arcadyan

DATA SHEET – PRELIMINARY

802.11A/B/G MINI PCI CARD

PH11107/PH12127

Type IIIA

Type IIIB

MAIN FEATURES OF THIS DESIGN

- IEEE 802.11a compatible
- IEEE 802.11b compatible
- IEEE 802.11g compatible
- Support for draft 802.11e, 802.11f, 802.11h and 802.11i standards
- Orthogonal Frequency Division Multiplexing (OFDM) modulation schemes supported for both frequency ranges
- Data rates of 1, 2, 5.5, 11 Mbps (802.11b)
- Data rates of 6, 9, 12, 18, 24, 36, 48, and 54 Mbps (802.11a/g)
- Turbo Mode™ offering up to 108-Mbps data rate (optional)
- Supports dual-band antenna diversity
- Standard MiniPCI Type III (A or B) form factor
- Antenna connectors for use with laptop with built-in antenna
- Low power sleep mode
- AdHoc and Infrastructure modes supported, for use in office and peer-to-peer wireless networks
- Automatic data rate and mode selection
- Encryption – WEP (Wire Equivalent Privacy) 64 and 128-bit modes, as well as TKIP (Temporal Key Integrity Protocol)
- Wi-Fi™ certification pending
- WHQL (Windows® Hardware Quality Labs) certification pending
- Supports passive and active scanning, subject to local regulatory requirements
- Dynamic frequency selection/Dynamic power control. DFS/TPC (Dynamic Frequency Selection/Transmit Power Control) used for international operation
- Full 802.11a frequency range, covers 5.15-5.85 GHz, subject to local regulatory requirements
- Full 802.11b frequency range coverage
- Support for hardware RF silence
- LEAP support
- CCX support
- WPA support
- 802.1x support
- Customisation upon request

DESCRIPTION

The Arcadyan™ 802.11a/b/g MiniPCI Card is a Type (IIIA or IIIB) MiniPCI Card, which provides WLAN networking to the host PC.

IEEE 802.11A STANDARD

802.11a networking uses 300 MHz of bandwidth in the 5 GHz Unlicensed National Information Infrastructure (U-NII) band. The lower 200 MHz of this band is physically contiguous, but the FCC has divided the total 300 MHz into three distinct 100 MHz domains, each with a different legal maximum power output. The lowest frequency space lies between 5.15 and 5.25 GHz, the middle frequency band lies between 5.25 and 5.35 GHz, and the highest frequency band, which lies between 5.725 - 5.825 GHz. One requirement specific to the low band is that all devices must use integrated antennas.

