



AP.MR02.1

Wi-Fi 7 (802.11be) Embedded Board

Hardware User Guide

Wi-Fi 7 / 802.11be Tri-Band Support 2.4GHz + 5GHz + 6GHz	IPQ5424 Qualcomm Marina Series	6 Ethernet Ports 4× 2.5Gbps + 2× 10Gbps RJ45 LAN/WAN	4×4 MU-MIMO OFDMA Support All Three Bands
---	--	---	--

Updated: 20260826

Contents

1. Introduction	3
2. Package Contents	5
3. Hardware Overview.....	6
3.1 Board Layout.....	6
3.2 Connector Descriptions.....	8
3.3 LED Indicators.....	11
3.4 Hardware Pinouts.....	12
4. Radio Module Specifications	16
4.1 Wi-Fi Capability	16
4.2 Notes & Recommendations	17
5. Mechanical Specifications	18
5.1 Board Dimensions.....	18
5.2 Environmental Ratings.....	18
5.3 Mounting & Installation Notes	18
6. Power Specifications	19
6.1 Power Requirements.....	19
6.2 Power Delivery Protection.....	19
6.3 Notes & Recommendations	19
7. Installation & Integration	20
7.1 Pre-Installation Checklist	20
7.2 Antenna Installation.....	20
7.3 Power Connection.....	21
7.4 Ethernet Connection	21
8. Configuration	22
8.1 Default Settings.....	22
8.2 Accessing the Web User Interface	22
8.3 Wireless Configuration.....	23
9. Troubleshooting.....	24
10. Safety Precautions.....	25
11. Technical Support.....	26
12. Full Specifications	27
13. Regulatory Information.....	29

1. Introduction

Thank you for choosing the Compex AP.MR02.1. This document provides complete hardware integration guidance for engineers and system developers deploying the AP.MR02.1 in embedded, industrial, and networking platforms.

The AP.MR02.1 is a high-performance Wi-Fi 7 embedded board powered by Qualcomm's IPQ5424 'Marina' Series quad-core ARM Cortex-A55 processor. Unlike conventional embedded boards requiring separate radio modules, the AP.MR02.1 integrates full tri-band 4×4 MU-MIMO Wi-Fi 7 radio directly on-board, delivering robust networking capabilities through multiple high-speed Ethernet ports and full 802.11be compatibility.

Key Highlights

- Qualcomm IPQ5424 'Marina' Quad-Core ARM Cortex-A55 @ 1.8 GHz SoC for high-throughput network processing.
- Tri-band Wi-Fi 7 (802.11be) integrated on-board — 4×4 MU-MIMO OFDMA across 2.4 GHz, 5 GHz, and 6 GHz simultaneously, with no external radio module required.
- High-speed wireless: Up to 1376 Mbps @ 2.4 GHz, 8647 Mbps @ 5 GHz, and 11530 Mbps @ 6 GHz.
- Supports 320 MHz channel width at 6 GHz for ultra-high-speed connectivity.
- Multiple Ethernet interfaces: 4× 2.5GbE RJ45 ports and 2× 10GbE RJ45 ports for high-speed LAN/WAN connectivity.
- Generous onboard memory: 4 GB DDR4 RAM (standard), up to 8 GB DDR4 (max option), 256 MB NAND Flash, and 32 MB NOR Flash.
- 12× U.FL antenna connectors (4 per band) for flexible external antenna configurations.
- Optional onboard modules: LASER, ZigBee, and Bluetooth.
- OpenWrt 24.10 firmware with full SDK and QCA binary driver support.
- REACH and RoHS compliant for global deployment.

Intended Use

The AP.MR02.1 is an engineering-grade embedded board intended for OEM/ODM integration and product development. Typical target applications include:

- 802.11be MU-MIMO OFDMA Wi-Fi 7 access points and tri-band router platforms.
- Internet of Things (IoT) gateways with integrated Wi-Fi and Ethernet.
- HD streaming and gaming platforms requiring ultra-low latency wireless.
- Industrial networking appliances and edge computing nodes.

2. Package Contents

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

Checklist

- 1 × AP.MR02.1 embedded board

⚠ Note: External antennas, Ethernet cables, and power supply are not included unless specified in the order. Contact sales@compex.com.sg for accessory options.

