



# WLW3000H6

Wi-Fi 6E (802.11ax) Single-Band Wireless Module

## Hardware User Guide

**Wi-Fi 6E / 802.11ax**  
6GHz Single Band

**QCN9024 / QCN9074-I**  
Qualcomm Pine Series

**M.2 E Key Interface**  
PCIe 3.0 Compatible

**4x4 MU-MIMO**  
Up to 4804 Mbps

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# 1. Introduction

Thank you for choosing the Compex WLW3000H6. This document provides complete hardware integration guidance for engineers and system developers deploying the WLW3000H6 Wi-Fi 6E wireless module in embedded, industrial, and networking platforms.

The WLW3000H6 is a single-band Wi-Fi 6E (802.11ax) wireless module based on the Qualcomm Atheros QCN9024 'Pine' series chipset (commercial grade) or the QCN9074-I 'Pine' series chipset (industrial grade). Built on the PN02.6 reference design, the module delivers 4×4 MU-MIMO operation in the 6GHz band through a standard M.2 E Key (PCIe 3.0) host interface.

## Key Highlights

- Qualcomm Atheros QCN9024 'Pine' series chipset for commercial-grade deployments.
- Qualcomm Atheros QCN9074-I 'Pine' series chipset for industrial-grade deployments.
- 6GHz, 4×4 MU-MIMO, up to 4804 Mbps physical data rate.
- M.2 E Key interface with PCIe 3.0 host connectivity.
- Based on the PN02.6 reference design.
- Supports up to 4096-QAM modulation with OFDMA technology.
- Operating temperature: -20°C to 70°C; storage temperature: -40°C to 90°C.
- 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 × WLW3000H6 Wi-Fi 6E 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](mailto:sales@compex.com.sg) for accessory options.

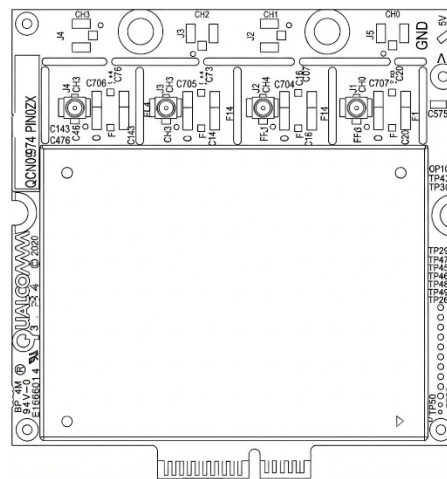
If any item is missing or damaged, contact Compex Technical Support (see Chapter 10) before proceeding.

## 3. Hardware Overview

The WLW3000H6 is a radio-only Wi-Fi 6E module designed to be installed into a host platform's M.2 E Key slot. To install into a different slot type, a compatible 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 WLW3000H6 features the following major components and connectors:

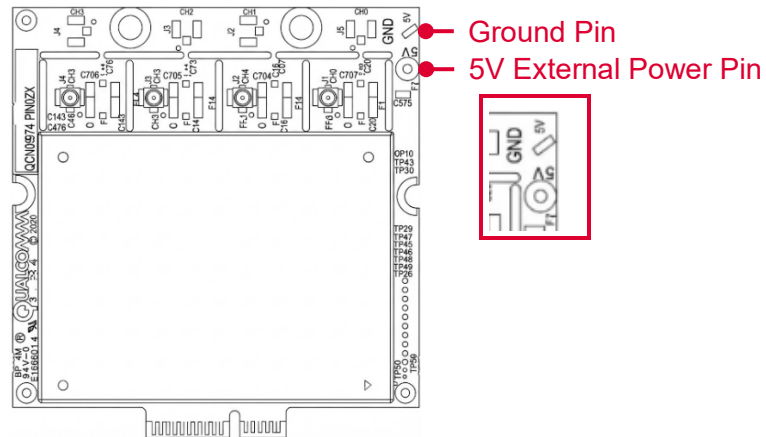


|                               |                                                                                                                          |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Chipset</b>                | Qualcomm Atheros QCN9024 'Pine' series (Commercial grade)<br>Qualcomm Atheros QCN9074-I 'Pine' series (Industrial grade) |
| <b>Reference Design</b>       | PN02.6                                                                                                                   |
| <b>Host Interface</b>         | M.2 E Key Interface with PCIe 3.0                                                                                        |
| <b>RF Connectors</b>          | 4× U.FL Connectors (CH0, CH1, CH2, CH3)                                                                                  |
| <b>System Memory</b>          | 2Mbit serial I <sup>2</sup> C bus EEPROM                                                                                 |
| <b>Dimensions (W × H × D)</b> | 57mm × 60mm × 6.3mm                                                                                                      |