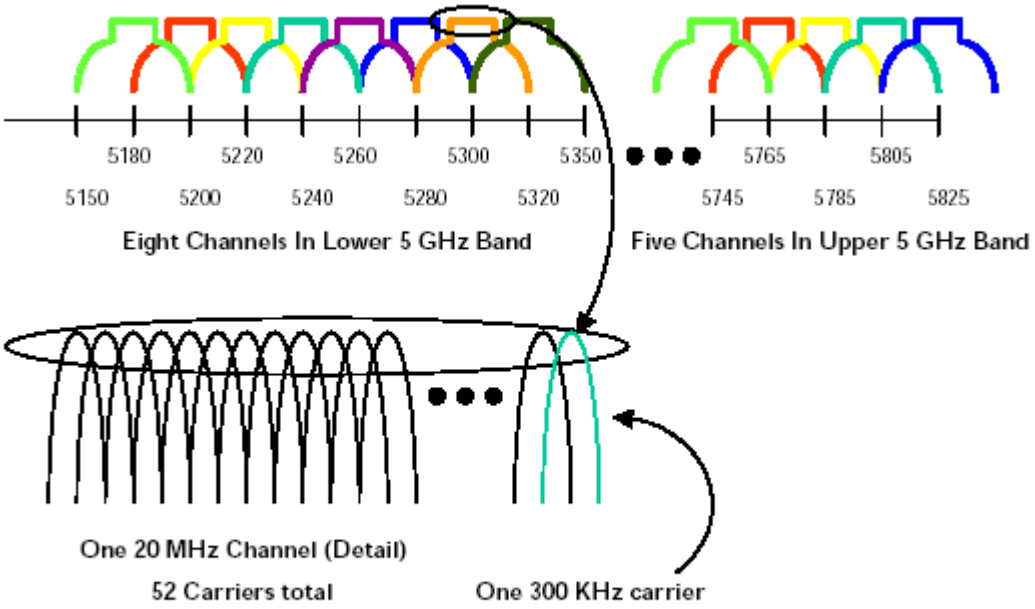

Figure 1 - 802.11a band usage

IEEE 802.11H STANDARD

IEEE 802.11h is a pending standard required for European regulatory compliance. It adds Transmit Power Control and Dynamic Frequency Selection to the 802.11a (5 GHz) standard. It also adds support for eleven more channels between 5.5 GHz and 5.7 GHz.

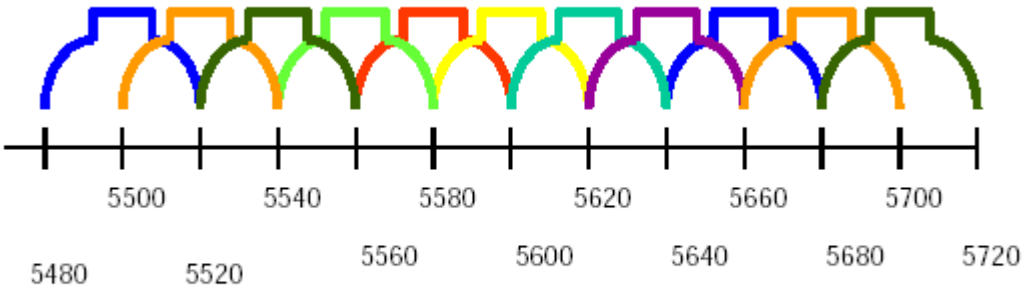

Figure 2 - Eleven European channels

JAPAN SUPPORT

In Japan, 5 GHz signalling occurs on four lower channels, which are offset by 10 MHz from their European and North American counterparts. The channels for Japan are 5.17, 5,19, 5.21, and 5.23 GHz.

IEEE 802.11B SUPPORT

IEEE 802.11b networking uses 62 MHz of bandwidth in the 2.4 GHz Industrial Scientific and Medical (ISM) band. This device uses 13 overlapping channels between 2.412-2.472 MHz (USA) and one channel at 2.484 GHz (Japan).

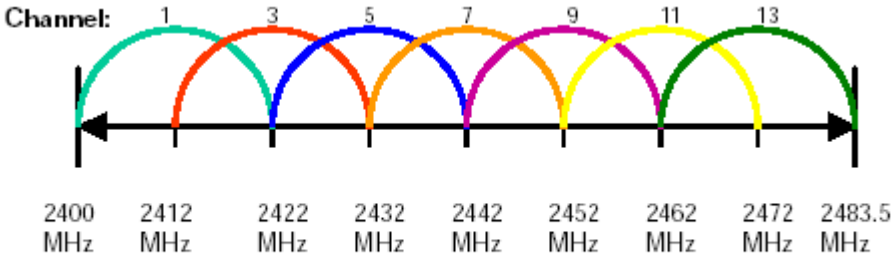

Figure 3 - 802.11b channels (even-numbered channels not shown)

IEEE 802.11G STANDARD

IEEE 802.11g is a new standard for OFDM signalling at 2.4 GHz. It promises provides similar data rates to IEEE 802.11a networking, with the range and penetration capabilities of IEEE 802.11b networking.

REGULATORY REQUIREMENTS

The 802.11a/b/g MiniPCI Card can be configured to support local regulatory requirements, and Arcadyan has solutions to implement worldwide conformance with the minimum number of configurations.