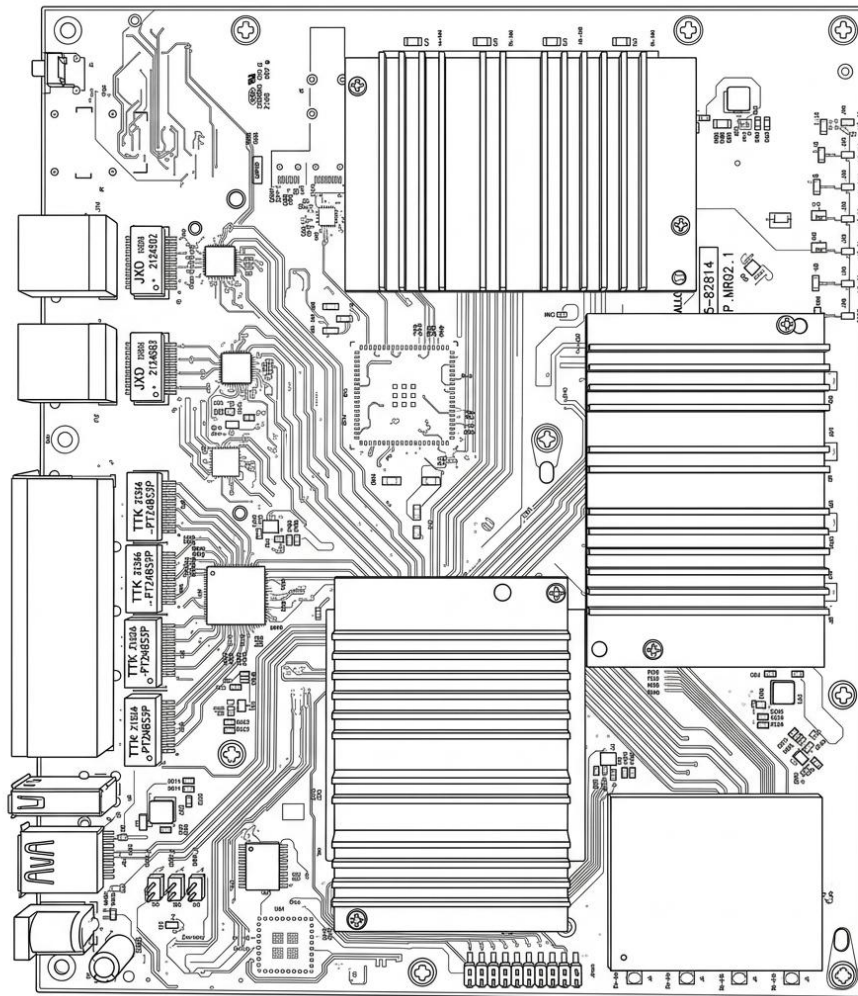
If any item is missing or damaged, contact Compex Technical Support (see Chapter 11) before proceeding.

3. Hardware Overview

The AP.MR02.1 is a fully integrated embedded networking platform based on the Qualcomm IPQ5424 SoC. All networking processing — including routing, switching, and full tri-band Wi-Fi 7 radio management — is handled entirely on-board with no external radio modules required.

3.1 Board Layout

The AP.MR02.1 features the following major components and connectors:



SoC	Qualcomm IPQ5424 'Marina' Series, Quad-Core ARM Cortex-A55 @ 1.8 GHz
Reference Design	Qualcomm AP.MR02.1
System Memory	4 GB DDR4, 32-bit interface (standard); 8 GB DDR4, 32-bit interface (max option)
Flash Storage	256 MB NAND Flash + 32 MB NOR Flash
On-Board Wi-Fi	4×4 2.4 GHz MU-MIMO 802.11b/g/n/ax/be 4×4 5 GHz MU-MIMO 802.11a/n/ac/ax/be 4×4 6 GHz MU-MIMO 802.11ax/be
Antenna Connectors	12× U.FL connectors (4 per band: 2.4 GHz, 5 GHz, 6 GHz)
Ethernet Ports	2× 10GbE RJ45 + 4× 2.5GbE RJ45 (LAN/WAN)
USB	1× USB 2.0 Port + 1× USB 3.0 Port
Serial / Debug	1× UART 12-Pin Connector (TTL) + 1× JTAG 20-Pin Connector
Other I/O	1× WPS Button, 7× LED Indicators
Optional Modules	1× LASER module, 1× ZigBee module, 1× Bluetooth module
Form Factor	215 mm × 180 mm × 25.5 mm

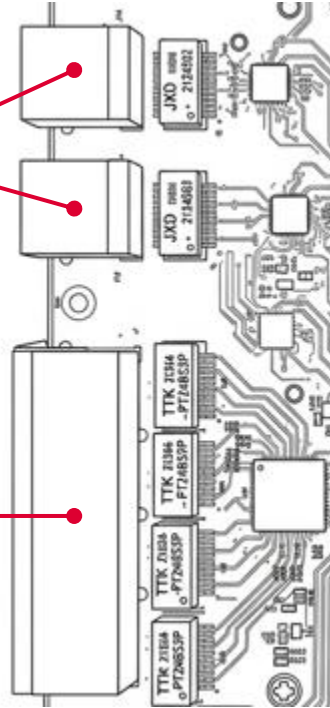
3.2 Connector Descriptions

Ethernet Port(RJ45)

- 4× 2.5GbE RJ45 ports for high-speed LAN/WAN connectivity.
- 2× 10GbE RJ45 ports for ultra-high-speed uplink connectivity.
- All ports support auto-MDI/MDIX and auto-negotiation.

