Product Specifications

AWPC085

IEEE 802.11a/b/g single chip mini PCI

V 0.1

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Revision History

Edition #	*Reason for revision*	*Issue date*	*Written by*
V 0.1	♦ Initial Document	Nov. 01, 2004	Jason Lee
	♦		

Chapter 1 Introduction

1. Introduction

The AWPCI085 is an IEEE 802.11a/b/g standard compatible mini PCI Card, which supports high data rate up to 54Mbps (for 802.11a or g) over the Ethernet speed, while remaining backward compatible to the existing installed base of 802.11b over 15 million Wi-Fi systems worldwide. AWPCI085 enables a high-data-rate platform for operation in the 2.4 GHz band as well as in 5 GHz that deliver a five-fold speed increase. The world band 5GHz coverage from 4.9GHz to 5.8GHz meets worldwide 11a regulation. The cost and performance advantages will make it an ideal solution for high bandwidth enterprise applications, such as wireless video conferencing and large file transfers, as well as advanced home networking applications such as multi-channel CD-quality audio and DVD-quality video streaming. AWPCI085 incorporates the 802.11g Standard mandatory modulation schemes—Complementary Code Keying (CCK), which is used in 802.11b, and Orthogonal Frequency Division Multiplexing (OFDM), used in 802.11g or 11a. Using CCK ensures backward-compatibility with the installed Wi-Fi 802.11b base, while OFDM provides the speed required for today's high-bandwidth applications.

1.1 Product Features

- ♦ High speed for wireless LAN connection, up to 54 Mbps data rate in 11a or 11g standard.
- ♦ **Support for 802.11a or 802.11g with enhanced “Super A/G mode” for high data throughput access.**
- ♦ **Atheros Super AG mode, offering up to 108Mbps**
- ♦ **Extended Range feature supported**
- ♦ Backward compatible to the existing IEEE 802.11b WLAN infrastructure.
- ♦ An user-friendly utility to configure SSID, security setup and site survey.
- ♦ Wireless data encryption with 64, 128 encryption for security.
- ♦ Support for WPA.
- ♦ Hardware AES Accelerator.
- ♦ Hardware built-in dual diversity antenna
- ♦ Firmware upgradeable by only changing driver.

1.2 Applications

- ♦ Home networking for device sharing.
- ♦ Wireless multimedia.

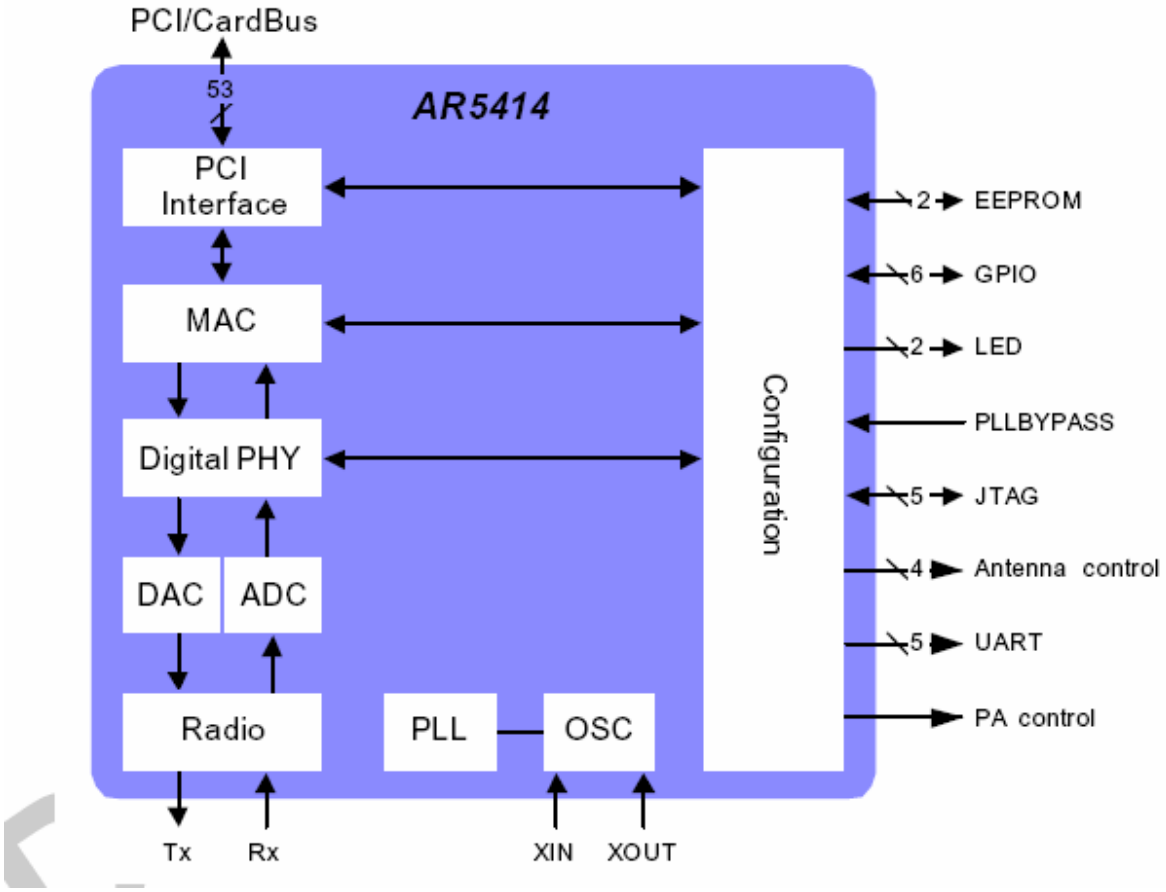
- Wireless office for extension Ethernet range.
- Mobile networking for notebook PC, PDA, Web Pad or Wireless Gateway Built-in Application.