PCI AND MINIPCI STANDARD

The PCI Local Bus is a high performance 32-bit or 64-bit bus with multiplexed address and data lines. The bus is intended for use as an interconnect mechanism between highly integrated peripheral controller components, peripheral add-in cards, and processor/memory systems. The Mini PCI Specification 1.0 defines an alternate implementation for small form factor PCI cards referred to in this specification as a Mini PCI Card. This specification uses a qualified sub-set of the same signal protocol, electrical definitions, and configuration definitions as the PCI Local Bus Specification 2.3.

THE 802.11A/B/G MINIPCI CARD

In the 5 GHz band, the 802.11a/b/g MiniPCI Card uses all 12 IEEE 802.11a channels, but does not support the high-power modes in the upper channels. The 802.11a/b/g MiniPCI Card also supports tuning to the Japan allocated 5 GHz frequency band from 5.17 to 5.23 GHz. The 802.11a/b/g MiniPCI Card uses the MiniPCI socket on a Microsoft® Windows®-based host computer to provide wireless networking to the computer. Once the NDIS (Network Driver Interface Specification) driver is installed and configured, the 802.11a/b/g MiniPCI Card allows peer-to-peer (Ad-Hoc Mode) connections with other computers with 802.11a or 802.11b/g products installed, and also allows connections between the host computer and 802.11a or 802.11b/g-based access points (Infrastructure Mode).

The IEEE 802.11a/b/g MiniPCI Card operates from the PC host power supply and comprises of a baseband section and an RF section, refer to Figure 2. The baseband section deals with the interface to the host PC via the MiniPCI interface, and provides the data formatting, encoding and encryption required by both IEEE 802.11a and IEEE 802.11b/g standards. Selection between IEEE 802.11a, b, and g is determined within the NDIS driver configuration on the host PC using information provided by the baseband processor of the 802.11a/b/g MiniPCI Card. A discrete EEPROM memory device holds configuration data including the MAC address of the 802.11a/b/g MiniPCI Card.

The Baseband Processor is the origin and destination for all the front-end signals. Both transmit and receive signals are switched and transferred either to a 5 GHz front-end or to a second chip (2.4 GHz RF Transceiver) which up converts or down converts the 5 GHz signals to 2.4 GHz. The 2.4 GHz RF Transceiver, in turn, feeds a 2.4 GHz front-end. Both the 2.4 GHz and 5 GHz front-ends are combined via two diplexers, which are designed to feed two dual-band diversity antennas.

The 5 GHz signal is equivalent to the IEEE 802.11a signal, while the 2.4 GHz signal is equivalent to the IEEE 802.11b signal.

The 5 GHz transmit signal is filtered after passing through an RF switch. The filter removes the different by-products of the internal 5 GHz RF Transceiver local oscillator (LO). Also, the 5 GHz transmit signal is boosted with power amplifier (PA). The PA drives a coupler/detector (PDET) assembly. The coupler/detector's function is to sample the transmit signal and rectify it.

The rectified signal is proportional to the output power and is used for power levelling and control. The 5 GHz transmit signal then passes through a bridge switch. The bridge switch is a diversity (transfer) type and has 4 ports: two inputs (transmit and receive) and two outputs (antennas). It enables the connection of any

of the input ports to either one of the outputs. The 5 GHz transmit signal is then transferred through a Low Pass Filter (LPF) which removes any 5 GHz harmonics generated by the PA and bridge switch.

The 5 GHz transmit signal then passes through a diplexer to the antenna port. The diplexer has a common (antenna) port and two more ports for 5 GHz and 2.4 GHz. The diplexer is transparent to 5 GHz signals between the common and 5 GHz port. Likewise, the diplexer is transparent to 2.4 GHz signals between the common port and the 2.5 GHz port. The diplexer includes a low pass filter for 2 GHz harmonic rejection. The 5 GHz receive signal is transferred in a reverse order from the antenna through the diplexers and bridge switches. It is filtered to reject image frequencies via a BPF (Band Pass Filter) and boosted via a LNA (Low Noise Amplifier).

The transmit and receive 2.4 GHz signals follow a similar path as the 5 GHz signals in the 2.4 GHz front-end.