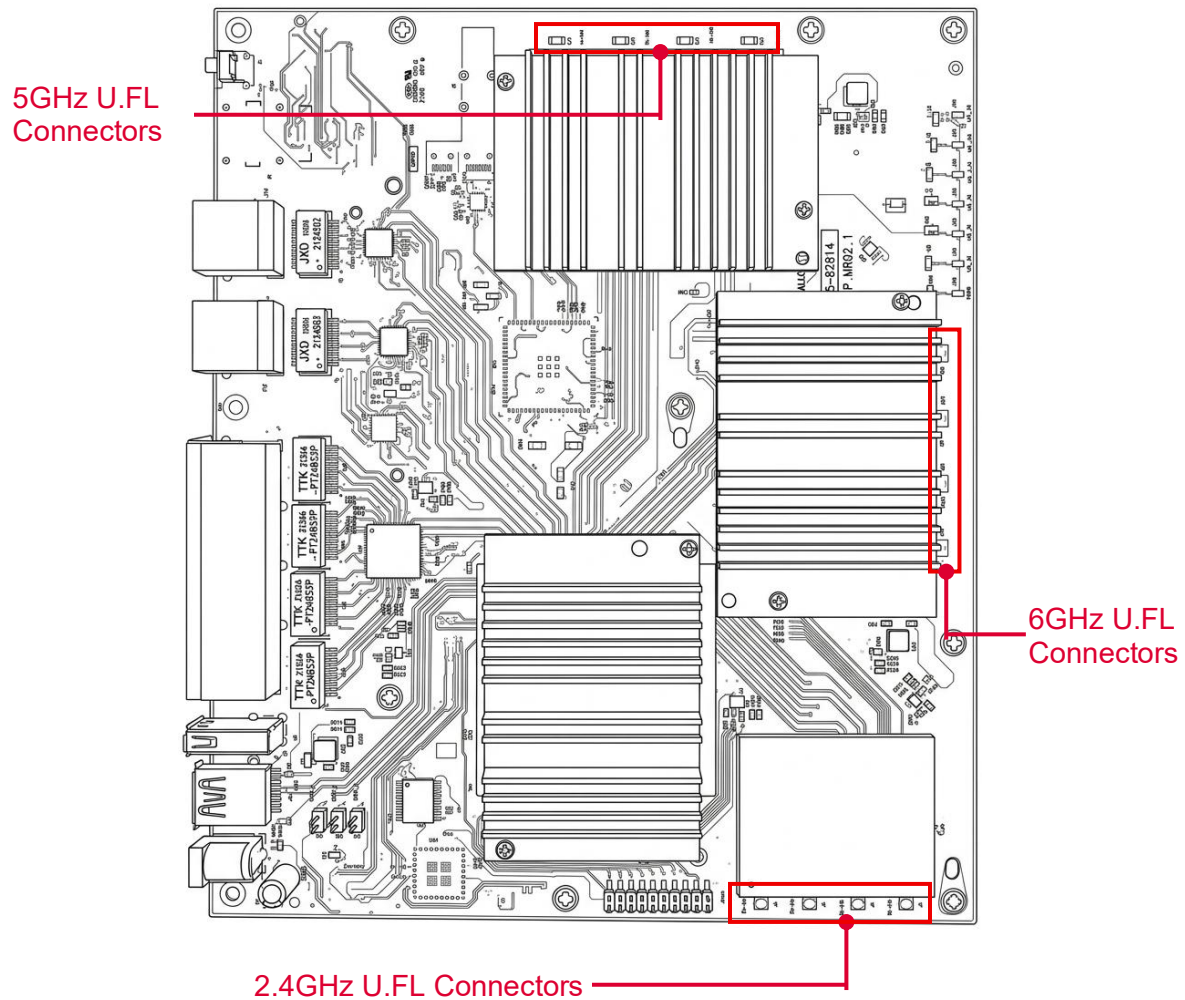
2x 10 Gbps Ethernet Port LAN/WAN RJ45
(PoE Supported)

4x 2.5 Gbps Ethernet Port LAN/WAN RJ45



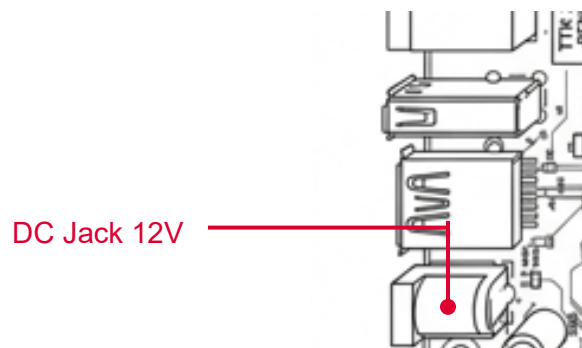
U.FL Antenna Connectors

- 12× U.FL connectors total, providing 4 connectors per band (CH0–CH3).
- Connect suitable external antennas rated for the respective frequency band.



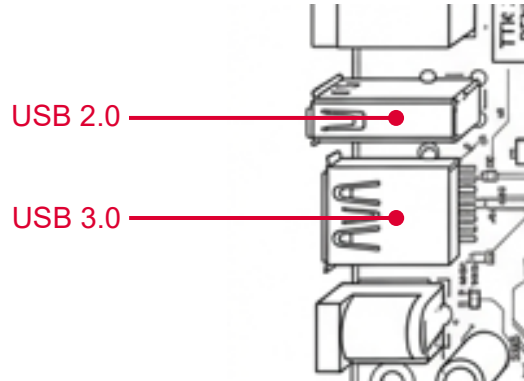
Power Connector

- 1× DC Jack Connector, 12 V DC input at 5 A.
- Maximum board-only power consumption: 39.3 W.



