



**Product User Manual For
WIRELESS N MODULE**

(Ralink Solution) Model

Number: WMP-N07

Revision: 1.0



Revision History

Rev.	Date	Author	Reason for Changes
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1.0 Scope

1.1 Document This document is to specify the product requirements for **WIRELESS N MODULE**. This Mini-PCI Card is

based on Ralink RT2800 chipset that complied with 802.11n draft 1.0 standard from 2.4~2.5GHz, and it can be used to provide up to 11Mbps for IEEE 802.11b and 54Mbps for 2.4GHz IEEE 802.11g to connect your wireless LAN.

With seamless roaming, fully interoperability and advanced security with WEP standard, **WIRELESS N MODULE** offers absolute interoperability with different vendors' 802.11b/g MIMO Access Points through the wireless LAN.

1.2 Product Features

- Compatible with IEEE 802.11b high rate standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11g higher speed standard to provide wireless 54Mbps data rate
- Operation at 2.4 ~ 2.5GHz frequency band to meet worldwide regulations
- Dynamic data rate scaling at 6, 9, 12, 18, 24, 36, 48, 54 for 802.11g
- Dynamic data rate scaling at 1, 2, 5.5, and 11Mbps for IEEE 802.11b
- Compatible with IEEE 802.11n draft 1.0 higher speed standard in High Throughput mode from MCS-0 to MCS-15. The HT data rate refers to Appendix A.
- Maximum reliability, throughput and connectivity with automatic data rate switching
- Supports wireless data encryption with 64/128/152-bit WEP for security
- Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
- Supports WPA and AES enhanced security
- Supports VLAN tagging
- Friendly user configuration and utilities
- Drivers support Windows 98SE, ME, 2K, and XP
- Supports Mini-PCI Type IIIB form factor

2.0 Requirements

The following sections identify the detailed requirements of the **WIRELESS N MODULE**.

2.1 Functional Block Diagram

N/A

2.2 General Requirements

2.2.1 IEEE 802.11b Section

	Feature	Detailed Description
2.2.1.1	Standard	☒ IEEE 802.11b
2.2.1.2	Radio and Modulation Schemes	☒ DQPSK, DBPSK, DSSS, and CCK
2.2.1.3	Operating Frequency	☒ 2400 ~ 2497MHz ISM band
2.2.1.4	Channel Numbers	☒ 11 channels for United States ☒ 13 channels for Europe Countries ☒ 14 channels for Japan
2.2.1.5	Data Rate	☒ 11, 5.5, 2, and 1Mbps
2.2.1.6	Media Access Protocol	☒ CSMA/CA with ACK
2.2.1.7	Transmitter Output Power	☒ IEEE 802.11b: 22.71dBm
2.2.1.8	Receiver Sensitivity	☒ Typical -84dBm for 11Mbps @ 8% PER ☒ Typical -90dBm for 2Mbps @ 8% PER

2.2.2 IEEE 802.11g Section

	Feature	Detailed Description
2.2.2.1	Standard	☒ IEEE 802.11g
2.2.2.2	Radio and Modulation Schemes	☒ BPSK, QPSK, 16QAM, 64QAM, and OFDM
2.2.2.3	Operating Frequency	☒ 2400 ~ 2483.5MHz ISM band
2.2.2.4	Channel Numbers	☒ 11 channels for United States ☒ 13 channels for Europe Countries ☒ 13 channels for Japan
2.2.2.5	Data Rate	☒ 6,9,12,18,24,36,48,54Mbps
2.2.2.6	Media Access Protocol	☒ CSMA/CA with ACK
2.2.2.7	Transmitter Output Power	☒ IEEE 802.11g: 20.82dBm
2.2.2.8	Receiver Sensitivity	☒ Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% ☒ -86dBm at 6Mbps ☒ -86dBm at 9Mbps ☒ -84dBm at 12Mbps ☒ -82dBm at 18Mbps ☒ -78dBm at 24Mbps ☒ -75dBm at 36Mbps ☒ -71dBm at 48Mbps ☒ -70dBm at 54Mbps

