Airgo Networks

AGN0912AR-01

Installation and Configuration Guide

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AGN0912AR-01 BBGW Radio--2.4 GHz MISO Design Details

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Product Description

Airgo Network's AGN0912AR-01 product design is based on Airgo's advanced two- receiver AGN103BB and AGN100RF chipset. The product is designed specifically for Broadband Gateways and other similar Access Point applications. Airgo Network's patented multi-antenna technology yields enhanced range and provides data rates of up to 10 times the competition at the same range. Airgo's patented True MIMO™ multi-antenna technology enables the AGN0912AR-01 to deliver 108 Mbps data rates in a single 20 MHz channel that is legal worldwide. Full support for IEEE 802.11b/g standards allows for an unprecedented level of backwards compatibility and performance at all data rates. Airgo Networks has shattered the previous definition of range, speed giving you maximum performance and feature advantages.

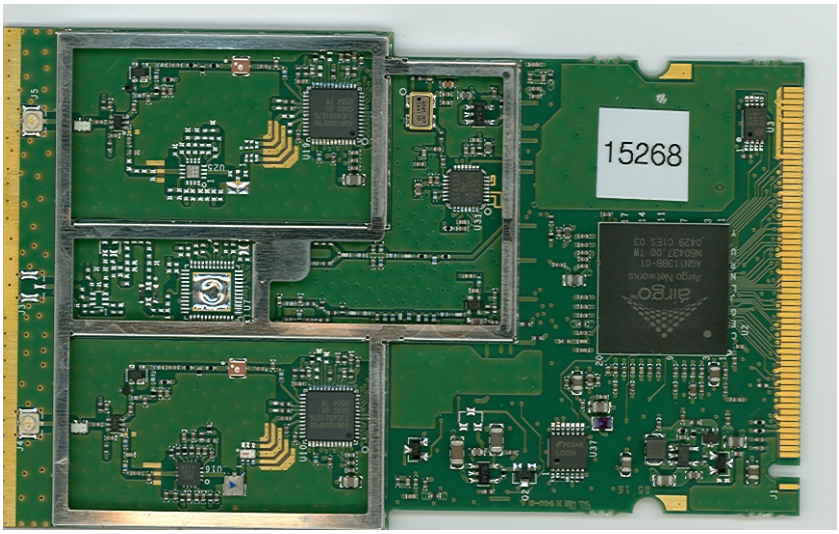

Figure 1 AGN0912AR-01

Users will no longer be frustrated by severe degradations in performance as they move away from Access Points (APs). Airgo's technology delivers up to five times the range and ten times the data rates of other vendor solutions, thus significantly increasing network capacity and reducing total cost of ownership. Although the AGN0912AR-01 displays high performance and range in any Wi-Fi environment, its file transfer rate, robustness and range are greatly enhanced when it is used in conjunction with Airgo's True MIMO™ -based Client Adapters, with data rates up to 108 Mbps.

Airgo's patented True MIMO™ multi-antenna technology also permits the AGN0912AR-01 to communicate simultaneously with legacy devices at standard 802.11 b/g rates, while communicating with Airgo True MIMO™ enabled devices (APs and clients) at data rates up to 108 Mbps. This is enabled by the AGN0912AR-01's use of True MIMO™ or standards compliant modulation on a packet by packet basis, depending on the capability of the device at the other end of the link.