USB Ports

- 1× USB 2.0 Port
- 1× USB 3.0 Port
- Supports external storage, peripherals, and firmware upgrade via USB



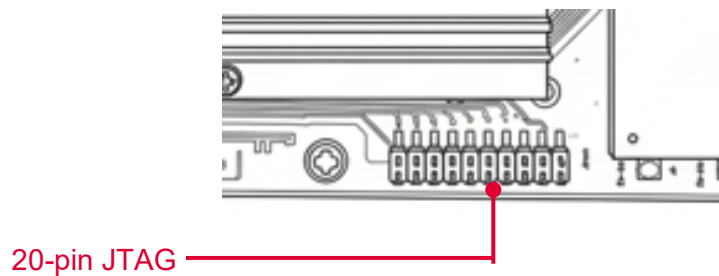
UART Debug Interface

- UART: 12-pin TTL header for serial console access. A Serial Converter (TTL to RS-232) is available for standard serial debugging.



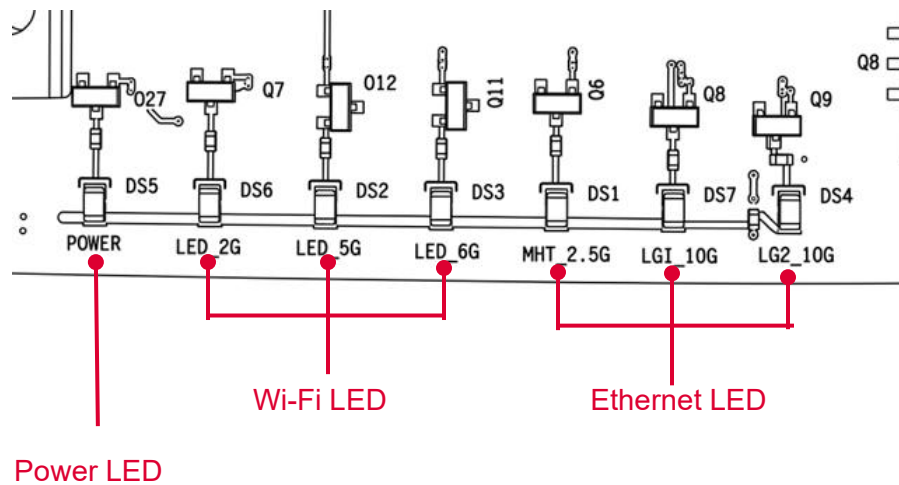
JTAG Debug Interface

- JTAG: 20-pin header for low-level firmware programming and hardware debugging.



3.3 LED Indicators

Color	Description
Power LED	Solid On: Board powered and operational
Wi-Fi LED	Indicates wireless radio activity across all three bands
Ethernet LEDs	Individual link/activity LEDs for each RJ45 port (4× 2.5GbE + 2× 10GbE)



3.4 Hardware Pinouts

Ethernet Port Pin Assignment (RJ45 10G) J12

Pin	Signal	Pin	Signal
1	CONN_LG1_MD_A_P	5	CONN_LG1_MD_C_N
2	CONN_LG1_MD_A_N	6	CONN_LG1_MD_B_N
3	CONN_LG1_MD_B_P	7	CONN_LG1_MD_D_P
4	CONN_LG1_MD_C_P	8	CONN_LG1_MD_D_N

Ethernet Port Pin Assignment (RJ45 10G) J14

Pin	Signal	Pin	Signal
1	CONN_LG2_MD_A_P	5	CONN_LG2_MD_C_N
2	CONN_LG2_MD_A_N	6	CONN_LG2_MD_B_N
3	CONN_LG2_MD_B_P	7	CONN_LG2_MD_D_P
4	CONN_LG2_MD_C_P	8	CONN_LG2_MD_D_N

Ethernet Port Pin Assignment (RJ45 2x 2.5G Port)

Pin	Signal	Pin	Signal
1	P0_TRXP_0	17	P2_TRXP_0
2	P0_TRXN_0	18	P2_TRXN_0
3	P0_TRXP_1	19	P2_TRXP_1
4	P0_TRXP_2	20	P2_TRXP_2
5	P0_TRXN_2	21	P2_TRXN_2
6	P0_TRXN_1	22	P2_TRXN_1
7	P0_TRXP_3	23	P2_TRXP_3
8	P0_TRXN_3	24	P2_TRXN_3
9	P1_TRXP_0	25	P3_TRXP_0
10	P1_TRXN_0	26	P3_TRXN_0
11	P1_TRXP_1	27	P3_TRXP_1
12	P1_TRXP_2	28	P3_TRXP_2
13	P1_TRXN_2	29	P3_TRXN_2
14	P1_TRXN_1	30	P3_TRXN_1
15	P1_TRXP_3	31	P3_TRXP_3
16	P1_TRXN_3	32	P3_TRXN_3