## External Power Pin

- A dedicated Ground Pin and 5V External Power Pin, separate from the M.2 E Key edge connector, provide an alternative way to supply the 5V required by the module.
- Use this External Power Pin only as an alternative to, not together with, the gold-finger VDD\_5V pins (15, 17, 19, 21, 23) on the M.2 edge connector; when using the External Power Pin, ensure these pins are not connected to the host board.



## 3.3 Hardware Pinouts

### M.2 E Key Slot Pin Assignment

| Top side         |               | Bottom side |                   |
|------------------|---------------|-------------|-------------------|
| 1                | GND           | 2           | VDD_3V3           |
| 3                | NC            | 4           | VDD_3V3           |
| 5                | NC            | 6           | PCIE_LED0(GPIO27) |
| 7                | GND           | 8           | NC                |
| 9                | NC            | 10          | NC                |
| 11               | NC            | 12          | NC                |
| 13               | NC            | 14          | NC                |
| 15               | VDD_5V        | 16          | PCIE_LED1(GPIO35) |
| 17               | VDD_5V        | 18          | GND               |
| 19               | VDD_5V        | 20          | NC                |
| 21               | VDD_5V        | 22          | NC                |
| 23               | VDD_5V        |             |                   |
| Mechanical key E |               |             |                   |
| 33               | GND           | 32          | NC                |
| 35               | PCIE_RX0_P    | 34          | NC                |
| 37               | PCIE_RX0_N    | 36          | NC                |
| 39               | GND           | 38          | NC                |
| 41               | PCIE_TX0_P    | 40          | NC                |
| 43               | PCIE_TX0_N    | 42          | NC                |
| 45               | GND           | 44          | PTA1_BT_PRIO      |
| 47               | PCIE_REFCLK_P | 46          | PTA1_WL_ACT       |
| 49               | PCIE_REFCLK_N | 48          | PTA1_BT_ACT       |
| 51               | GND           | 50          | NC                |
| 53               | PCIE_CLKREQ_N | 52          | PCIE_RST_N        |
| 55               | PCIE_WAKE_N   | 54          | NC                |
| 57               | GND           | 56          | NC                |
| 59               | PCIE_RX1_P    | 58          | NC                |
| 61               | PCIE_RX1_N    | 60          | NC                |
| 63               | GND           | 62          | NC                |
| 65               | PCIE_TX1_P    | 64          | NC                |
| 67               | PCIE_TX1_N    | 66          | NC                |
| 69               | GND           | 68          | NC                |
| 71               | NC            | 70          | NC                |
| 73               | NC            | 72          | VDD_3V3           |
| 75               | GND           | 74          | VDD_3V3           |

## 4. Radio Module Specifications

### 4.1 Wi-Fi Capability

|                                |                                                                              |
|--------------------------------|------------------------------------------------------------------------------|
| <b>Wi-Fi Standards</b>         | 802.11ax                                                                     |
| <b>Bands</b>                   | 6GHz Single Band                                                             |
| <b>MIMO Configuration</b>      | 4×4 MU-MIMO                                                                  |
| <b>Max Physical Data Rate</b>  | up to 4804 Mbps                                                              |
| <b>Frequency Range</b>         | US: 6.115 ~ 7.125GHz; EU: 5.945 ~ 6.425GHz                                   |
| <b>Modulation Techniques</b>   | OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM |
| <b>Channel Spectrum Widths</b> | Supports 20/40/80/160MHz at 6GHz                                             |
| <b>TX Power</b>                | Max 20dBm per chain @ 6GHz                                                   |
| <b>RF Connectors</b>           | 4× U.FL Connectors (CH0, CH1, CH2, CH3)                                      |

