PRISM II™ 11Mbps Wireless Local Area Network PC Card

INTERSIL PRISM RADIO CHIP SET

The Intersil HWB3163 WLAN PC Card (Note 1) is a complete wireless high speed Network Interface Card (NIC) utilizing the Intersil PRISM II Direct Sequence Spread Spectrum Wireless Transceiver chip set. It provides a complete evaluation platform of hardware and software to system providers or integrators requiring wireless data communications capability and is ideal for integration into computer platforms.

Evaluation kits include two WLAN PC cards, a Microsoft® Windows® 95/98/NT Driver, LANEVAL software, PRISM® Transmitter Test Utilities (PTTU) software (Note 3) and documentation to get your evaluation started quickly. Supporting the IEEE 802.11 network specification for Direct Sequence Spread Spectrum DSSS signaling, the card is packaged in a PCMCIA Type II extended cover set. The card provides data rates of 1, 2, 5.5 and 11Mbps. Access Points will be available from a number of suppliers, enabling a total wireless network solution.

TYPICAL OPERATING RANGE (NOTE 2)

DATA RATE (Mbps)	INDOOR RANGE	OUTDOOR RANGE
11	120 feet (37 meters)	400 feet (122 meters)
5.5	200 feet (61 meters)	600 feet (183 meters)
2	240 feet (73 meters)	750 feet (228 meters)
1	300 feet (91 meters)	1000 feet (305 meters)

Ordering Information

PART NUMBER	DESCRIPTION	CARDS/SET
HWB3163-EVAL	WLAN Evaluation Kit	2

Features

- FCC Certified Under Part 15 to Operate in 2.4GHz ISM Band (Approval Pending)

- Support for 11, 5.5, 2 and 1 Megabit Per Second (Mbps) Data Rates

- Supports the IEEE 802.11 Direct Sequence Specification

- Driver Supports Microsoft® Windows® 95, 98, 2000, NT, CE and LINUX®

- Integrated Microstrip Dual Diversity Antennas

- Advanced RAKE Receiver Design with AGC

- Uses 50% of the Power of Previous Devices

- Provides Wireless Data Communications at Full Ethernet Speed

- Completely Covered Assembly is Designed to Fully Support PCMCIA Type II Defined Mechanical and Environmental Stress Conditions

- Intelligent Power Control, Including Low Power Standby Mode

- Complete Reference Design, the HWB3163-CD Available to Ensure Minimum Time-to-Market

NOTES:

1. Throughout this document, all references to 'PC Card', 'WLAN adapter', 'adapter', or 'card' refer to a covered card assembly conforming to the mechanical size specifications of the PCMCIA Standard Release 2.0, Type II Extended (5.0mm) definition.

2. The range will vary in different operating environments due to effects such as building construction.

3. At present, PTTU supports Windows 95 and 98. An upgrade is in process which will add support for NT.

Packaging

Functional Overview

The WLAN PC Card is designed to operate in the 2.4GHz ISM frequency band, channels 1 to 11, as specified by the FCC in the USA. The Card will also operate on channels 12 through 14, where permitted by local regulatory authorities (refer to Table 2). Radio equipment must be certified in a country prior to use. Refer to Table 3 for a list of countries and agencies that have approved the HWB3163-EVAL for operation.

The Intersil PRISM Chip Set allows for high level integration for reduced size, increased throughput, improved radio performance and faster time to market. The WLAN PC card implements Direct Sequence Spread Spectrum DSSS technology providing superior noise and signal jamming immunity including less severe impact from unintentional radiators such as microwave ovens. The user can connect the PC Card in an ad-hoc peer to peer networking scheme, allowing for instant network setup in any office environment. By using an access point, the wireless LAN can be set up to allow for a greater number of users to interconnect, and to increase the coverage area. With a portal (i.e., Access Point), the wireless LAN can be easily connected into an existing wired LAN, allowing for easy expansion of the service.