LED Pin Assignment

Location	Signal
DS5	POWER
DS6	LED_2G
DS2	LED_5G
DS3	LED_6G
DS1	MHT_2.5G
DS7	LG1_10G
DS4	LG2_10G

USB 2.0 Port Pin Assignment

Pin	Signal	Pin	Signal
1	DVDD_5V_USB	2	CONN_USB2_DM
3	CONN_USB2_DP	4	GND

USB 2.0 Port Pin Assignment

Pin	Signal	Pin	Signal
1	DVDD_5V_USB	2	USB1_CONN_DM
3	USB1_CONN_DP	4	GND
5	USB1_SS_RX_N	6	USB1_SS_RX_P
7	GND	8	CONN_USB1_SS_TX_N
9	CONN_USB1_SS_TX_P		

UART Pin Assignment

Pin	Signal	Pin	Signal
1	DVDD_3V3	2	DVDD_3V3
3	UART_RXD1_CONN	4	NC
5	NC	6	NC
7	NC	8	NC
9	UART_TXD1_CONN	10	NC
11	GND	12	GND

JTAG Interface Pin Assignment

Pin	Signal	Pin	Signal
1	VDD_1V8	2	VDD_1V8
3	JTAG_TRSTN	4	NC
5	JTAG_TDI	6	GND
7	JTAG_TMS	8	GND
9	JTAG_TCK	10	GND
11	PULL UP_1V8	12	GND
13	JTAG_TDO	14	GND
15	JTAG_SRSTN	16	GND
17	GND	18	GND
19	GND	20	GND

Zigbee Interface Pin Assignment

Pin	Signal	Pin	Signal
1	DVDD_3V3	2	DVDD_3V3
3	GND	4	ZIGBEE_LED_3P3
5	ZIGBEE_SPI_CS_3P3	6	ZIGBEE_HOST_INT_N_3P3
7	ZIGBEE_SPI_CLK_3P3	8	ZIGBEE_SPI_MISO_3P3
9	GND	10	GND
11	ZIGBEE_SPI_MOSI_3P3	12	ZIGBEE_PRIORITY_3P3
13	ZIGBEE_WAKE_3P3	14	ZIGBEE_REQUEST_3P3
15	GND	16	GND
17	WLAN_ACTIVE_ZB_3P3	18	ZIGBEE_RST_3P3
19	GND	20	GND

GPIO Pin Mapping

Pin	Signal	Pin	Signal
GPIO_0	QSPI_DATA[3]	GPIO_1	QSPI_DATA[2]
GPIO_2	QSPI_DATA[1]	GPIO_3	QSPI_DATA[0]
GPIO_4	QSPI_CS_N	GPIO_5	QSPI_CLK
GPIO_6	SPI0_CLK	GPIO_7	SPI0_CS
GPIO_8	SPI0_MISO	GPIO_9	SPI0_MOSI
GPIO_10	SLIC_INT_N	GPIO_11	ZB_SPI_CS_N
GPIO_12	ZB_SPI_MISO	GPIO_13	ZB_SPI_MOSI
GPIO_14	TREX_I2C_SCL_1P8	GPIO_15	TREX_I2C_SDA_1P8
GPIO_16	CORE_VOL_0	GPIO_17	CORE_VOL_1
GPIO_18	PHY_RST	GPIO_19	WPS_IN
GPIO_20	MHT_MST_MDC	GPIO_21	MHT_MST_MDIO
GPIO_22	MDC	GPIO_23	MDIO
GPIO_24	IPQ_WSI0_CLK_IN	GPIO_25	SLIC_RST_N
GPIO_26	IPQ_WSI0_DATA_IN	GPIO_27	IPQ_WSI1_CLK_OUT
GPIO_28	LG1_RST_N	GPIO_29	IPQ_WSI1_DATA_OUT
GPIO_30	LG1_INT_N	GPIO_31	WK_6G_PCIE2_RST_N
GPIO_32	LG2_INT_N	GPIO_33	PTA1_WLAN_ACTIVE
GPIO_34	WK_5G_PCIE3_RST_N	GPIO_35	2G_IRON_RST
GPIO_36	PCM_DTX	GPIO_37	PCM_DRX
GPIO_38	PCM_FSYNC	GPIO_39	PCM_PCLK
GPIO_40	LG2_RST_N	GPIO_41	MHT_INT_N
GPIO_42	IPQ_2G_LED	GPIO_43	UART_RXD1
GPIO_44	UART_TXD1	GPIO_45	PCM_SPI_CLK
GPIO_46	PCM_SPI_CS_N	GPIO_47	PCM_SPI_MISO
GPIO_48	PCM_SPI_MOSI	GPIO_49	SYS_1V8_RSTN