### 4.2 Notes & Recommendations

- Use external antennas rated for the 6GHz band on all four U.FL connectors to fully utilize the 4×4 MU-MIMO capability.
- Refer to the OpenWRT 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

|                               |                                 |
|-------------------------------|---------------------------------|
| <b>Dimensions (W × H × D)</b> | 57mm × 60mm × 6.3mm             |
| <b>Mounting Hole Diameter</b> | Ø3.0mm                          |
| <b>Form Factor</b>            | Standard M.2 E Key, no heatsink |

## 5.2 Environmental Ratings

|                              |                           |
|------------------------------|---------------------------|
| <b>Operating Temperature</b> | -20°C to 70°C             |
| <b>Storage Temperature</b>   | -40°C to 90°C             |
| <b>Operating Humidity</b>    | 5% to 95%, Non-Condensing |
| <b>Storage Humidity</b>      | Max. 90%                  |

## 5.3 Mounting & Installation Notes

- Secure with the mounting screw at the designated Ø3.0mm mounting hole, if provided by the host chassis.
- Ensure adequate airflow around the module for sustained high-throughput operation.

# 6. Power Specifications

## 6.1 Power Requirements

|                                         |                                                                                                                                                             |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operating Voltage</b>                | 5V DC                                                                                                                                                       |
| <b>Power Consumption</b>                | 16W (Max)                                                                                                                                                   |
| <b>Power Source</b>                     | 5V supplied via either of two methods (choose one): through the M.2 gold-finger VDD_5V pins (15, 17, 19, 21, 23), or via an external 5V connection          |
| <b>External Power Pin (Alternative)</b> | Dedicated Ground Pin and 5V External Power Pin, provided as an alternative to the M.2 gold-finger VDD_5V pins; use only one method, not both simultaneously |

## 6.2 Power Delivery Protection

- The host platform must provide a regulated 5V supply with short-circuit/overcurrent protection, either through the M.2 gold-finger VDD\_5V pins or via an external 5V connection.
- Ensure the host power rail can supply the module's peak 16W power consumption without voltage droop.

## 6.3 Notes & Recommendations

- Use a host platform with a stable, well-regulated 5V supply (via gold-finger pins or external connection).
- 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 16W operation.
- Deliver the required 5V to the module via only one method — either the M.2 gold-finger VDD\_5V pins (15, 17, 19, 21, 23) or the External Power Pin — and not both simultaneously; if using the External Power Pin, ensure pins 15, 17, 19, 21 and 23 are not connected to the host board.

# 7. Installation & Integration

## 7.1 Pre-Installation Checklist

- Power off and disconnect the host platform before installation.
- Verify the host platform provides an M.2 E Key slot compatible with PCIe 3.0.
- Prepare four external antennas rated for the 6GHz band with U.FL connectors or pigtail adapters.

## 7.2 Module Installation

- Align the WLW3000H6 module's gold-finger edge connector with the host M.2 E Key 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

- 5V power is supplied through the M.2 E Key edge connector via the gold-finger pins (no extra cable needed), or via an external 5V connection, depending on the chosen method.
- Confirm the chosen 5V supply path (gold-finger pins or External Power Pin) is stable before powering on.

## 7.4 Antenna Connection

- Connect external antennas to the CH0, CH1, CH2, and CH3 U.FL connectors.
- Ensure antenna cables are routed without sharp bends to avoid signal loss or connector damage.

## 8. Troubleshooting

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Not Detected</b>                      | <ul style="list-style-type: none"><li>•Verify the module is fully seated in the M.2 E Key slot and the retaining screw (if present) is secured.</li><li>•Confirm the host platform's M.2 E Key slot supports PCIe 3.0, and that the 5V supply (gold-finger pins or External Power Pin) is present.</li><li>•Check that the appropriate OpenWRT driver/SDK package is installed on the host.</li></ul> |
| <b>No Wireless Signal / Weak RF Performance</b> | <ul style="list-style-type: none"><li>•Verify external antennas are securely connected to the CH0, CH1, CH2, and CH3 U.FL connectors.</li><li>•Confirm antennas are rated for the 6GHz band in use.</li><li>•Check for physical damage to U.FL connectors or antenna cables.</li></ul>                                                                                                                |
| <b>Overheating or Unexpected Shutdown</b>       | <ul style="list-style-type: none"><li>•Ensure adequate airflow around the module for sustained high-throughput operation.</li><li>•Confirm ambient temperature is within the rated operating range (-20°C to 70°C).</li></ul>                                                                                                                                                                         |