Major Features

- Highly integrated chipset for IEEE 802.11b and 802.11g standards provides reduced BOM costs, and seamless roaming between all standards
- Muti-Antenna MISO OFDM technology yields extreme rate and range advantages over other vendor radio implementations
- Data rates up to 108 Mbps in the 2.4 GHz band within a single channel yield unprecedented throughput and capacity
- Radio supports the 2.4 GHz ISM band providing worldwide operation.
- Hardware Security Support for the latest standards increases system performance
- Multiple Quality of Service (QoS) features supports multi-media applications
- 802.11 compliant and Airgo's protocol enhancements yield industry-best throughput
- Wi-Fi , WHQL, FCC and TELEC certifiable modules

Applications

- WLAN Access Points and Bridges
- Voice and Video over WLAN applications

Standards Supported

- IEEE 802.11b
- IEEE 802.11d
- IEEE 802.11e
- IEEE 802.11f
- IEEE 802.11g
- IEEE 802.11i draft
- IEEE 802.11j draft
- IEEE 802.11k draft
- Wi-Fi Protected Access TKIP encryption
- Wi-Fi Protected Access AES-CCMP encryption
- Wi-Fi (WMM) Wi-Fi Wireless Multimedia
- Wi-Fi (WSM) Wireless Scheduled Multimedia

Chipset

- AGN103BB Single Chip integrated Baseband and MAC
- AGN100RF Single Chip (2.4 GHz) Transceiver

Data Rates Supported

- IEEE 802.11b: 1, 2, 5.5 and 11 Mbps
- IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- Proprietary Operation at: 72, 96 and 108 Mbps within a single 20 MHz channel for 2.4GHz band
- Switching time between any mode: < 3ms
- Background Scanning and on-the-fly switching between any of the above standards and modes.

Frequency Range Supported

- 2.4 GHz: Channels 1 to 14; 2.412 to 2.484 GHz[1]

Modulation Supported

- OFDM: BPSK, QPSK, 16QAM, 64QAM, Proprietary MIMO modulation
- BPSK, QPSK, CCK, DSSS

[1] The supported frequency range and transmit power will be limited based on the ISO Country Code in EEPROM to adhere to country specific regulatory requirements.

Noise Figure

The following table lists the noise figure for the frequency band:

Frequency Band	Noise Figure (dB)
2.4 GHz	4.0

Output Power

Maximum transmitted power shown in the tables below is limited by EVM and performance. In typical end user product operation, actual maximum transmit power will vary based on regulatory requirements.

		Maximum Transmit Power*									
Channel Number	Frequency MHz	Modulation Rate									
		1-11	6-12	18	24	36	48	54	72	96	108
1	*2412*	17	17	17	17	17	16	14	16	14	14
2	*2417*	17	17	17	17	17	16	14	16	14	14
3	*2422*	17	17	17	17	17	16	14	16	14	14
4	*2427*	17	17	17	17	17	16	14	16	14	14
5	*2432*	20	20	19	19	17	16	14	16	14	14
6	*2437*	20	20	19	19	17	16	14	16	14	14
7	*2442*	20	20	19	19	17	16	14	16	14	14
8	*2447*	20	20	19	19	17	16	14	16	14	14
9	*2452*	17	17	17	17	17	16	14	16	14	14
10	*2457*	17	17	17	17	17	16	14	16	14	14
11	*2462*	17	17	17	17	17	16	14	16	14	14
12	*2467*	17	17	17	17	17	16	14	16	14	14
13	*2472*	17	17	17	17	17	16	14	16	14	14
14	*2484*	17	17	17	17	17	16	14	16	14	14

Typical Receiver Sensitivity

The following figures depict Rx Sensitivity in dBm as defined in IEEE 802.11 specification(s)

2.4 GHz CCK (8% PER)	
Data Rate	2Rx
1	-102.5
2	-101.5
5.5	-100.5
11	-97.5

2.4 GHz OFDM (10% PER)	
Data Rate	2Rx
6	-99.5
9	-97.5
12	-94.5
18	-93.5
24	-89.5
36	-87.5
48	-82.5
54	-81.5

Security Features

- Hardware Support for 40bit and 128bit WEP
- Software Support for Wi-Fi Protected Access WPA (TKIP encryption)
- Hardware-based AES-CCM (Advanced Encryption Standard IEEE TGi draft compliant)

Quality of Service (QoS) Features

- Support for IEEE 802.11e DCF (WMM: Wi-Fi Multimedia)
- Hybrid Coordination Function (HCF), (WSM: Wi-Fi Scheduled Multimedia)
- Burst ACK and Enhanced Distributed Coordination Function (eDCF)
- 256 user queues for packet prioritization

Interfaces

- 32bit 3.3volt Cardbus (PC Card v7.1) compliant
- PCI/MiniPCI ver2.2 Compliant with bus-master and slave-mode support

Physical

- MiniPCI Interface Extended form factor

Antenna Connections

Three U.FL connectors (also known as IPAX or Hirose connectors).