SLIC Interface Pin Assignment

Pin	Signal	Pin	Signal
1	GND	2	GND
3	GND	4	GND
5	DVDD_3V3	6	DVDD_3V3
7	DVDD_3V3	8	DVDD_3V3
9	PCM_FSYNC	10	GND
11	GND	12	12V_IN
13	PCM_PCLK	14	12V_IN
15	GND	16	12V_IN
17	PCM_DRX	18	NC
19	GND	20	NC
21	GND	22	SLIC_RST_N
23	NC	24	GND
25	PCM_SPI_MISO	26	PCM_DTX
27	GND	28	GND
29	SLIC_INT_N	30	PCM_SPI_CS_N
31	GND	32	GND
33	NC	34	PCM_SPI_CLK
35	NC	36	GND
37	GND	38	PCM_SPI_MOSI
39	GND	40	GND
41	NC	42	NC
43	GND	44	DVDD_1V8
45	NC	46	DVDD_1V8
47	GND	48	DVDD_1V8
49	GND	50	GND
51	GND	52	GND
53	NC	54	GND
55	GND	56	GND
57	NC	58	GND
59	GND	60	GND

4. Radio Module Specifications

4.1 Wi-Fi Capability

The AP.MR02.1 features fully integrated tri-band 4×4 MU-MIMO Wi-Fi 7 radios operating simultaneously across all three frequency bands. All three radios are driven by the Qualcomm IPQ5424 SoC and require no external M.2 or mini-PCIe radio modules.

Wi-Fi Standard	IEEE 802.11be (Wi-Fi 7) — backward compatible to 802.11a/b/g/n/ac/ax
2.4 GHz Radio	4×4 MU-MIMO 802.11b/g/n/ax/be; up to 1376 Mbps; max 23 dBm per chain
5 GHz Radio	4×4 MU-MIMO 802.11a/n/ac/ax/be; up to 8647 Mbps; max 21 dBm per chain
6 GHz Radio	4×4 MU-MIMO 802.11ax/be; up to 11530 Mbps; max 19 dBm per chain
Frequency Ranges	2.4 GHz: 2.412–2.472 GHz 5 GHz: 5.150–5.825 GHz 6 GHz: 5.945–7.125 GHz
Channel Widths	2.4 GHz: 20/40 MHz 5 GHz: 20/40/80/160/240 MHz 6 GHz: 20/40/80/160/320 MHz
Modulation	OFDMA: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
DFS Support	YES — Dynamic Frequency Selection supported
Antenna Connectors	12× U.FL connectors (4 per band)

4.2 Notes & Recommendations

- Always connect appropriate antennas to all 12 U.FL ports before powering on. Never operate with open (unterminated) U.FL connectors, as this may damage the RF front-end.
- For 6 GHz operation, ensure regulatory compliance and appropriate certification for the target market. 6 GHz band availability and permissible power levels vary by country.
- Use antennas rated for the specific frequency band (2.4 GHz, 5 GHz, or 6 GHz) and ensure 50 Ω impedance matching.
- Maintain a minimum safety distance of 20 cm from antennas during normal operation.
- Do not modify the onboard antenna circuitry or U.FL connector wiring. Unauthorised modifications will void regulatory compliance.
- The DFS feature enables automatic channel switching to avoid radar interference in the 5 GHz band. Ensure firmware configuration enables DFS if required by local regulations.

5. Mechanical Specifications

5.1 Board Dimensions

Dimensions (W × H × D)	215 mm × 180 mm × 25.5 mm
PCB Thickness	Standard (multi-layer PCB)

5.2 Environmental Ratings

Operating Temperature	-15°C to +70°C
Storage Temperature	-40°C to +90°C
Relative Humidity (Operating)	5% to 95%, non-condensing
Relative Humidity (Storage)	Max 90%, non-condensing

5.3 Mounting & Installation Notes

- The AP.MR02.1 board includes mounting holes at the corners for secure mechanical integration into an enclosure or chassis.
- Ensure adequate clearance around all connectors (RJ45, USB, U.FL, DC Jack) for cable routing.
- Provide sufficient airflow or thermal management for the SoC and on-board radio components, particularly in high-throughput applications.
- Do not stack objects directly on the board surface. Ensure the PCB is mounted horizontally or secured in a suitable bracket.
- All dimensions are in millimetres. Refer to the mechanical drawing on the datasheet for precise mounting hole locations.

6. Power Specifications

6.1 Power Requirements

Input Voltage	12 V DC (via DC Jack Connector)
Input Current	5 A (maximum)
Max Power Consumption	39.3W (board only)

6.2 Power Delivery Protection

- The board incorporates reverse polarity and over-voltage protection circuitry.
- Ensure the external power supply is rated to deliver at least 5 A at 12 V DC continuously.
- Use a regulated DC power supply. Unregulated or noisy supplies may adversely affect RF performance.

6.3 Notes & Recommendations

- Disconnect power before installing any external cables or performing maintenance.
- Never exceed 12 V DC input. Overvoltage will permanently damage the board.
- Verify power supply polarity before connecting. Reverse polarity damage may not be covered under warranty.
- Account for the full 39.3 W maximum power draw when sizing the power supply for enclosure designs.

7. Installation & Integration

Follow these steps carefully to set up or install the AP.MR02.1.

7.1 Pre-Installation Checklist

- Verify package contents (see Section 2) before starting installation.
- Prepare a 12 V DC, 5 A regulated power supply.
- Prepare external antennas for all 12 U.FL connectors (4 per band: 2.4 GHz, 5 GHz, 6 GHz).
- Prepare Ethernet cables (Cat5e or higher) for LAN/WAN connections.
- Ensure an ESD-safe work environment before handling the board. (see Section 10)
- Have a laptop or PC available for initial configuration via Ethernet.