Compared to the first generation PRISM I chip set, the PRISM II generation offers:

- 3.3V operation for reduced power dissipation

- 50% reduction in current drain for extended battery life

- Transmitter Automatic Level Control (ALC/AGC) to provide constant RF power output

- Sophisticated RAKE receiver and Automatic Gain Control (AGC) for improved multipath performance

- Higher level of chip integration and less peripheral components to yield 30% reduction in material cost

- Support of optional IEEE 802.11 Short Preamble for significantly increased data throughput

A complete Reference Design CD, the HWB3163-CD is available to ensure minimum time-to-market. This CD contains detailed information for manufacturing a PCMCIA WLAN assembly, including Gerber PC board files, an accurate Bill of Material with component sourcing and complete mechanical drawings.

Related Literature

To learn more about what the IEEE 802.11 is, refer to:

- Tech Brief TB337, Intersil Corporation, "A Brief Tutorial on Spread Spectrum and Packet Radio" [1].

For a more detailed description of radio operation, please refer to:

- Application Note AN9864, Intersil Corporation, "HWB3163-EVAL PRISM II 11Mbps WLAN PCMCIA Card User's Guide" [2]

The HFA3841 Media Access Controller (MAC) Protocol Handler

The HFA3841 MAC and its firmware are responsible for running the IEEE 802.11 protocol in the WLAN card. This section describes the features of IEEE 802.11 that are implemented.

The functions supported by the STA (station) Firmware are:

- CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) with Random Backoff

- WEP Security

- Short/Long Preamble with multirate

- RTS/CTS Handshake (Ready To Send/Clear To Send) and NAV Management (Network Allocation Vector)

- MAC Level Acknowledgments (Media Access Control)

- Re-Transmission of Unacknowledged Frames

- Duplicate Detection and Rejection

- Broadcast and Multicast Frames

- Fragmentation and Re-Assembly

- Power Management (Planned)

- Timestamp Synchronization

- DCF (Distributed Coordination Function)

- PCF (Point Coordination Function)

- Beacon Generation in an Ad-Hoc Network

- Probe Response Generation in an Ad-Hoc Network

Card Information Structure

The standard Intersil WLAN PC Card will be supplied with the following information embedded in the CIS. It should be noted that in most systems this information is displayed when the card is inserted. Customization of the CIS for specific customer requirements is available upon request, to enable customer information to be displayed when the card is inserted.

TABLE 1.

FUNCTION NAME	CONTENT
Manufacturer's ID	00
Function ID	Network Adapter
Product Revision	1
Manufacturer	Intersil Corporation
Product	HFA3841
PROG	
LOT	

IEEE 802.11 International Agreement and Frequency Assignments

The IEEE 802 LAN committee has forged an international agreement providing for wireless data communication standards for the frequency range of 2.4GHz to 2.4835GHz, as allocated by the FCC in the USA, and in the 2.471GHz to 2.497GHz frequency range, as specified by the regulatory authority in Japan. These standards are designed to focus the industry to develop highly integrated, low cost, interoperable WLAN equipment, of which the HWB3163-EVAL is a prime example.

In the U.S., there are 11 channels specified by the FCC in the 2.412GHz to 2.462GHz range. In Japan, one channel at 2.484GHz is authorized. The ETSI (European) regulatory body conforms to the USA (FCC) channel assignments with the exception that channels 12 and 13 are also allowed. Some countries in Europe, notably France and Spain have unique channel restrictions.

Although information contained in Table 2 is deemed to be accurate, local regulatory authorities should be consulted before using such equipment.

The available channels of operation in the 2.4GHz to 2.4835GHz and 2.471GHz to 2.497GHz ranges are as follows:

TABLE 2. IEEE 802.11 CHANNELS

CHANNEL NUMBER	CHANNEL FREQUENCY	GEOGRAPHIC USAGE
1	2412MHz	US, CA, ETSI
2	2417MHz	US, CA, ETSI
3	2422MHz	US, CA, ETSI
4	2427MHz	US, CA, ETSI
5	2432MHz	US, CA, ETSI
6	2437MHz	US, CA, ETSI
7	2442MHz	US, CA, ETSI
8	2447MHz	US, CA, ETSI
9	2452MHz	US, CA, ETSI
10	2457MHz	US, CA, ETSI, FR, SP
11	2462MHz	US, CA, ETSI, FR, SP
12	2467MHz	ETSI, FR
13	2472MHz	ETSI, FR
14	2484MHz	Japan†

KEY: US = United States, CA = Canada, ETSI = ETSI countries (except France and Spain), FR = France, SP = Spain.

