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

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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.

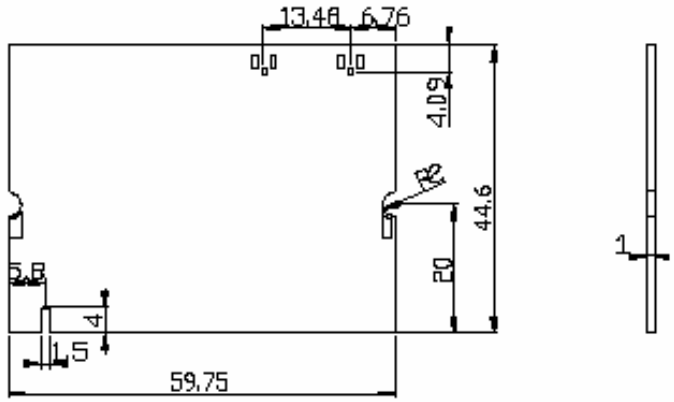

Figure 1. Mini-PCI Type III-B dimension

Mechanically unique coaxial connectors for two external antennas.

Operating Conditions

Operating Temperature	0° to 70° Celsius
Operating Humidity	90% (non-condensing)
Storage Temperature	-20°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:
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Taiwan DGT warning statement

低功率電波輻性電機管理辦法
第十四條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十七條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Translation:

Article 14
Without permission granted, the frequency change, transmitting power enhance or alter of original design characteristic as well as function by company, enterprise, or user for approved Low-power radio frequency devices is not allowed.

Article 17
Low-power radio-frequency devices shall not influence aircraft security and interfere legal communications; If found, shall cease operating immediately until no interference is achieved.

Above mentioned Legal Communications is defined as radio communications operation follows Telecommunications Act. Low-power radio-frequency devices must susceptible with the interference from legal communications, ISM radio wave radiated devices.

USA-Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna
-Increase the distance between the equipment and the receiver.
-Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Caution: Exposure to Radio Frequency Radiation.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Canada – Industry Canada (IC)

This device complies with RSS 210 of Industry Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device."

L ' utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire de brouillage et (2) l' utilisateur du dispositif doit étre prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

Pour empecher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit etre utilize a l'interieur et devrait etre place loin des fenetres afin de Fournier un ecram de blindage maximal. Si le matriel (ou son antenne d'emission) est installe a l'exterieur, il doit faire l'objet d'une licence.

Caution: Exposure to Radio Frequency Radiation.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada’s website www.hc-sc.gc.ca/rpb.

FCC Statements:

1. 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.

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

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

4. This device is for OEM installation only, the End User manual shall not contain informationabout how to install the module.

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

6. Only the type of antenna tested may be used.

7. The end product must carry a label stating "Contains TX FCC ID:IXMMPGBR05 ".