Chapter 2 Hardware

2.1 General Overview

- Power: 3.3V, DC input.
- Antenna connector: Two Hirose, FL-R-SMT (01) coaxial connectors.

2.2 Hardware Architecture



2.3 Main chip information:

2.3.1 **AR5414:** An IEEE 802.11g MAC + Baseband processor, AES Hardware accelerator, on-chip SRAM memory and MiniPCI/PCI bus interface. Radio-on-Chip (RoC). A zero-IF direct down conversion transceiver. a 2.4GHz power amplifier, 5GHz SiGe monolithic VCO.

Chapter 3 Appearance

Chapter 4 Specifications

- Frequency Band:
  802.11a Radio: 5.15 ~ 5.85 GHz
  802.11g Radio: 2.4 GHz~2.497GHz
- Modulation TYPE: OFDM, CCK
- Security: Hardware 64/128-bit WEP/TKIP/AES-CCM/ 802.1x, WPA
- Operating Voltage: 3.0V ~ 3.6V
- Transmitted Power: *See Table 1(will update later)*
- Rates/Sensitivity/Allowable Path Loss: *See the Table 2(will update later)*
- Mechanical specification:
  - miniPCI Type 3B
- Regulatory compliance:
  - Power Limit: FCC 15.407
  - IC
  - ETSI
- Current consumption:
  - 11a: TX: 520mA Max; RX: 390mA Max; Power Saving: 20mA
  - 11g: TX: 540mA Max; RX: 350mA Max; Power Saving: 20mA
  - 11b: TX: 540mA Max; RX: 350mA Max; Power Saving: 20mA
- Operating Temperature: 0 ~ 50 ^{o}C ambient
- Storage Temperature: -20 ~ 75 ^{o}C ambient
- Humidity: 5 ~ 90% and must be non-condensing
- ESD: EN61000-4-2, which specifies 4kV contact and 8kV air discharge.

Table 1: Modulation Scheme and Nominal Transmit Power

Modulation Rate	Output Power 2.4-2.5GHz	Output Power 5.15-5.25GHz	Output Power 5.25-5.725GHz	Output Power 5.725-5.850GHz
802.11b (1Mbps)	19	NA	NA	NA
802.11b (5.5Mbps)	19	NA	NA	NA
802.11b (11Mbps)	19	NA	NA	NA
802.11g (6Mbps)	18	NA	NA	NA
802.11g (36Mbps)	17	NA	NA	NA
802.11g (48Mbps)	16	NA	NA	NA
802.11g (54Mbps)	15	NA	NA	NA
802.11a (6Mbps)	NA	17	17	17
802.11a (36Mbps)	NA	16	16	16
802.11a (48Mbps)	NA	14	14	14
802.11a (54Mbps)	NA	13	13	13
Modulation Rate	**Output Power**			
MKK (6Mbps)	17			
MKK (36Mbps)	14			
MKK (48Mbps)	13			
MKK (54Mbps)	11			

Note:

1. **The listed output power is nominal value.**
2. **The acceptable tolerance for power variation is +1, -1.5dB from nominal value.**

Modulation Rate	Receiver Sensitivity (dBm) 2.412 ~ 2.484 GHz
802.11b – 1Mbps	-95
802.11b – 2Mbps	-93
802.11b – 5.5Mbps	-91
802.11b– 11Mbps	-89

Table 2: Typical Range at Which Frame (1000 Bytes PDUs) Packet Error Rate=10%

Modulation Rate	Receiver Sensitivity (dBm) 2.412 ~ 2.5 GHz
802.11g – 1Mbps	**-99**
802.11g – 2Mbps	**-97**
802.11g – 3Mbps	**-96**
802.11g– 6Mbps	**-91**
802.11g – 9Mbps	**-90**
802.11g – 12Mbps	**-90**
802.11g – 18Mbps	**-88**
802.11g– 24Mbps	**-84**
802.11g-36Mbps	**-81**
802.11g – 48Mbps	**-76**
802.11g – 54Mbps	**-74**
802.11g – 1Mbps	**-95**
802.11g– 2Mbps	**-93**
802.11g – 5.5Mbps	**-91**
802.11g – 11Mbps	**-89**

