector

- Standard MiniPCle (PCIe 3.0) edge connector along the bottom edge of the module.
- Carries PCIe data lanes, 3.3V power input, ground, and control signals to the host platform.

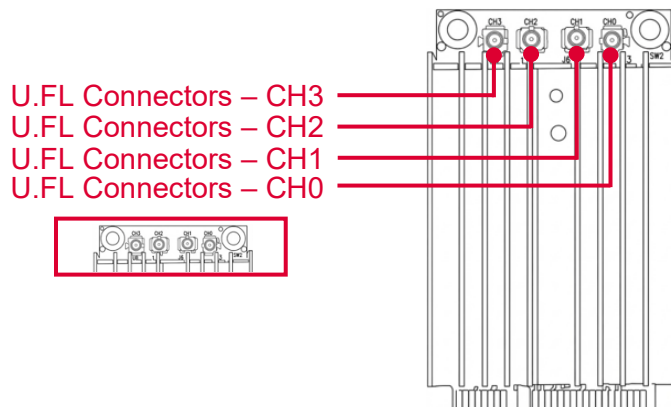


Mini PCIe Interface (for Power supply)



U.FL RF Connectors

- 4× U.FL Connectors (CH0, CH1, CH2 and CH3) located at the top edge of the module.
- CH0, CH1, CH2, and CH3 support 2.4GHz or 5GHz operation (one band at a time, selectable).
- Connect suitable external antennas rated for the 2.4GHz and 5GHz bands.



3.3 Hardware Pinouts

MiniPCle Slot Pin Assignment

Top side		Bottom side	
1	PCIE0_WAKE_N	2	VDD_3V3
3	NC	4	GND
5	NC	6	NC
7	PCIE0_CLKREQ_N	8	NC
9	GND	10	NC
11	PCIE0_REFCLK_N	12	NC
13	PCIE0_REFCLK_P	14	NC
15	GND	16	NC
Mechanical key MiniPCle			
17	NC	18	GND
19	NC	20	NC
21	GND	22	PCIE0_PERST
23	PCIE0_RX0_N	24	VDD_3V3
25	PCIE0_RX0_P	26	GND
27	GND	28	NC
29	GND	30	NC
31	PCIE0_TX0_N	32	NC
33	PCIE0_TX0_P	34	GND
35	GND	36	NC
37	NC	38	NC
39	VDD_3V3	40	GND
41	VDD_3V3	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	VDD_3V3

4. Radio Module Specifications

4.1 Wi-Fi Capability

Wi-Fi Standards	2.4GHz: 802.11b/g/n/ax 5GHz: 802.11a/n/ac/ax
Bands	2.4GHz + 5GHz Dual Band Selectable
MIMO Configuration	4×4 MU-MIMO
Max Physical Data Rate	2.4GHz: up to 1376.4 Mbps 5GHz: up to 4804 Mbps
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	Supports 20/40MHz at 2.4GHz Supports 20/40/80/160MHz at 5GHz
TX Power	Max 20dBm per chain @ 2.4GHz Max 20dBm per chain @ 5GHz
RF Connectors	4× U.FL Connectors (CH0, CH1, CH2, CH3)

4.2 Notes & Recommendations

- Use external antennas rated for either the 2.4GHz or 5GHz band (depending on selected band) on all four U.FL connectors to fully utilize the 4×4 MU-MIMO capability.
- The QCN6024/9024 commercial-grade variant is rated for -20°C to 70°C operation; the QCN9074 industrial-grade variant extends this to -40°C to 85°C, and is recommended for deployments requiring extended temperature operation.
- Refer to the Linux driver/SDK documentation supplied by Compex or Qualcomm for channel and regulatory domain configuration.
- Actual throughput will vary depending on host platform, driver configuration, channel width, and RF environment.

5. Mechanical Specifications

5.1 Module Dimensions

Dimensions (W × H × D)	30mm × 50.8mm × 13.4mm (Commercial grade) 30mm × 50.8mm × 25.4mm (Industrial grade)
Mounting Hole Diameter	Ø2.50mm
Form Factor	Standard MiniPCle with heatsink

5.2 Environmental Ratings

Operating Temperature (Commercial Grade)	-20°C to 70°C
Operating Temperature (Industrial Grade)	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Operating Humidity	5% to 95%, Non-Condensing
Storage Humidity	Max. 90%

5.3 Mounting & Installation Notes

- Secure with the mounting screw at the designated Ø2.50mm hole if the host chassis provides one.
- Ensure adequate airflow or thermal contact with the heatsink fins for sustained high-throughput operation.

6. Power Specifications

6.1 Power Requirements

Operating Voltage	3.3V DC
Power Consumption	9W (Max)
Power Source	Supplied via MiniPCle edge connector from host platform

6.2 Power Delivery Protection

- The host platform's MiniPCle slot is responsible for providing regulated 3.3V power and short-circuit/overcurrent protection.
- Ensure the host power rail can supply the module's peak 9W power consumption without voltage droop.

6.3 Notes & Recommendations

- Use a host platform with a stable, well-regulated 3.3V MiniPCle power rail.
- Avoid hot-plugging the module; always power down the host before installation or removal.
- For high-duty-cycle or industrial deployments, verify thermal dissipation is adequate at sustained 9W operation.

7. Installation & Integration

7.1 Pre-Installation Checklist

- Power off and disconnect the host platform before installation.
- Verify the host platform provides a MiniPCle slot compatible with PCIe 3.0.
- Prepare external antennas rated for 2.4GHz and/or 5GHz with U.FL connectors or pigtail adapters.