Interfaces

- PCI/MiniPCI ver2.2 Compliant with slave mode support.
- On-chip ADCs and DACs
- GPIO interface
- I and Q for RF analog
- SPI for RF Control
- SDRAM Interface (optional)

External Memory Support

- SEEPROM
- SDRAM (optional)

Additional Hardware Features

- Hardware based Multicast address filtering
- Automatic RTS/CTS generation
- Independent AGC functions for up to 3 receive chains
- Enhanced Interference Avoidance
- Beacon Mode hardware support
- Programmable defer / detect thresholds
- Automatic transmit gain control compensates for gain.

Typical Power Consumption

- 808mW @54Mbps (10% Tx, 20% Rx, 20% Listen, 50% Sleep)

Operating Parameters

- **Operating Voltage: 3.3V +/- .10V**
- **Operating Temperature Range: -10 to +85C**
- **Operating Humidity Range: 15% - 95%, non-condensing**

AGN0912AR-01 Installation

The AGN0912AR-01 is designed specifically for Broadband Gateways and other similar Access Point applications. The AGN0912AR-01 uses a miniPCI connector for insertion into an attaching system. However, the AGN0912AR-01 does not conform to the miniPCI PCB size or power restrictions.

Below is a "typical" AGN0912AR-01 module installation:

- Align the miniPCI connector on the AGN0912AR-01 with the miniPCI receptacle on the attaching system, taking care to fit the notch in the bottom left of the radio module with the tab on the miniPCI receptacle on the attaching system (see Figure 3).

- Firmly press the radio card towards the attaching system until the clips engage.

- **Disseminating end-user documentation for the installation/removal of the AGN0912AR-01 is expressly prohibited by regulatory statues.**