## 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 the 6 GHz band is subject to regulatory approval — 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 WLW3000H6. For technical assistance, integration support, or to report a hardware issue, please contact:

|                                 |                                                                                                                                                                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Company</b>                  | Compex Systems Pte Ltd                                                                                                                                                                                                |
| <b>Headquarters</b>             | Singapore                                                                                                                                                                                                             |
| <b>Sales Enquiries</b>          | <a href="mailto:sales@compex.com.sg">sales@compex.com.sg</a>                                                                                                                                                          |
| <b>Technical Support</b>        | <a href="https://compex.com.sg/support-downloads/">https://compex.com.sg/support-downloads/</a>                                                                                                                       |
| <b>Website</b>                  | <a href="https://compex.com.sg">https://compex.com.sg</a>                                                                                                                                                             |
| <b>Product Page (WLW3000H6)</b> | <a href="https://compex.com.sg/shop/wifi-module/802-11ax-wifi-module/wlw3000h6-11ax-6e-6ghz-qcn9024-qcn9074/">https://compex.com.sg/shop/wifi-module/802-11ax-wifi-module/wlw3000h6-11ax-6e-6ghz-qcn9024-qcn9074/</a> |
| <b>Qualcomm Design Centre</b>   | 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](mailto:sales@compex.com.sg).

# 11. Full Specifications

|                                  |                                                                                                                              |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                     | WLW3000H6                                                                                                                    |
| <b>Chipset</b>                   | Qualcomm Atheros QCN9024 'Pine' series for Commercial grade<br>Qualcomm Atheros QCN9074-I 'Pine' series for Industrial grade |
| <b>System Memory</b>             | 2Mbit serial I <sup>2</sup> C bus EEPROM                                                                                     |
| <b>Reference Design</b>          | PN02.6                                                                                                                       |
| <b>Host Interface</b>            | M.2 E Key Interface with PCIe 3.0                                                                                            |
| <b>Operating Voltage</b>         | 5V DC                                                                                                                        |
| <b>Power Consumption</b>         | 16W (Max)                                                                                                                    |
| <b>Wireless</b>                  | 4×4 6GHz 802.11ax, max 20dBm per chain<br>4× U.FL Connectors                                                                 |
| <b>Frequency Range</b>           | US: 6.115 ~ 7.125GHz; EU: 5.945 ~ 6.425GHz                                                                                   |
| <b>Modulation Techniques</b>     | OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM                                                 |
| <b>Channel Spectrum Widths</b>   | Supports 20/40/80/160MHz at 6GHz                                                                                             |
| <b>Operating System</b>          | OpenWRT                                                                                                                      |
| <b>Certification</b>             | REACH & RoHS Compliance                                                                                                      |
| <b>Environmental Temperature</b> | Operating: -20°C to 70°C<br>Storage: -40°C to 90°C                                                                           |
| <b>Environmental Humidity</b>    | Operating: 5% to 95%, Non-Condensing<br>Storage: Max. 90%                                                                    |
| <b>Dimensions (W × H × D)</b>    | 57mm × 60mm × 6.3mm                                                                                                          |

# 12. Regulatory Information

## Declaration of Conformity

The WLW3000H6 is designed to comply with applicable regional regulatory requirements, including REACH and RoHS. The WLW3000H6 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, or other applicable regional approvals) for their final product in each target market, including any additional certifications required for the complete host platform assembly.

## 6GHz Band Restrictions

Operation in the 6 GHz frequency band is subject to national regulatory authority approval. Manufacturers must ensure compliance with local regulations before enabling 6 GHz radio operation. Unauthorized use of restricted frequency bands may be illegal and could cause harmful interference to 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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