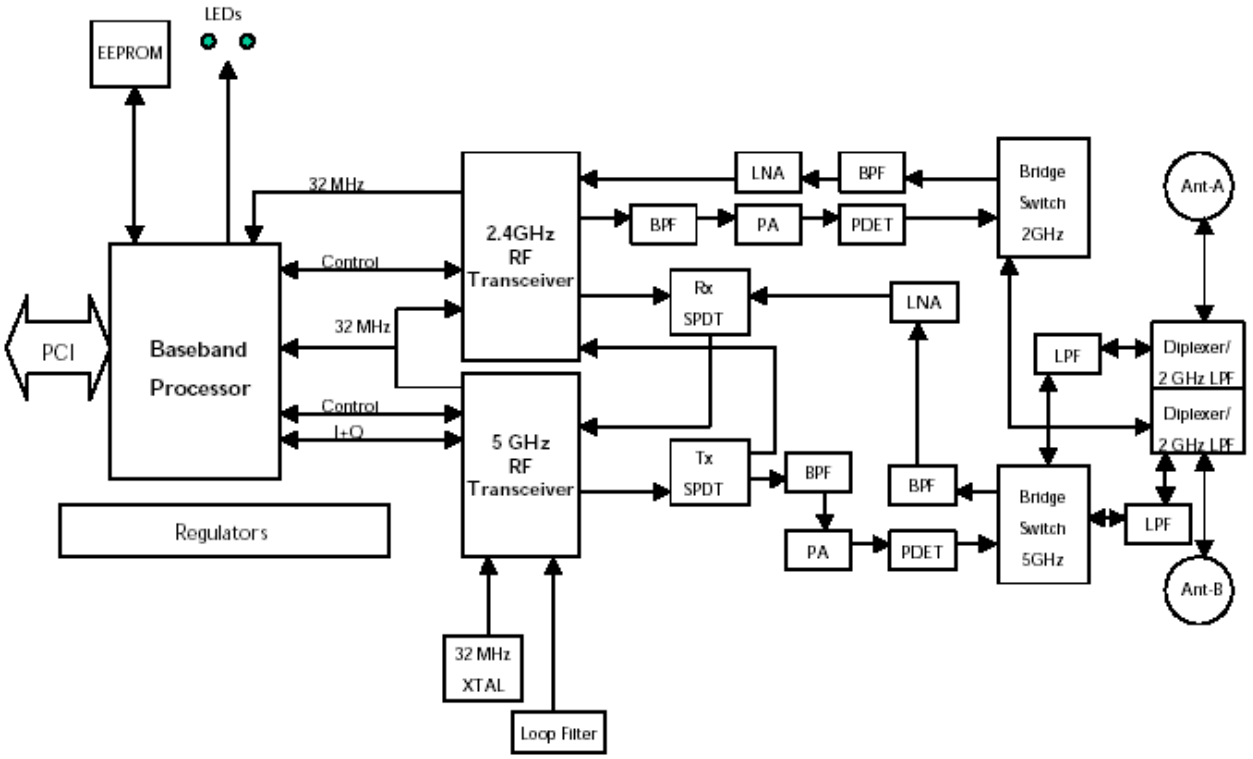

Figure 4 - Block Diagram

PERFORMANCE

Note: 802.11g performance numbers are preliminary, and subject to change

RECEIVER

802.11a	6Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps	Units
Sensitivity	-91	-90	-89	-87	-84	-80	-74	-72	dBm

802.11b/g	1Mbps	2 Mbps	5.5 Mbps	11 Mbps	6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps	Units
Sensitivity	-93	-92	-91	-89	-89	-88	-86	-84	-82	-78	-72	-68	dBm

TRANSMITTER

802.11a		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps	Units
Avg. Channel Power	5.170-5.700 GHz	17	17	17	17	17	15	14	13	dBm
Avg. Channel Power	5.745-5.865 GHz	16	16	16	16	16	15	12	10	dBm

802.11b/g	1 Mbps	2 Mbps	5.5 Mbps	11 Mbps	6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps	Units
Avg. Channel Power	17	17	17	17	17	17	17	17	17	15.5	13.5	11.5	dBm

Channel Power may be limited, subject to local regulatory requirements.