7.2 Antenna Installation

- The AP.MR02.1 provides 12 U.FL antenna connectors, with 4 connectors per frequency band. All antenna connectors must be fitted before powering on the board.
- Identify the correct U.FL connectors for each band using the Component Map (Section 3.2).
- Press each U.FL connector cable firmly until a tactile click is felt, confirming full engagement.
- Ensure antenna cables are not sharply bent or kinked, as this degrades RF performance.

7.3 Power Connection

- Verify the power supply is rated at 12 V DC, 5 A (minimum).
- Insert the DC Jack plug firmly into the board's DC Jack socket.
- Power on the supply. The Power LED should illuminate within 2–3 seconds.
- Allow the board approximately 60 seconds to complete its boot sequence before testing connectivity.

7.4 Ethernet Connection

- Connect a PC or network device to one of the four 2.5GbE RJ45 ports (LAN).
- Connect the upstream router, modem, or network switch to one of the 10GbE RJ45 ports (WAN) for high-speed uplink.
- Ensure Ethernet cables are Cat5e or higher for 2.5GbE connections, and Cat6 or higher for 10GbE connections.
- All Ethernet ports support auto-MDI/MDIX, so straight-through or crossover cables may be used.

8. Configuration

The AP.MR02.1 runs an OpenWrt 24.10-based firmware stack and can be configured via the web user interface (webUI) or through the SSH/serial console command line

8.1 Default Settings

Default IP Address	192.168.1.1
Default Username	root
Default Password	Set on first login
Firmware	OpenWrt 24.10
Web Interface	webUI (accessible at http://192.168.1.1)
SSH Access	Port 22 (enabled by default)
UART Baud Rate	115200 bps, 8N1

8.2 Accessing the Web User Interface

- Connect a PC to one of the AP.MR02.1 Ethernet ports.
- Set the host PC's Ethernet adapter to a static IP address in the 192.168.1.x range (e.g. 192.168.1.10, subnet 255.255.255.0).
- Open a web browser and navigate to <http://192.168.1.1>.
- Log in with username root and the password set during first-time setup. If no password has been set, the browser will prompt you to create one.
- The webUI will load, providing access to network, wireless, and system configuration.

8.3 Wireless Configuration

Wireless settings must be configured via SSH or serial console command line using UCI commands or by directly editing the configuration files.

- Via Web User Interface (webUI): Navigate to Network > Wireless to configure SSIDs, security, channels, and transmit power for each band.
- Via SSH: Connect using PuTTY or any SSH client, entering the IP address 192.168.1.1 and port 22.
- Via Serial Console: Connect using TeraTerm with the UART 12-pin header (115200 bps, 8N1) and a TTL serial converter.
- Wireless configuration files are located at /etc/config/wireless.
- Use UCI commands to modify wireless settings, for example:

```
uci set wireless.wifi0.disabled='0'
```

```
uci set wireless.wifi0.htmode='EHT40'
```

```
uci commit wireless
```

```
wifi
```

- Use iw dev to verify radio status after applying changes.

9. Troubleshooting

Power LED not lit	Check 12 V DC power supply voltage and polarity. Verify DC jack connection is secure. Confirm supply provides at least 5 A continuous current.
Ethernet link not established	Verify Ethernet cable is fully seated in RJ45 port. Confirm link partner supports the relevant speed (2.5G or 10G). Try a different cable or port.
Cannot access webUI	Confirm host PC IP is set to 192.168.1.x/24. Disable any VPNs or firewall rules blocking 192.168.1.1. Verify Ethernet link LED is active.
Wi-Fi SSIDs not visible	Confirm all 12 U.FL antenna connectors are properly attached. Allow the board sufficient boot time (approximately 60 seconds). Use iw dev or uci show wireless to verify radio settings are enabled.
Poor Wi-Fi throughput	Verify antenna orientation and placement. Ensure correct channel and bandwidth settings (e.g. EHT320 for 6 GHz). Check for RF interference sources nearby.
Board overheating	Attach suitable heatsinks to the SoC. Ensure adequate airflow clearance. Verify ambient temperature is within operating range (-15 to +70°C).
Firmware upgrade fails	Do not power off during update. Use a wired Ethernet connection for firmware upload. Reset to factory defaults before upgrading if previously customised.
Optional module not detected	Ensure LASER, ZigBee, or Bluetooth module is correctly seated on its connector. Verify the module is supported by the installed firmware version.
Factory Reset	To restore factory default settings: •Press and hold the RESET button for 10 seconds while the module is powered on. •Alternatively, via SSH or serial console, run: <code>rm -rf /overlay/*</code> <code>reboot</code> The board will reboot and restore all settings to factory defaults. This process takes approximately 60 seconds.

10. Safety Precautions

Electrical Safety

- Disconnect power before connecting or disconnecting any cables or performing any maintenance.
- Never exceed the rated input voltage (12 V DC). Overvoltage will permanently damage the board.
- Verify power supply polarity before connecting. Reverse polarity damage is not covered under warranty.
- Keep the board away from conductive materials that may cause short circuits.