7.2 Module Installation

- Align the WLE3000HX module's gold-finger edge connector with the host MiniPCle slot.
- Insert at a slight angle (typically 15–20°) and press down firmly until fully seated.
- Rotate the module flat and secure with the mounting screw if provided by the host chassis.

7.3 Power Connection

- Power is supplied automatically through the MiniPCle edge connector; no separate power cable is required.
- Confirm the host platform's MiniPCle slot delivers a stable 3.3V supply before powering on.

7.4 Antenna Connection

- Connect external antennas to the CH0, CH1, CH2, and CH3 U.FL connectors. Ensure antennas are rated for the operating band (2.4GHz or 5GHz).
- Ensure antenna cables are routed without sharp bends to avoid signal loss or connector damage.

8. Troubleshooting

Module Not Detected	•Verify the module is fully seated in the MiniPCle slot and the retaining screw (if present) is secured. •Confirm the host platform's MiniPCle slot supports PCIe 3.0 and provides 3.3V power. •Check that the appropriate Linux driver/SDK package is installed on the host.
No Wireless Signal / Weak RF Performance	•Verify external antennas are securely connected to the CH0, CH1, CH2, and CH3 U.FL connectors. •Confirm antennas are rated for the 2.4GHz and/or 5GHz bands in use. •Check for physical damage to U.FL connectors or antenna cables.
Overheating or Unexpected Shutdown	•Ensure adequate airflow around the module for sustained high-throughput operation. •Confirm ambient temperature is within the rated -20°C to 70°C (commercial) or -40°C to 85°C (industrial) operating range.

9. Safety Precautions

- Always power off and disconnect the host system before installing or removing the module.
- Handle the module by its edges; avoid touching the gold-finger connector or RF components.
- Use proper ESD (electrostatic discharge) precautions, including a grounded wrist strap, when handling the module.
- Operation in DFS channels is subject to local regulatory requirements — see Section 12 for details.
- Do not operate the module without antennas connected to all active U.FL connectors, as this may damage the transmitter.
- Do not attempt to modify or repair the module; contact Compex Technical Support for service.

10. Technical Support

Compex Systems Pte Ltd provides engineering and technical support for the WLE3000HX. For technical assistance, integration support, or to report a hardware issue, please contact:

Company	Compex Systems Pte Ltd
Headquarters	Singapore
Sales Enquiries	sales@compex.com.sg
Technical Support	https://compex.com.sg/support-downloads/
Website	https://compex.com.sg
Product Page (WLE3000HX)	https://compex.com.sg/shop/wifi-module/802-11ax-wifi-module/wle3000hx-wifi6-11ax-qcn6024-qcn9024-qcn9074/
Qualcomm Design Centre	Qualcomm Authorized Design Centre (ADC) since 2014

Before contacting support, please:

- Note the firmware version (visible via webUI: System > Software, or via SSH/serial console: `cat /etc/openwrt_release`)
- Record the MAC address of the board (visible on PCB label).
- Describe the issue with steps to reproduce, observed symptoms, and host platform details.

For sample requests, pre-production evaluations, or OEM/ODM partnership enquiries, contact the Compex sales team at sales@compex.com.sg.

11. Full Specifications

Model	WLE3000HX
Chipset	Qualcomm QCN6024/9024 'Pine' series for Commercial grade Qualcomm QCN9074 'Pine' series for Industrial grade
System Memory	2Mbit serial I ² C bus EEPROM
Reference Design	PN02.1
Host Interface	MiniPCIe Interface with PCIe 3.0
Operating Voltage	3.3V
Power Consumption	9W (Max)
Wireless	4×4 2.4GHz 802.11b/g/n/ax, max 20dBm per chain 4×4 5GHz 802.11a/n/ac/ax, max 20dBm per chain 4× 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	Supports 20/40MHz at 2.4GHz Supports 20/40/80/160MHz at 5GHz
Operating System	Linux
Certification	FCC, CE & IC Certified, REACH & RoHS Compliance
Environmental Temperature	Operating (Commercial): -20°C to 70°C Operating (Industrial): -40°C to 85°C Storage: -40°C to 90°C
Environmental Humidity	Operating: 5% to 95%, Non-Condensing Storage: Max. 90%
Dimensions (W × H × D)	30mm × 50.8mm × 13.4mm (Commercial grade) 30mm × 50.8mm × 25.4mm (Industrial grade)

12. Regulatory Information

Declaration of Conformity

The WLE3000HX is FCC, CE and IC Certified and designed to comply with applicable regional regulatory requirements. The WLE3000HX is a component-level radio module intended for integration into end products. End-product manufacturers are responsible for obtaining all necessary regulatory certifications (e.g., FCC, CE, IC) for their final product in each target market, including any additional certifications required for the complete host platform assembly.

5GHz DFS Band Restrictions

Operation in DFS (Dynamic Frequency Selection) channels within the 5 GHz band is subject to national regulatory authority requirements. Manufacturers must ensure compliance with local regulations before enabling DFS channels. Unauthorized use of restricted frequency bands may be illegal and could cause harmful interference to radar and other services.

REACH & RoHS Compliance

This product is manufactured in compliance with REACH Regulation (EC) No 1907/2006 and RoHS Directive 2011/65/EU (amended by 2015/863/EU), restricting the use of hazardous substances in electrical and electronic equipment.

Disposal & Recycling

This product is subject to the Waste Electrical and Electronic Equipment (WEEE) Directive. At the end of its service life, return the product to an authorised recycling facility or contact Compex Systems for take-back options.

Legal Notices

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