DC CHARACTERISTICS

The following conditions apply to all PCI interface DC characteristics unless otherwise specified:
Vdd = 3.3 V, Tamb = 25 °C

SYMBOL	PARAMETER	CONDITION	MIN	MAX	UNITS	NOTES
VDD	Supply Voltage		3.0	3.6	V	
VIH	High level input voltage	—	0.7·Vdd	Vdd + 0.5	V	—
VIL	Low level input voltage	—	-0.5	0.3·Vdd	V	—
VIPU	Input pull-up voltage	—	0.7·Vdd	—	V	1
IIL	Input leakage current	0 < Vin < Vdd	—	± 10	µA	2
VOH	High level output voltage	Iout = -500µA	0.9·Vdd	—	V	—
VOL	Low level output voltage	Iout = 1500µA —	0.1	·Vdd	V	—
CIN	Input capacitance	—	—	10	pF	3
CCLK	PCI_CLK pin capacitance	—	5	12	pF	—
CIDSEL	PCI_IDSEL pin capacitance	—	—	8	pF	4
LPIN	Pin inductance	—	—	20	nH	

Notes:

1. By design. Minimum voltage to which pull-up resistors are calculated to pull a floated network. Applications sensitive to static power utilization must ensure that the input buffer is conducting minimum current at this input voltage.
2. Input leakage currents include hi-Z output leakage for all bi-directional buffers with tri-state outputs.
3. Absolute maximum pin capacitance for a PCI input is 10 pF (except for PCI_CLK).
4. Lower capacitance on this input-only pin allows for nonresistive coupling to PCI_AD[XX].

POWER CONSUMPTION

The 802.11a/b/g MiniPCI Card supports the following power modes:

MODE	UNINITIALIZED	TX	RX	IDLE/LISTENING	SLEEP	UNITS
802.11b	33	1640	832	898	33	mW
802.11a	33	1782	815	822	33	mW
802.11a	33	1897	1402	1320	33	mW
Turbo mode	33	2294	1234	NA	33	mW

ENVIRONMENTAL

NON-OPERATIONAL CONDITIONS:

- Ambient temperature : -40°C to +85°C
- Relative humidity : 5-95%, non-condensing.
- Bump acceleration : According to Mini PCI Specification 1.0
- Shock acceleration : According to Mini PCI Specification 1.0

OPERATIONAL CONDITIONS:

- Ambient temperature : 0°C to +60°C
- Relative humidity : 95% max

DEFINITION OF TERMINALS / LED DATA

The 802.11a/b/g MiniPCI Card is compliant with PCI 2.3. During operation, the interface provides data and command transfer between the host software and the DMA engine, and the configuration registers of the 802.11a/b/g MiniPCI Card. For details refer to the PCI 2.3 specification. Signals in grey are not used by this product.

PIN	SIGNAL	DESCRIPTION	PIN	SIGNAL	DESCRIPTION
1	TIP	Conductor of the wire pair comprising the local loop.	63	3.3V	3.3 V Supply voltage
	Key	-	64	FRAME#	Indicates Bulk Transfer
2	RING	Conductor of the wire pair comprising the local loop.	65	CLKRUN#	Used to stop clock on certain mobile PCI devices
3	8PMJ-3	Pin 3 of an 8-pin modular jack interface	66	TRDY#	Target Ready
4	8PMJ-1	Pin 1 of an 8-pin modular jack interface	67	SERR#	Indicates catastrophic system error
5	8PMJ-6	Pin 6 of an 8-pin modular jack interface	68	STOP#	Indicates target wishes to end transfer
6	8PMJ-2	Pin 2 of an 8-pin modular jack interface	69	GROUND	Ground
7	8PMJ-7	Pin 7 of an 8-pin modular jack interface	70	3.3V	3.3 V Supply voltage
8	8PMJ-4	Pin 4 of an 8-pin modular	71	PERR#	Indicates Parity Error