RF / Antenna Safety

- Never operate Wi-Fi radios without antennas or 50 Ω termination loads on all 12 U.FL ports.
- Maintain a minimum safety distance of 20 cm from antennas during normal operation.
- For 6 GHz operation, ensure regulatory approval and proper certification for the target market.
- Do not modify antennas or RF circuitry. Unauthorised modifications will void regulatory compliance.

Thermal Safety

- Operating the board above 70°C ambient temperature may cause thermal shutdown or permanent damage. Ensure adequate cooling is installed.
- Do not obstruct ventilation around the board.
- Allow the board to cool down before handling after extended operation.

ESD Precautions

- Handle the board only at a properly grounded ESD workstation.
- Wear an ESD wrist strap connected to ground at all times when handling the board.
- Store the board in its original ESD protective bag when not in use.
- Avoid touching PCB traces, IC pads, or connector pins directly.

11. Technical Support

Compex Systems Pte Ltd provides engineering and technical support for the AP.MR02.1. 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 (AP.MR02.1)	https://compex.com.sg/shop/embedded-board/802-11be-embedded-board/ap-mr02-1/
Qualcomm Design Centre	Qualcomm Authorized Design Centre (ADC) since 2014

Before contacting support, please:

- Review this user guide and the Troubleshooting section (Section 9).
- Note the firmware version (visible in webUI: System > Software).
- Record the MAC address of the board (visible on PCB label or in webUI).
- 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.

12. Full Specifications

Model Number	AP.MR02.1
SoC	Qualcomm IPQ5424 'Marina' Series, Quad-Core ARM Cortex-A55 @ 1.8 GHz
Reference Design	Qualcomm AP.MR02.1
System Memory	4 GB DDR4, 32-bit interface (standard); 8 GB DDR4, 32-bit interface (max option)
NAND Flash	256 MB
NOR Flash	32 MB
Wi-Fi Standard	IEEE 802.11be (Wi-Fi 7) — backward compatible to 802.11a/b/g/n/ac/ax
2.4 GHz Radio	4×4 MU-MIMO 802.11b/g/n/ax/be; max 23 dBm/chain; up to 1376 Mbps
5 GHz Radio	4×4 MU-MIMO 802.11a/n/ac/ax/be; max 21 dBm/chain; up to 8647 Mbps
6 GHz Radio	4×4 MU-MIMO 802.11ax/be; max 19 dBm/chain; up to 11530 Mbps
Frequency Ranges	2.4 GHz: 2.412–2.472 GHz 5 GHz: 5.150–5.825 GHz 6 GHz: 5.945–7.125 GHz
Channel Widths	2.4 GHz: 20/40 MHz 5 GHz: 20/40/80/160/240 MHz 6 GHz: 20/40/80/160/320 MHz
Modulation	OFDMA: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
DFS Support	YES
Antenna Connectors	12× U.FL connectors (4 per band)
Ethernet Ports	2× 10GbE RJ45 + 4× 2.5GbE RJ45 (LAN/WAN)
USB	1× USB 2.0 + 1× USB 3.0
Serial Debug	1× UART 12-Pin Header (TTL)
JTAG	1× JTAG 20-Pin Header
WPS	1× WPS Button

LED Indicators	7× onboard LED indicators
Optional Modules	1× LASER module, 1× ZigBee module, 1× Bluetooth module
Power Interface	1× DC Jack (12 V, 5 A)
Max Power Consumption	39.3 W (board only)
Dimensions (W×H×D)	215 mm × 180 mm × 25.5 mm
Operating Temperature	-15°C to +70°C
Storage Temperature	-40°C to +90°C
Operating Humidity	5% to 95% (non-condensing)
Storage Humidity	Max. 90% (non-condensing)
OS / Firmware	OpenWrt 24.10
SDK	SDKs with QCA binary drivers available for software developers
Accessories	JTAG Programmer, Serial Converter, Power Supply (if available)
Certification	REACH & RoHS Compliant
Ordering Code	AP.MR02.1 PR32F4G1.0-TE

13. Regulatory Information

Declaration of Conformity

The AP.MR02.1 is designed to comply with applicable regional regulatory requirements. End-product manufacturers are responsible for obtaining all necessary regulatory certifications (e.g., FCC, CE, IMDA) for their final product in each target market. The AP.MR02.1 is provided as an embedded module for OEM/ODM integration and does not carry end-product regulatory approval.

6GHz Band Restrictions

Operation in the 6 GHz frequency band (when enabled via an installed M.2 radio module) 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). These regulations restrict the use of hazardous substances in electrical and electronic equipment.

Disposal & Recycling

Do not dispose of this product in unsorted municipal waste. 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 authorized recycling facility or contact Compex Systems for take-back options.

Legal Notices

Qualcomm and IPQ5424 are trademarks or registered trademarks of Qualcomm Technologies, Inc. Compex® and the Compex logo are trademarks of Compex Systems Pte Ltd. All other trademarks are the property of their respective owners.

Copyright

© 2026 Compex Systems Pte Ltd. All rights reserved.