2.2.3 High Throughput Section (HT Mode)

	Feature	Detailed Description
2.2.2.1	Standard	☒ IEEE 802.11n draft 1.0
2.2.2.2	Radio and Modulation Type	☒ BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.2.3	Operating Frequency	☒ 2400 ~ 2483.5MHz ISM band
2.2.2.4	Channel Numbers	☒ 11 channels for United States ☒ 13 channels for Europe Countries ☒ 13 channels for Japan
2.2.2.5	Data Rate	☒ From MCS – 0 to MCS –15 as shown in Appendix A
2.2.2.6	Media Access Protocol	☒ CSMA/CA with ACK
2.2.2.7	Transmitter Output Power	☒ IEEE 802.11n HT20: 20.61dBm ☒ IEEE 802.11n HT40: 20.47dBm
2.2.1.8	Receiver Sensitivity	☒ Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% ☒ –88dBm at BPSK, coding rate 1/2 (MCS-0) ☒ –84dBm at QPSK, coding rate 1/2 (MCS-1) ☒ –81dBm at QPSK, coding rate 3/4 (MCS-2) ☒ –78dBm at 16-QAM, coding rate 1/2 (MCS-3) ☒ –75dBm at 16-QAM, coding rate 3/4 (MCS-4) ☒ –70dBm at 64-QAM, coding rate 2/3 (MCS-5) ☒ –69dBm at 64-QAM, coding rate 3/4 (MCS-6) ☒ –68dBm at 64-QAM, coding rate 5/6 (MCS-7)

2.2.4 General Section

	Feature	Detailed Description
2.2.3.1	Antenna Connector	☒ Three UFL antenna connectors
2.2.3.2	Operating Voltage	☒ 3.3VDC +/- 10%
2.2.3.3	Current Consumption	☒ 800mA at continuous transmit mode (2 Tx chains on) ☒ 450mA at continuous receive mode (3 Rx chains on)
2.2.3.4	Form Factor and Interface	☒ Mini-PCI Type IIIB form factor
2.2.3.5	LEDs	☒ External LED function supported

2.3 Software Requirements

The Configuration Software supports Microsoft Windows 98SE, ME, 2000, and XP. This configuration software includes the following functions:

Information

Information allows you to monitor network status.

Configuration

Configuration allows you to configure parameters for wireless networking.

Security

Supports enhanced security WEP, 802.1x, WPA.

2.3.1 Information

	Feature	Detailed Description
2.3.1.1	General Information	<input checked="" type="checkbox"/> General Information shows the name of Wireless Adapter, Adapter MAC Address, Regulatory Domain, Firmware Version, and Utility Version.
2.3.1.2	Current Link Information	<input checked="" type="checkbox"/> Current Link Information shows the Current Setting ESSID, Channel Number, Associated BSSID, Network Type (infrastructure or Ad-hoc network), WEP Status (enable or disable), Link Status (Connect or Disconnect), 802.11g Transmit Speed (6, 9, 12, 18, 24, 36, 48, 54Mbps), 802.11b Transmit Speed (1, 2, 5.5, 11Mbps), Signal Strength, and Link Quality.
2.3.1.3	Site survey	<input checked="" type="checkbox"/> To search the neighboring access points and display the information of all access points.

2.3.2 Configuration

	Feature	Detailed Description
2.3.2.1	ESS ID	<input checked="" type="checkbox"/> Input an SSID number if the roaming feature is enabled <input checked="" type="checkbox"/> Supports for ASCII printable characters.
2.3.2.2	Network Type	<input checked="" type="checkbox"/> Ad-hoc Mode and 802.11 Ad-hoc Mode for network configurations that do not have any access points <input checked="" type="checkbox"/> Infrastructure Mode for network configurations with access points
2.3.2.3	Power Save	<input checked="" type="checkbox"/> Extend the battery life of clients by allowing the client to sleep for short periods of time while the Access Point buffers the messages.
2.3.2.4	RTS Threshold	<input checked="" type="checkbox"/> Set the number of bytes used for fragmentation boundary for messages
2.3.2.5	Fragment Threshold	<input checked="" type="checkbox"/> Set the number of bytes used for RTS/CTS boundary
2.3.2.6	Transmission Speed	<input checked="" type="checkbox"/> This indicates the communication rates. Select appropriate transmission speed to match your wireless LAN settings
2.3.2.7	Roaming	<input checked="" type="checkbox"/> Support Automatic or Manual Rescan to associate with access point.