		jack interface			
9	8PMJ-8	Pin 8 of an 8-pin modular jack interface	72	DEVSEL#	PCI Device Select
10	8PMJ-5	Pin 5 of an 8-pin modular jack interface	73	C/BE[1]#	Byte Enable
11	LED1_GRNP	Interface for external LEDs	74	GROUND	Ground
12	LED2_YELP	Interface for external LEDs	75	AD[14]	Multiplexed Address/Data Bus
13	LED1_GRNN	RF Silent input	76	AD[15]	Multiplexed Address/Data Bus
14	LED2_YELN	Interface for external LEDs	77	GROUND	Ground
15	CHSGND	Chassis Ground	78	AD[13]	Multiplexed Address/Data Bus
16	RESERVED	-	79	AD[12]	Multiplexed Address/Data Bus
17	INTB#	Interrupt Request B	80	AD[11]	Multiplexed Address/Data Bus
18	5V	5 V Supply voltage	81	AD[10]	Multiplexed Address/Data Bus
19	3.3V	3.3 V Supply voltage	82	GROUND	Ground
20	INTA#	Interrupt Request A	83	GROUND	Ground
21	RESERVED	-	84	AD[09]	Multiplexed Address/Data Bus
22	RESERVED	-	85	AD[08]	Multiplexed Address/Data Bus
23	GROUND	Ground	86	C/BE[0]#	Byte Enable
24	3.3VAUX	3.3 V supply-uninterrupted	87	AD[07]	Multiplexed Address/Data Bus
25	CLK	PCI Clock	88	3.3V	3.3 V Supply voltage
26	RST#	PCI Reset	89	3.3V	3.3 V Supply

					voltage
27	GROUND	Ground	90	AD[06]	Multiplexed Address/Data Bus
28	3.3V	3.3 V Supply voltage	91	AD[05]	Multiplexed Address/Data Bus
29	REQ#	PCI Bus Request	92	AD[04]	Multiplexed Address/Data Bus
30	GNT#	PCI Bus Grant	93	RESERVED	-
31	3.3V	3.3 V Supply voltage	94	AD[02]	Multiplexed Address/Data Bus
32	GROUND	Ground	95	AD[03]	Multiplexed Address/Data Bus
33	AD[31]	Multiplexed Address/Data Bus	96	AD[00]	Multiplexed Address/Data Bus
34	PME#	Power Management Event	97	5V	5 V Supply voltage
35	AD[29]	Multiplexed Address/Data Bus	98	RESERVED_WIP5	-
36	RESERVED	-	99	AD[01]	Multiplexed Address/Data Bus
37	GROUND	Ground	100	RESERVED_WIP5	-
38	AD[30]	Multiplexed Address/Data Bus	101	GROUND	Ground
39	AD[27]	Multiplexed Address/Data Bus	102	GROUND	Ground
40	3.3V	3.3 V Supply voltage	103	AC_SYNC	AC97 Sync
41	AD[25]	Multiplexed Address/Data Bus	104	M66EN	Enables 66 MHz PCI bus
42	AD[28]	Multiplexed Address/Data Bus	105	AC_SDATA_IN	AC97 Data Input
43	RESERVED	-	106	AC_SDATA_OUT	AC97 Data Output