†In Japan, authorization for Channels 1 through 11 is pending.

The HWB3163 is shipped with USA-compliant firmware. In order to ensure regulatory-compliant channel usage in a particular country, special geographic-specific firmware is available for customer production assemblies which restricts channel usage. Examples include ETSI-compliant firmware, etc. Since the end user does not have the ability to alter this firmware, regulatory compliance is ensured.

Agency and Regulatory Body Approvals

The WLAN PC Card will comply to the following standards:

TABLE 3.

COUNTRY	APPROVAL	NOTES
USA	FCC part 15, Sec. 15.247, Sec. 15.107 and 15.109	Approval pending for Intentional Radiators Computer Peripheral
Canada	ICAN RSS-210	Designed for compliance
Europe	ETSI 300.328 Nov 96 EMC prETS 300.826	Designed for compliance
Japan	MKK	Designed for compliance

3V PCMCIA Interface Standard

CAUTION: This assembly is designed to operate with a supply voltage of 3.3V in laptop computers supporting the dual 3V/5V PCMCIA standard. As such, it is mechanically keyed with a wide tab to prevent insertion in older laptops only capable of supplying 5V power. Do not therefore force engagement of the card in the PCMCIA slot of the laptop as the computer might not be supporting the newer standard.

Permanent damage may occur if operated on 5V.

Absolute Maximum Ratings

Supply Voltage . . . . -0.3V to 4.0V (Max)
Storage Temperature (Note 4) . . . . -20°C to 65°C

Operating Conditions

Temperature Range . . . . 0°C ≤ T$_A$ ≤ 55°C
Supply Voltage Range . . . . 3.0V to 3.6V

Caution: These are the absolute maximum ratings for the PC Card product. Exceeding these limits could cause permanent damage to the card.

NOTE:

4. All temperature references refer to ambient conditions.

Electrical Specifications   Test Conditions: Supply Voltage (V$_{CC}$) = 3.3V, Ambient Temperature (T$_A$) = 25°C, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
CURRENT CONSUMPTION						
Average Current (Without Power Saving Mode) (Note 5)	I$_{CC}$	2% Transmit 98% Receive	-	218	-	mA
Average Current (With Power Saving Mode) (Note 5)	I$_{CC}$	2% TX 90% Standby 8% RX	-	40	-	mA
Continuous Transmit Mode	I$_{CC}$		-	-	380	mA
Continuous Receive Mode	I$_{CC}$		-	-	215	mA
Standby (Note 5)	I$_{CC}$		-	-	17	mA
PC CARD LOGIC LEVELS						
Input HIGH Voltage	V$_{IH}$		0.7V$_{CC}$	-	V$_{CC}$ +0.2	V
Input LOW Voltage	V$_{IL}$		0.0	-	V$_{CC}$/3	V
Output HIGH Voltage	V$_{OH}$	Sourcing 1mA	V$_{CC}$-0.2	-	V$_{CC}$	V
Output LOW Voltage	V$_{OL}$	Sinking 2mA	0	-	0.2	V
Input Leakage Current	I$_{IH}$ or I$_{IL}$		-10	-	10	µA
PC CARD LOADING CAPACITANCE						
Input Capacitance	C$_{IN}$		-	-	15	pF
Output Capacitance	C$_{OUT}$		-	-	15	pF
ENVIRONMENTAL SPECIFICATIONS						
Vibration	Vib	10 to 2000Hz, V$_{CC}$ = 0	-	-	15	G
Drop	Drop		-	-	75	cm
Torque	T	10° Max	-	-	11	Lb/Ft^2
ESD	ESD	Non-Operating	-	-	1500	V
X-RAY	X-RAY		-	-	10K	Roentgen
UV	UV	Wavelength 254nm	-	-	15K	µW/cm
Humidity	RH		-	-	98	%
EMI	EMI		-	-	1K	Oersted
RF SYSTEM SPECIFICATIONS						
Antenna Gain	AG		-	+2.5	-	dBi
Transmitter Power Output	POUT		-	+12.5	-	dBm
EIRP	EIRP		-	+15	-	dBm

