MP-G-BR-05
802.11G WIRELESS LAN MINI PCI ADAPTER

Data Sheet Nov. 2004 Rev 1.6

www.usi.com.tw

Introduction

The Mini-PCI Adapter type-III B is a high-speed 54 Mbits/s wireless networking card providing a multimode 802.11 b/g or 11g mode only connectivity for enterprise and home wireless LAN access.

The Mini-PCI Card uses direct sequence spread spectrum (DSSS), Orthogonal Frequency Division Multiplexing (OFDM) technology, and implements DBPSK, DQPSK, and CCK, OFDM modulation, as defined in the *IEEE*® 802.11b, g. This gives a very robust radio channel, which is made even better by the excellent receiver sensitivity and delay spread robustness.

In environments with radio interference, the Mini-PCI Card, because of its acknowledgment protocol and its option to be tuned to another frequency channel, continues to run.

Superior echo path management makes it suitable for areas with a large delay spread, for example, warehouses. This reduces the number of cells required and, therefore, reduces the total cost of ownership.

A firmware-based architecture is capable of supporting the latest industry standards in the security and quality of service (QoS), as the draft 802.11i and 802.11e standards, respectively.

The Mini-PCI Card is complemented by drivers and networking tools for various versions of the *Windows*® operating system. USI provides extensive technical documentation on integration issues such as antenna design, customizing drivers, and management software.

Features

- Automatic fallback: 54 Mbit/s, 48 Mbit/s, 36 Mbit/s, 24 Mbit/s, 18 Mbit/s, 12 Mbit/s, 11 Mbit/s, 9 Mbit/s, 6 Mbit/s, 5.5 Mbits/s, 2 Mbits/s, or 1 Mbit/s .
- Advanced silicon breakthrough single chip solution with Encore technology in this product which gain the advantage to better resistance to multipath; improve Rx sensitivity by enhanced DSP processing and adaptive equalization algorithms.
- Feature with Afterburner technology for this 54g platform, Products with this new technology provide up to 40 percent greater throughput than typical standard 802.11g systems without impacting the performance of neighboring wireless LANs.
- Low power consumption & Automatic power management to reduce battery use.
- Easy integration into mobile and hand-held platforms. It's flexible for design and antenna placement.
- External antenna diversity.
- Support AES-CCM, WPA (SSN-TKIP), and WEP (64-bit/128-bit or 152-bit).
- Corresponding to *IEEE* 802.11b/gspecification.
- Interoperable with other *IEEE* 802.11a/b/gcompliant systems.
- Conformable to industry-standard Mini-PCI Card Type III-B specification.
- Support Windows 98SE/ME/2K/XP,Linux,

Physical Dimension/Packaging

The Mini-PCI Card has been designed to conform to the Mini-PCI specification, as defined in Mini-PCI Specification Rev 0.1.

All dimensions in this section have a tolerance as permitted in the Mini-PCI Specification.
Dimension: 59.8 mm x 44.8 mm x 5.0 mm
Weight: Less than 25 g
Package: Bulk in 200 pcs.

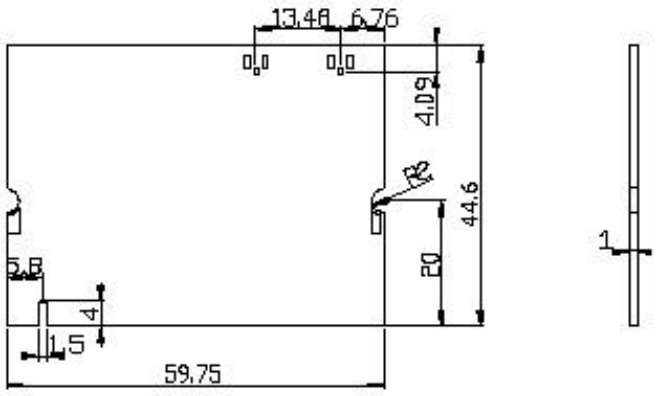

Figure 1. Mini-PCI Type III-B dimension

Mechanically unique coaxial connectors for two external antennas.

Operating Conditions

Operating Temperature	0° to 70° Celsius
Operating Humidity	90% (non-condensing)
Storage Temperature	-10°C to +75°C ambient temperature
Storage Humidity	95% (non-condensing)

Voltage and Current

The MP-G-BR-05 will comply with the following features and standards

Voltage	3.3 VDC from host (+/-0.2V)
Current	802.11g (Typ.)
Transmit	<450mA
Receive	<350mA
Stand By	<50mA

Wireless Specification

The MP-G-BR-05 will comply with the following features and standards:

Features	Description
WLAN Standards	IEEE 802 Part 11b/g

Antenna Connector	Hirose connector supported with diversity
Data Rates	1, 2, 5.5, 11 Mbps for 802.11b 6, 9, 12, 18, 24, 36, 48, 54 Mbps for 802.11g and 125Mbps for AfterBunrer
Medium Access Protocol	CSMA/CA (Collision Avoidance) with ACK

RF specification

Features	Description
Frequency Band	2.412 – 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	14 Channels
Modulation	DBPSK, DQPSK, CCK DSSS for 802.11b & g DPSK, QPSK, 16QAM, 64QAM OFDM for 802.11 g
Supported Rates	1, 2, 5.5, 11 Mbps for 802.11b 6, 9, 12, 18, 24, 36, 48, 54 Mbps for 802.11g
Maximum Receive Level	-20dBm (with PER< 10%) for 802.11g
Antenna	External (Hirose U-F-L)

Max. Output Power

19 dBm for 11b

15 dBm for 11g

Note: Actual output power may vary based on manufacturing process variations

802.11g Receive Sensitivity

Data Rates	Receive Sensitivity
54 Mbps	-72 dBm (typ)
11 Mbps	-87dBm (typ.)
6 Mbps	-88 dBm (typ.)
1 Mbps	-95 dBm (typ.)