44	AD[26]	Multiplexed Address/Data Bus	107	AC_BIT_CLK	AC97 Bit Clock
45	C/BE[3]#	Byte Enable	108 AC_	CODEC_ID0#	Identifier for AC97 CODEC
46	AD[24]	Multiplexed Address/Data Bus	109	AC_CODEC_ID1#	Identifier for AC97 CODEC
47	AD[23]	Multiplexed Address/Data Bus	110	AC_RESET#	AC97 Reset
48	IDSEL	Initialization Device Select	111	MOD_AUDIO_MON	Modern Audio Monitor
49	GROUND	Ground	112	RESERVED	-
50	GROUND	Ground	113	AUDIO_GND	Analog Ground for line-level audio
51	AD[21]	Multiplexed Address/Data Bus	114	GROUND	Ground
52	AD[22]	Multiplexed Address/Data Bus	115	SYS_AUDIO_OUT	Telephone Audio Out
53	AD[19]	Multiplexed Address/Data Bus	116	SYS_AUDIO_IN	Telephone Audio In
54	AD[20]	Multiplexed Address/Data Bus	117	SYS_AUDIO_OUT GND	Analog Ground for telephone audio
55	GROUND	Ground	118	SYS_AUDIO_IN GND	Analog Ground for telephone audio
56	PAR	Parity Bit	119	AUDIO_GND	Analog Ground for line-level audio
57	AD[17]	Multiplexed Address/Data Bus	120	AUDIO_GND	Analog Ground for line-level audio
58	AD[18]	Multiplexed Address/Data Bus	121	RESERVED	-
59	C/BE[2]#	Byte Enable	122	MPCIACT#	MiniPCI Function Active
60	AD[16]	Multiplexed Address/Data Bus	123	VCC5VA	5V Analog

61	IRDY#	Initiator Ready	124	3.3VAUX	3.3 V supply-uninterrupted
62	GROUND	Ground			

LED
There is a signal on the MiniPCI card which can be connected inside the host to an external LED. The Anode of the LED should be connected to LED1_YELP – pin 12 of the MiniPCI connector and the Cathode of the LED should be connected to LED1_YELN – pin 14 of the MiniPCI connector.

LED	MEANING
Slow-rate blink	Looking for network association
ON	Associated or joined with network; no activity
Fast-rate blink	Associated or joined with network; blink rate increases with activity on the network over the air or locally on the network device based on setting of the PCI configuration register
OFF	Radio is off (card may still be powered)

RF SILENT
Pin 13 of the MiniPCI connector is used to turn the radio off. It can be connected to an external switch, to disable the radio without software intervention (for example – before opening a laptop on a plane, where a WLAN may be disallowed). Pull this pin low to turn off the radio.

ANTENNAS
There are two antenna connectors (Hirose u.FL-type) along the top edge of the card which should be connected to dual-band antennas.

SOFTWARE/SYSTEM REQUIREMENTS

MEDIA SUPPLIED WITH 802.11A/B/G MINIPCI CARD

The 802.11a/b/g MiniPCI Card ships with a single 3" Mini-CD, which contains drivers and PDF files with installation and usage instructions.

APPLICATIONS SUPPLIED WITH 802.11A/B/G MINIPCI CARD

Once installed, the driver provides standard NDIS (Network Driver Interface Specification) services to the host operating system.

NDIS (Network Driver Interface Specification) is a Windows specification for how communication protocol programs (such as TCP/IP) and network device driver should communicate with each other. Using NDIS, Windows software developers can develop protocol stacks that work with the MAC driver for any hardware manufacturer's communications adapter. By the same token, any adapter maker can write a MAC driver software that can communicate with any protocol stack program.
An API is provided to the customer to enable custom configuration applications with access to the parameters and modes of the 802.11a/b/g MiniPCI Card.
A sample configuration application is also supplied, which allows the end-user to configure parameters and modes of the 802.11a/b/g MiniPCI Card.

OPERATING SYSTEMS SUPPORTED BY 802.11A/B/G MINIPCI CARD

Support for Microsoft Windows® 98SE, 2000, and XP. Linux, VX Works support is in progress.