2.3.3 Security

	Feature	Detailed Description
2.3.3.1	Encryption	<input checked="" type="checkbox"/> RC4 encryption algorithm <input checked="" type="checkbox"/> Support 64/128/152 bit WEP encryption <input checked="" type="checkbox"/> Support open system and shared key authentication

	Feature	Detailed Description
2.3.3.2	WEP Management	<input checked="" type="checkbox"/> Four WEP keys can be selected <input checked="" type="checkbox"/> STA with WEP off will never associate any AP with WEP enabled <input checked="" type="checkbox"/> WEP Key Format: Option for Hex format
2.3.3.3	802.1x	<input checked="" type="checkbox"/> Support EAP-TLS, EAP-TTLS, and EAP-PEAP
2.3.3.4	WPA	<input checked="" type="checkbox"/> Support WPA-PSK and WPA-EAP <input checked="" type="checkbox"/> Support Cipher Mode AES and TKIP

2.4 Mechanical Requirements

	Feature	Detailed Description
2.4.1	Length	<input checked="" type="checkbox"/> 50.8mm
2.4.2	Width	<input checked="" type="checkbox"/> 59.59mm
2.4.3	Height	<input checked="" type="checkbox"/> 0.99mm

2.5 Compatibility Requirements

This device passes the following compatibility requirements.

	Feature	Detailed Description
2.5.1	Wi-Fi	<input checked="" type="checkbox"/> Meet Wi-Fi certification for IEEE 802.11 product
2.5.2	WHQL	<input checked="" type="checkbox"/> Meet applicable WHQL certification requirements
2.5.3	Physical Layer and Functionality	<input checked="" type="checkbox"/> Meet ALPHA Engineering Test Plan and Test Report

2.6 Requirements of Reliability, Maintainability and Quality

	Feature	Detailed Description
2.6.1	MTBF	<input checked="" type="checkbox"/> Mean Time Between Failure > 30,000 hours
2.6.2	Maintainability	<input checked="" type="checkbox"/> There is no scheduled preventive maintenance required
2.6.3	Quality	<input checked="" type="checkbox"/> The product quality is followed-up by ALPHA factory quality control system

2.7 Environmental Requirements

	Feature	Detailed Description
2.7.1	Operating Temperature Conditions	<input checked="" type="checkbox"/> The product is capable of continuous reliable operation when operating in ambient temperature of 0 °C to +55°C.
2.7.2	Non-Operating Temperature Conditions	<input checked="" type="checkbox"/> Neither subassemblies is damaged nor the operational performance is degraded when restored to the operating temperature after exposing to storage temperature in the range of -20 °C to +75 °C.
2.7.3	Operating Humidity conditions	<input checked="" type="checkbox"/> The product is capable of continuous reliable operation when subjected to relative humidity in the range of 10% and 90% non-condensing.
2.7.4	Non-Operating Humidity Conditions	<input checked="" type="checkbox"/> The product is not damaged nor the performance is degraded after exposure to relative humidity ranging from 5% to 95% non-condensing

Federal Communications Commission (FCC) Statement

This Equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Reorient or relocate the receiving antenna.**
- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- **Consult the dealer or an experienced radio/TV technician for help.**

FCC Statements:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and**
- (2) This device must accept any interference received, including interference that may cause undesired operation.**

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

This compliance to FCC radiation exposure limits for an uncontrolled environment and minimum of 20 cm separation between antenna and body.

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product which integrates this module. LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: S9ZCAMWMPN07 ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.