WLE7002E25

Wi-Fi 7 (802.11be) Dual-Band Wireless Module

Hardware User Guide

Wi-Fi 7 / 802.11be 2.4GHz + 5GHz Dual-Band	**QCN6224 / QCN9274-I** Qualcomm Waikiki Series	**MiniPCIe Interface** PCIe 3.0 Compatible	**2×2 MU-MIMO** Up to 4324 Mbps (5GHz)

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1. Introduction

Thank you for choosing the Compex WLE7002E25. This document provides complete hardware integration guidance for engineers and system developers deploying the WLE7002E25 Wi-Fi 7 wireless module in embedded, industrial, and networking platforms.

The WLE7002E25 is a dual-band concurrent Wi-Fi 7 (802.11be) wireless module based on the Qualcomm QCN6224 'Waikiki' series chipset (commercial grade) or the QCN9274-I 'Waikiki' series chipset (industrial grade). Built on the WK03.2 reference design, the module delivers 2×2 MU-MIMO operation across the 2.4GHz and 5GHz bands simultaneously through a standard MiniPCIe (PCIe 3.0) host interface.

Key Highlights

- Qualcomm QCN6224 'Waikiki' series chipset for commercial-grade deployments.
- Qualcomm QCN9274-I 'Waikiki' series chipset for industrial-grade deployments.
- 2.4GHz, 2×2 MU-MIMO, up to 688 Mbps physical data rate.
- 5GHz, 2×2 MU-MIMO, up to 4324 Mbps physical data rate.
- Dual-Band Concurrent 2.4GHz + 5GHz Wi-Fi 7 (802.11be) operation.
- MiniPCIe interface with PCIe 3.0 host connectivity.
- Based on the WK03.2 reference design.
- Supports up to 4096-QAM (4K-QAM) modulation.
- Operating temperature: -20°C to 70°C with standard heatsink (customized heatsink solutions available for extended industrial-grade requirements).
- 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 × WLE7002E25 Wi-Fi 7 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.

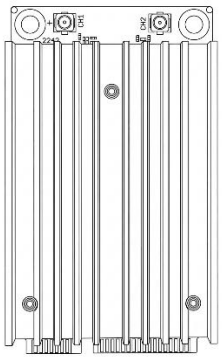
If any item is missing or damaged, contact Compex Technical Support (see Chapter 10) before proceeding.

3. Hardware Overview

The WLE7002E25 is a radio-only Wi-Fi 7 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 WLE7002E25 features the following major components and connectors:

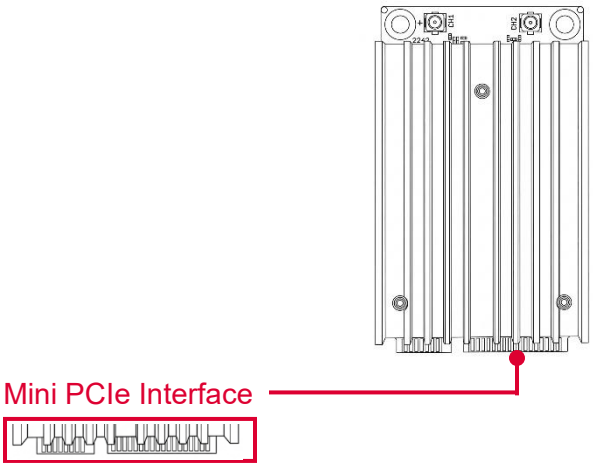


Chipset	Qualcomm QCN6224 'Waikiki' series (Commercial grade) Qualcomm QCN9274-I 'Waikiki' series (Industrial grade)
Reference Design	WK03.2
Host Interface	MiniPCIe Interface with PCIe 3.0
RF Connectors	2× U.FL Connectors (CH0, CH1)
System Memory	2Mbit serial I²C bus EEPROM
Dimensions (W × H × D)	30mm × 50.8mm × 13.4mm

3.2 Connector Descriptions

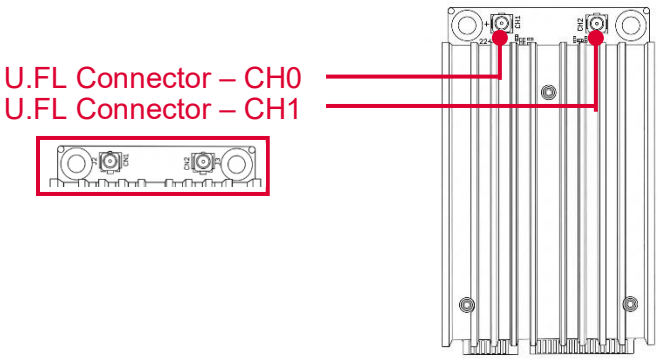
MiniPCIe Edge Connector

- Standard MiniPCIe (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.