Modulation Rate	Receiver Sensitivity (dBm) 5.15 ~ 5.85 GHz
802.11a – 1Mbps	**-99**

802.11a – 2Mbps	**-97**
802.11a – 3Mbps	**-96**
802.11a– 6Mbps	**-91**
802.11a– 9Mbps	**-90**
802.11a – 12Mbps	**-89**
802.11a – 18Mbps	**-88**
802.11a– 24Mbps	**-83**
802.11a– 36Mbps	**-80**
802.11a – 48Mbps	**-75**
802.11a – 54Mbps	**-73**

Table 3: WLAN Throughput

Throughput	Data Rate	Operating Distance

> 20 Mbps	54 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area – probably not work at this distance • 100 feet – Indoors, Office environment
> 18 Mbps	54 Mbps (b/g mixed mode w/o b client)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 6 Mbps	54 Mbps (b/g mixed mode with 2 active b clients)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 17 Mbps	36 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 13 Mbps	24 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 11 Mbps	18 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 7.9 Mbps	12 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 6.2 Mbps	9 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 4.4 Mbps	6 Mbps (“a” or “g” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
> 4.5 Mbps	11 Mbps (“b” mode)	• 1000 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
>2 Mbps	5.5 Mbps (“b” mode)	• 1100 feet – Outdoors Open Area • 200 feet – Indoors, Office environment
>700 Kbps	1 Mbps (“b” mode)	• 1200 feet – Outdoors Open Area • 300 feet – Indoors, Office

		environment

Also, for reference:11a

Throughput	Data Rate	Operating Distance
> 28 Mbps	54 Mbps	• 100 feet – Outdoors Open Area • 40 feet – Indoors, Office environment • 75 feet indoors
>20 Mbps	48 Mbps	• 150 feet – Outdoors Open Area • 75 feet – Indoors, Office environment • 155 feet indoors
>17 Mbps	36 Mbps	• 200 feet – Outdoors Open Area • 85 feet – Indoors, Office environment • 167 feet indoors
>10 Mbps	24 Mbps	• 250 feet – Outdoors Open Area • 100 feet – Indoors, Office environment
>7.5 Mbps	18 Mbps	• 350 feet – Outdoors Open Area • 125 feet – Indoors, Office environment • 199 feet indoors
>5 Mbps	12 Mbps	• 550 feet – Outdoors Open Area • 150feet – Indoors, Office environment • 216 feet indoors
>3.7 Mbps	9 Mbps	• 700 feet – Outdoors Open Area • 225feet – Indoors, Office environment • 228 feet indoors
>2.5 Mbps	6 Mbps	• 1000 feet – Outdoors Open Area • 300 feet – Indoors, Office environment • beyond size of building

Also for reference: 11g/b

Throughput	Data Rate	Operating Distance

>27 Mbps	54 Mbps (802.11g)	• 250 feet – Outdoors Open Area • 50 feet – Indoors, Office environment • 58 feet indoors
>24 Mbps	48 Mbps (802.11g)	• 350 feet – Outdoors Open Area • 75 feet – Indoors, Office environment • 96 feet indoors
>18 Mbps	36 Mbps (802.11g)	• 500 feet – Outdoors Open Area • 100 feet – Indoors, Office environment • 155 feet indoors
>12 Mbps	24 Mbps (802.11g)	• 600 feet – Outdoors Open Area • 125 feet – Indoors, Office environment • 183 feet indoors
>9 Mbps	18 Mbps (802.11g)	• 750 feet – Outdoors Open Area • 150 feet – Indoors, Office environment • 214 feet indoors
>6 Mbps	12 Mbps (802.11g)	• 1000 feet – Outdoors Open Area • 200 feet – Indoors, Office environment • 228 feet indoors
>4 Mbps	9 Mbps (802.11g)	• 1125 feet – Outdoors Open Area • 225 feet – Indoors, Office environment • beyond size of building
>3 Mbps	6 Mbps (802.11g)	• 1250 feet – Outdoors Open Area • 250 feet – Indoors, Office environment • beyond size of building
>6.0 Mbps	11 Mbps (802.11b)	• 500 feet – Outdoors Open Area • 100 feet – Indoors, Office environment • 180 feet indoors
>3.5 Mbps	5.5 Mbps (802.11b)	• 700 feet – Outdoors Open Area • 150 feet – Indoors, Office environment • beyond size of building
>1.5 Mbps	2 Mbps (802.11b)	• 1100 feet – Outdoors Open Area • 200 feet – Indoors, Office environment • beyond size of building

References

- **Atheros Reference Design Functional Specification**
- **IEEE 802.11a Standard Specification**
- **IEEE 802.11b Standard Specification**
- **IEEE 802.11g Standard Specification**