MECHANICAL DIMENSIONS
Inches [mm]

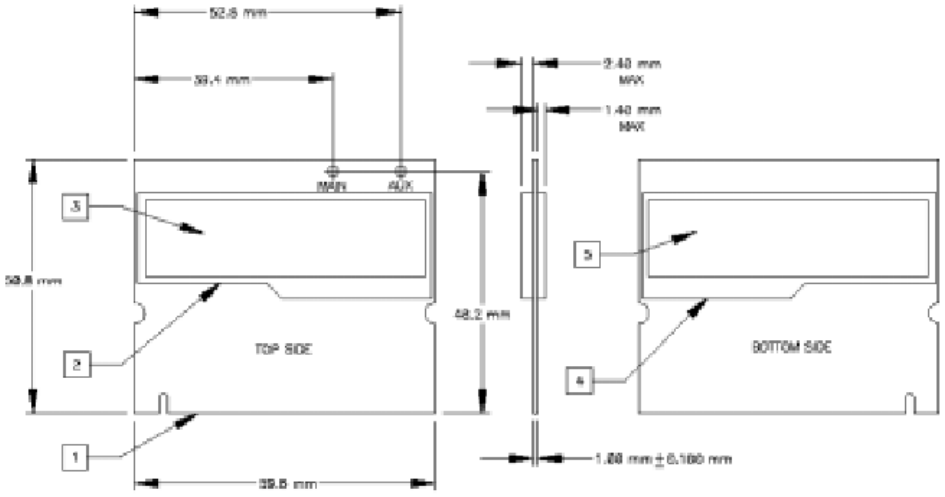

Figure 5a - Mechanical Drawing, MiniPCI Type IIIA

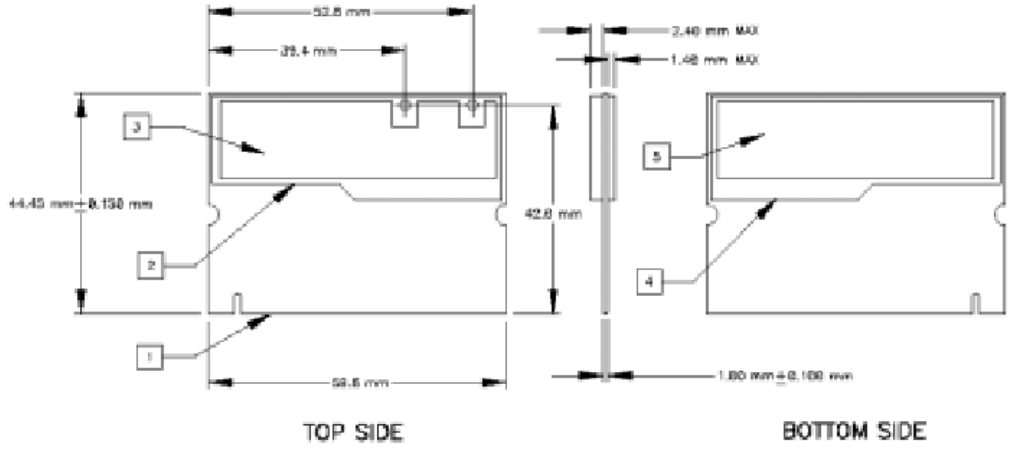

Figure 4b - Mechanical Drawing, MiniPCI Type IIIB

Legend:
1. Mini-PCI card-edge connector
2. Top side RF shield
3. Top side label
4. Bottom side RF shield
5. Bottom side label

PACKAGING

The modules are packed in a cardboard box. The packaging meets the requirements of transportation test stipulated in UAN-D1463. The transport of filled boxes should be done on pool pallets.
Packaging can be customized according to customer specifications.

ORDERING INFORMATION

TYPE	FORM FACTOR	RF-CONNECTOR(S)	DESCRIPTION	PART NUMBER
PH11107/12127	MiniPCI Type IIIA	Two RF connectors Hirose u.FL-R-SMT(01)	802.11a/b/g Wireless LAN Adapter with MiniPCI Type IIIA Host Interface	

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Platform specification	This data sheet contains final platform specification.
Application Information	
Where application information is given, it is advisory and does not form part of the specification	

LIFE SUPPORT APPLICATIONS

These platforms are not designed for use in life support appliances, devices, or systems where malfunctions of these platforms can reasonably be expected to result in personal injury. Arcadyan customers using or selling these platforms for use in such applications do so at their own risk and agree to fully indemnify Arcadyan for any damages resulting from such improper use or sale.

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