U.FL RF Connectors

- 2× U.FL Connectors (CH0 and CH1) located at the top edge of the module.
- CH0 and CH1 jointly support 2.4GHz and 5GHz dual-band concurrent operation.
- Connect suitable external antennas rated for the 2.4GHz and 5GHz bands.



3.3 Hardware Pinouts

MiniPCIe Slot Pin Assignment

Top side		Bottom side	
1	WAKE_3v3	2	VDD_3V3
3	NC	4	GND
5	NC	6	NC
7	CLKREQ_3v3	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
Mechanical key MiniPCIe			
17	NC	18	GND
19	NC	20	W_DISABLE_1V8
21	GND	22	PERST_3v3
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	NC	40	GND
41	NC	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/be 5GHz: 802.11a/n/ac/ax/be
Bands	2.4GHz + 5GHz Dual-Band Concurrent
MIMO Configuration	2×2 MU-MIMO
Max Physical Data Rate	2.4GHz: up to 688 Mbps 5GHz: up to 4324 Mbps
Frequency Range	2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.150 ~ 5.825GHz
Modulation Techniques	OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
Channel Spectrum Widths	Supports 20/40MHz at 2.4GHz Supports 20/40/80/160/240MHz at 5GHz
TX Power	Max 20dBm per chain @ 2.4GHz Max 18dBm per chain @ 5GHz
RF Connectors	2× U.FL Connectors (CH0, CH1)

4.2 Notes & Recommendations

- Use external antennas rated for both the 2.4GHz and 5GHz bands to fully utilize the dual-band concurrent capability.
- The QCN9274-I industrial-grade variant is recommended for deployments requiring extended temperature operation beyond the standard range. Both variants share the same standard operating range of -20°C to 70°C; operation beyond this range requires a customized heatsink solution (contact sales).
- 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
Mounting Hole Diameter	Ø2.50mm
Form Factor	Standard MiniPCIe with heatsink

5.2 Environmental Ratings

Operating Temperature	-20°C to 70°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.
- For industrial-grade ambient temperatures, contact your sales representative for a customized heatsink solution.

6. Power Specifications

6.1 Power Requirements

Operating Voltage	3.3V DC
Power Consumption	8W (Max)
Power Source	Supplied via MiniPCIe edge connector from host platform

6.2 Power Delivery Protection

- The host platform's MiniPCIe 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 8W power consumption without voltage droop.

6.3 Notes & Recommendations

- Use a host platform with a stable, well-regulated 3.3V MiniPCIe 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 8W operation.

7. Installation & Integration

7.1 Pre-Installation Checklist

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

7.2 Module Installation

- Align the WLE7002E25 module's gold-finger edge connector with the host MiniPCIe 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 MiniPCIe edge connector; no separate power cable is required.
- Confirm the host platform's MiniPCIe slot delivers a stable 3.3V supply before powering on.

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7.4 Antenna Connection

- Connect external antennas to the CH0 and CH1 U.FL connectors.
- 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 MiniPCIe slot and the retaining screw (if present) is secured. •Confirm the host platform's MiniPCIe 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 and CH1 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 or thermal contact with the heatsink fins for sustained high-throughput operation. •Confirm ambient temperature is within the rated -20°C to 70°C operating range. •For sustained high-throughput or industrial use, consider a customized heatsink solution.

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.
- Do not operate the module without an antenna connected, 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 WLE7002E25. 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 (WLE7002E25)	https://compex.com.sg/shop/wifi-module/802-11be/wle7002e25d-wifi7-11be-qcn6224-qcn6274-qcn9274/
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	WLE7002E25
Chipset	Qualcomm QCN6224 'Waikiki' series for Commercial grade Qualcomm QCN9274-I 'Waikiki' series for Industrial grade
System Memory	2Mbit serial I²C bus EEPROM
Reference Design	WK03.2
Host Interface	MiniPCIe Interface with PCIe 3.0
Operating Voltage	3.3V
Power Consumption	8W (Max)
Wireless	2×2 2.4GHz 802.11b/g/n/ax/be, max 20dBm per chain 2×2 5GHz 802.11a/n/ac/ax/be, max 18dBm per chain 2× U.FL Connectors
Frequency Range	2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.150 ~ 5.825GHz
Modulation Techniques	OFDMA: BPSK, QPSK, DBPSK, DQPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
Channel Spectrum Widths	Supports 20/40MHz at 2.4GHz Supports 20/40/80/160/240MHz at 5GHz
Operating System	Linux
Certification	FCC, CE, IC Certified, REACH & RoHS Compliance
Environmental Temperature	Operating: -20°C to 70°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

Notes

- For industrial-grade environmental temperature requirements, contact your sales representative for a customized heatsink solution.

12. Regulatory Information

Declaration of Conformity

The WLE7002E25 is FCC, CE, and IC Certified and designed to comply with applicable regional regulatory requirements. The WLE7002E25 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.

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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