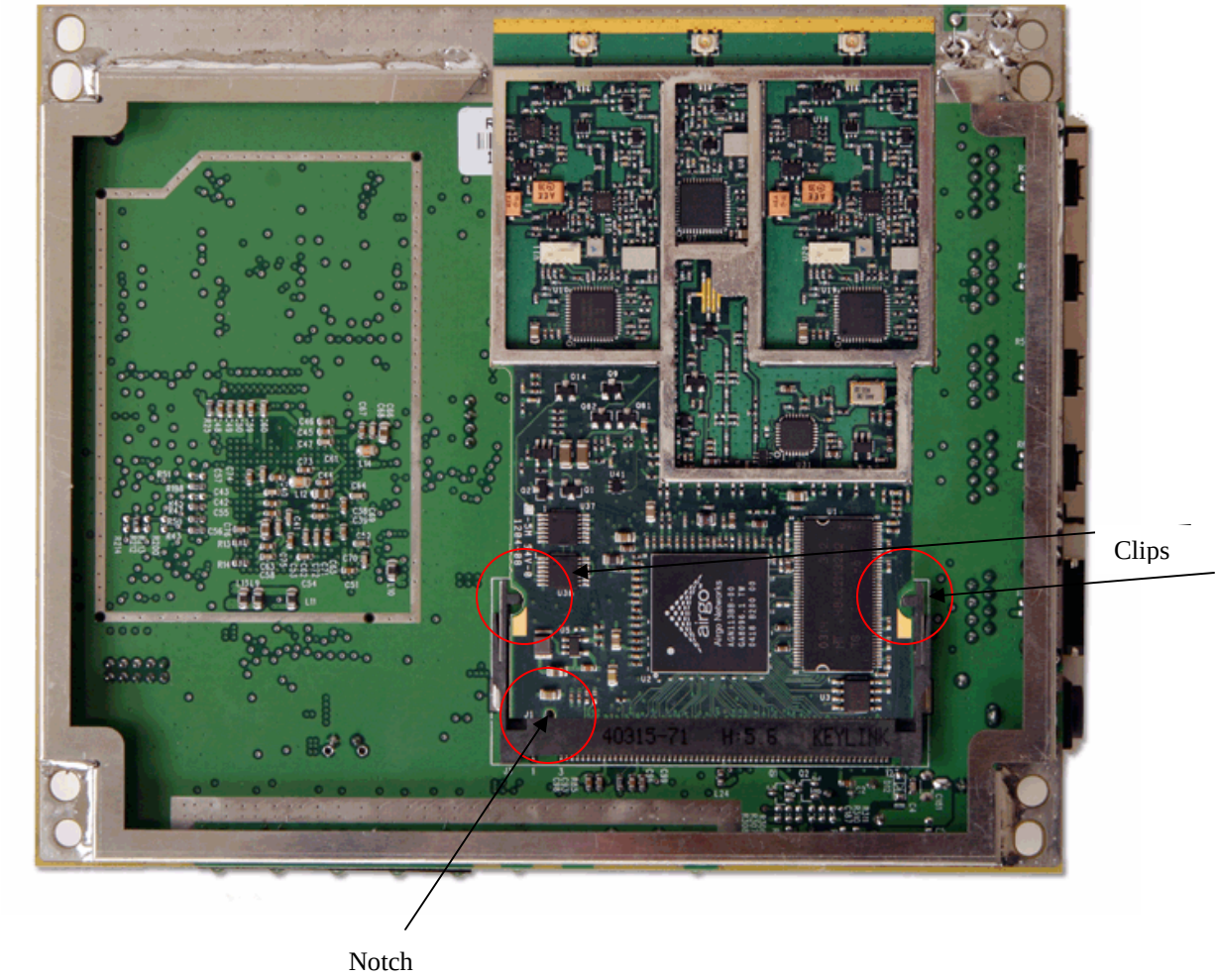

Figure 2 Radio Module Alignment

AGN0912AR-01 Antenna Specifications

The AGN0912AR-01 provides support for three antennas per radio module. These antennas are connected by way of Hirose connectors. It must be noted that there are no special requirements for the types of antennas used with Airgo's MIMO technology. The specifications for the antennas that have been used with the AGN0912AR-01 are as follows:

- Frequency Range: 2.4 to 2.5 GHz
- Impedance: 50 Ohms nominal
- VSWR: 2.0
- Normal Gain: 2 dBi @ 2.45GHz
- Radiation: Omni-directional
- Polarization: Vertical

Regulatory

Product Labeling

The AGN0912AR-01 radio transmitter module is authorized only for use in a device where the antenna may be installed such that 20 cm can be maintained between the antenna and the users. End-user products containing AGN0912AR-01 modules **MUST** have affixed to their labels the following phrase:

This product contains FCC ID: SA3-AGN0912AR0100 modules.

Product Usage

This device is intended only for OEM/ODM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users.
2. The transmitter module may not be co-located with any other transmitter or antenna.
3. Use only authorized antenna(s) as described in the FCC filing under FCCID:SA3-AGN0912AR0100

The OEM/ODM integrator is responsible for testing their product for any additional compliance mandates required when this module is installed within an end-user product.

i IMPORTANT NOTE: In the event that these conditions cannot be met, then the FCC authorization is no longer considered valid and the FCC ID number cannot be used on the final product and thus the OEM/ODM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Product Documentation

Following RF exposure information shall be supplied in end-users manual for products containing the AGN0912AR-01:

IMPORTANT NOTE:
To comply with FCC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Physical Dimensions