Electrical Specifications Test Conditions: Supply Voltage (V_{CC}) = 3.3V, Ambient Temperature (T_A) = 25°C, Unless Otherwise Specified **(Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Receive Sensitivity	RX_S	5.5Mbps, 8% PER or 1E-5 BER	-	-87	-	dBm
		11Mbps, 8% PER or 1E-5 BER	-	-84	-	dBm
Maximum Receive Level	RX_MAX	PER <8%	-4	-	-	dBm
Third Order Intercept Point (Input)	IIP3_90	-90 dBm input	-16	-3	-	dBm
	IIP3_25	-25 dBm input	+10	+20	-	dBm
Image Rejection	IR	PER <8%	-	60	-	dB
IF Rejection	IFR	PER <8%	60	100	-	dB
Adjacent Channel Rejection	ACR	PER <8% (Note 6)	-	46	-	dB
Data Rate (Physical Layer)	Rate		-	1, 2, 5.5 and 11	-	Mbps

NOTES:

5. Refer to Application Note "PRISM Power Management Modes" AN9665 [5].

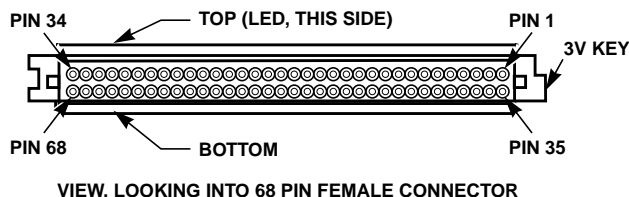6. The adjacent channel measurement is carried out on two channels separated by 25MHz (5 channels).

VIEW, LOOKING INTO 68 PIN FEMALE CONNECTOR

FIGURE 1. EDGE VIEW, PCMCIA CARD

Back PC Card Label

References

For Intersil documents available on the internet, see web site http://www.intersil.com/
Intersil AnswerFAX (321) 724-7800.

[1] *TB337 Tech Brief*, Intersil Corporation, "A Brief Tutorial on Spread Spectrum and Packet Radio", AnswerFAX document No. 82337.

[2] *AN9864 Application Note*, Intersil Corporation, "HWB3163-EVAL PRISM II 11Mbps WLAN PCMCIA Card User's Guide"

Further information can be found in the following:

- Intersil PRISM II datasheets, web home page, http://www.intersil.com/prism/prism.asp

- IEEE 802.11 Standards Project (available from the IEEE, New York, USA).

- PC Card V2.1 Standard.

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Notices

Electronic Emission Notices

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.

2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Interference Statement

The wireless LAN PC card is subject to the rules of the Federal Communications Commission (FCC). This card is considered an intentional radiator as per the FCC guidelines.

NOTE: 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 instruction manual, 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 the 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 ratio/TV technician for help

WARNING! *Any changes or modifications of equipment not expressly approved by Intersil could void the user's authority to operate the equipment.*

For information regarding Intersil Corporation and its products, see web site **www.intersil.com**

Sales Office Headquarters

NORTH AMERICA
Intersil Corporation
P. O. Box 883, Mail Stop 53-204
Melbourne, FL 32902
TEL: (321) 724-7000
FAX: (321) 724-7240

EUROPE
Intersil SA
Mercure Center
100, Rue de la Fusee
1130 Brussels, Belgium
TEL: (32) 2.724.2111
FAX: (32) 2.724.22.05

ASIA
Intersil (Taiwan) Ltd.
7F-6, No. 101 Fu Hsing North Road
Taipei, Taiwan
Republic of China
TEL: (886) 2 2716 9310
FAX: (886) 2 2715 3029