Note: Actual receive sensitivity for individual products may vary based on manufacturing process and environmental variations

Antenna Specifications

The Mini-PCI adapter is available in two variants: unique coax connectors with diversity function.

On-Board Diversity Switch

This variant of the Mini-PCI Card has connectors for two external passive antennas: MAIN and AUX. One of the antennas is used for transmission, and the DSP selects which of the two to use for reception, based on signal strength.

The coax connectors for the antennas are mechanically unique, so that no off-the-shelf connector will fit (FCC requirement).

Switch electronics for selection between the two antennas for reception of the stronger receive signal is provided onboard.

Security

At the physical layer, transmissions are encrypted using WEP; three levels of encryption are possible：

- 40-bit key plus 24-bit initialization vector
- 104-bit key plus 24-bit initialization vector
- 128-bit key plus 24-bit initialization vector

AES, TKIP, WPA draft 802.11i are supported.

Attacks have been made on WEP by exploiting various weaknesses. The Mini-PCI Card implements random setting of the initialization vector and utilizes WEPplus, which prevents initialization vectors that result in weak keys being used. WEPplus is completely compatible with WEP.

For those operating systems that support it either natively or with an add-on supplement (i.e, *Windows* 98, *Windows* 98SE, *Windows ME*, *Windows* 2000, *Windows XP*, the 802.1x, WPA/TKIP SSN security standard are implemented. This offers port-based network access control, and automatic key distribution.

Performance

Table 1. Characteristics at Different Rates

The real operating range will be different by measurement environment and condition.

802.11b/g

Data Rates	Operating Distance
54 Mbps	70m
11 Mbps	370m
6 Mbps	330m
1 Mbps	550 m

International Channel Frequencies

The Mini-PCI Card uses frequencies in the 2.4 GHz to 2.5 GHz ISM band, as defined by IEEE 802.11.

The channels available in the regional variants of the Mini-PCI Card are:

- FCC: 1 to 11
- ETSI: 1 to 13
- Japan: 1 to 14

Regulatory Body Approvals/Compliance

USI will perform pre-test for the following international regulations: approval is a matter for the OEM once the device is integrated into a host platform.

Description	Country	Compliance
Electromagnetic Compatibility	USA	FCC CFR47 Part 15B, Class II
	Europe	89/336/EEC, ETS 301 489-1&17 (2.4GHz) EN61000-3-2 (Harmonic AC Current emissions) EN55022 Class II, EN50082-1 (Immunity)
Product safety	International	CB (IEC 60950)
Radio Regulations	USA	FCC CFR47 part 15 C, para 15.247,295,209
	Europe	EN 300-328

Ordering Information

USI 802.11g miniPCI Adapter Model No. MP-G-BR-05
Rev: May 2004. Specifications are subject to change without notice.

For Additional information, please contact the following:
Universal Scientific Industrial Co., Ltd.
Headquarters
141, Lane 351, Taiping Road, Sec. 1 , Tsao-Tuen , Taiwan,
Http://www.usi.com.tw
Tel: + 886-49-2350876, 2325876
Fax: +886-49-3439561, 2337360,2351093
E-mail:usi@ms.usi.com.tw

Regulatory Information

FCC (United States)

The computer equipment described in this manual generates and uses radio frequency (RF) energy. If the equipment is not installed and operated in strict accordance with the manufacturer's instructions, interference to radio and television reception might result.

Tested To Comply
With FCC Standards
For Home or Office Use

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

Part 15, Class B, of the FCC Rules, is designed to provide reasonable protection against radio and television interference in a residential installation. Although the equipment has been tested and found to comply with the allowed RF emission limits, as specified in the above cited Rules, there is no guarantee that interference will not occur in a particular installation. Interference can be determined by turning the equipment off and on while monitoring radio or television reception. The user may be able to eliminate any interference by implementing one or more of the following measures:

- Reorient the affected device and/or its receiving antenna.
- Increase the distance between the affected device and the computer equipment.
- Plug the computer and its peripherals into a different branch circuit from that used by the affected device.
- If necessary, consult an experienced radio/television technician for additional suggestions.

NOTE: Changes or modifications to the electronics or enclosure of this product must be expressly approved by Iomega; otherwise, the user's authority to operate this product might be voided by the FCC.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Canadian Verification

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations (ICES-003, Class B).

OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).
IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains TX FCC ID: DDX-NHDD4”.