



## Approval Sheet



(V1.7)

<b>Model Name:</b>	<b>DCMA-81</b>
<b>WNC P/N:</b>	
<b>Customer P/N:</b>	
<b>Description:</b>	<b>802.11abg half size MiniPCI card</b>
<b>PCB Ver.:</b>	
<b>Prepared By:</b>	<b>Abber Lee</b>
<b>Checked By:</b>	<b>Ray Lee</b>
<b>Approved By:</b>	<b>Ray Lee</b>

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<i>Edition #</i>	<i>Reason for revision</i>	<i>Issue date</i>
V1.0	● Initial Document	9/02,2005
V1.1	● Modify 3.3V tolerance from 5% to 10%	9/20,2005
V1.2	● Add more detail power and sensitivity data	11/8,2005
V1.3	● Update the target power	11/11,2005
V1.4	● Update the power table	11/21,2005
V1.5	● Mark both target power and measured power	12/05,2005
V1.6	● Add W52 & W53 in Japan channel support	12/06, 2005
V1.7	● Modify PCB thickness from 0.8mm to 1.0mm	9/06, 2006
V1.8	● Correct the LED naming of pin definition	11/02, 2006



## **1. Introduction**

The DCMA-81 is a mini PCI solution for IEEE 802.11a/b/g wireless LAN. With 802.11b mode, it provides data rates of 1, 2, 5.5, and 11Mbps, supporting IEEE 802.11b network specification for Direct Sequence Spread Spectrum (DSSS) signaling. With 802.11a mode, it implements a half-duplex, orthogonal frequency division multiplexing (OFDM) technology supporting all IEEE 802.11a data rates (6 to 54Mbps). 802.11g mode is also provided to support 1 to 54Mbps with DSSS or OFDM technology. This card is a good solution for users who need mini PCI 802.11a/b/g WLAN functionality.

### **1.1. Scope**

This document describes the hardware architecture and specification for the DCMA-81.

### **1.2. Product Features**

- ✓ High speed for wireless LAN connection: IEEE802.11b 11Mbps data rate by incorporating Direct Sequence Spread Spectrum (DSSS); IEEE802.11a 54Mbps data rate with Orthogonal Frequency Division Multiplexing (OFDM) and up to 108Mbps with Turbo mode; IEEE802.11g 54Mbps data rate with OFDM (108Mbps in Turbo mode) and 11Mbps with DSSS. Provide seamless roaming within the IEEE 802.11a/b WLAN infrastructure
- ✓ IEEE 802.11a/b/g compatible: allowing inter-operation among multiple vendors
- ✓ 64-bit, 128-bit, or 152-bit WEP encryption, set by ASCII and Hexadecimal mode
- ✓ Smart selection function
- ✓ half size Mini PCI Type 3A form factor
- ✓ Site survey function.
- ✓ Hardware Radio on/off function
- ✓ Support MicroSoft Windows XP, 2000, ME, and 98SE
- ✓ Interoperability – Complying with WiFi
- ✓ WPA, WPA-PSK
- ✓ Super A/G.

## 2. Hardware Architecture

### 2.1 Hardware Block Diagram

The major internal components and external interfaces of the DCMA-81 are illustrated in Figure 1-1.

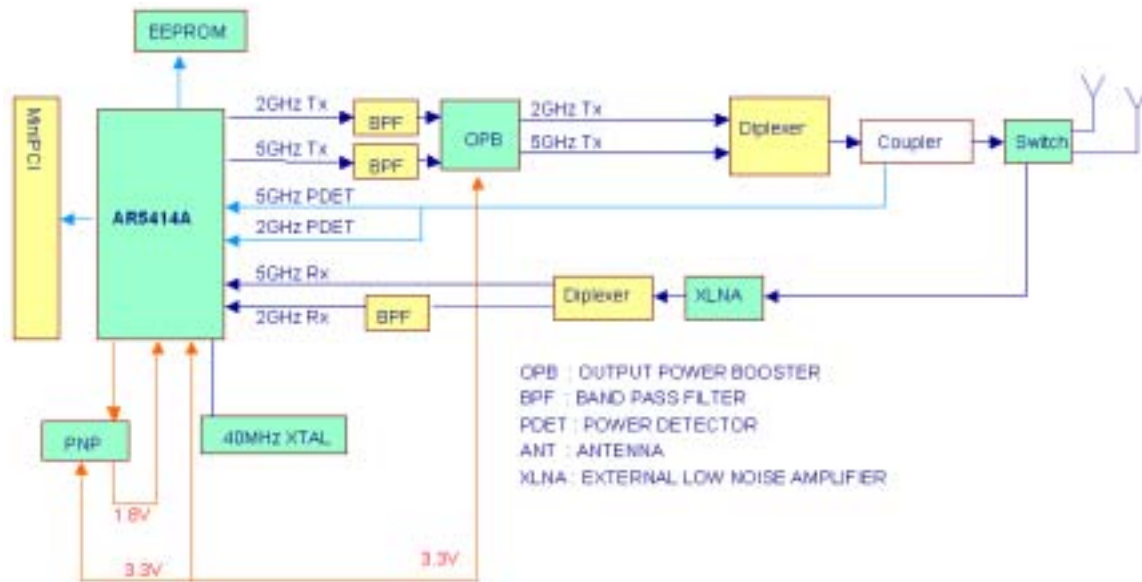


Figure 1-1 DCMA-81 Major Component and System Interface

### 2.2 Main Chipset Information

Item	Vender	Model #
MAC/BBP/Transceiver	Atheros	AR5414

#### 2.2.1 MAC/Baseband Processor

The Atheros AR5414A is part of the AR5006 solutions for 5GHz and 2.4GHz wireless local area networks. The AR5414A integrates multi-protocol media access control, a baseband processor, and a PCI/Cardbus host interface, analog-to-digital, and digital-to-analog converters.

#### 2.2.2 Radio Transceiver

The AR5414A chip also integrates CMOS radio transceiver that supports the IEEE 802.11a, 802.11b, and 802.11g standard. The chip supports connection to an external output booster for higher performance.

### 2.3 Antenna Connector



Two antenna connectors (HRS U.FL-R-SMT) are provided to support antenna diversity.

## 2.4 LED Function

State	LED_0	LED_1
Power save mode	Slow-rate blink	OFF
Awake from power save mode, can be used to indicate power is applied.	ON	OFF
Looking for network association	Alternate blink between LED_0 and LED_1	Alternate blink between LED_0 and LED_1
Associated or joined with network; no activity	Slow-rate blink	Slow-rate blink
Associated or joined with network; blink rate increases with activity	Blink	Blink
Power off	OFF	OFF

## 2.5 Pin Definition

Pin Number	Pin Name	Pin I/O Type	Description
1	TIP	NC	No use
2	RING	NC	No use
3	8PMJ-3	NC	No use
4	8PMJ-1	NC	No use
5	8PMJ-6	NC	No use
6	8PMJ-2	NC	No use
7	8PMJ-7	NC	No use
8	8PMJ-4	NC	No use
9	8PMJ-8	NC	No use
10	8PMJ-5	NC	No use
11	LED1_GRNP	Output, 12mA	LED0 anode
12	LED2_YELP	Output, 12mA	LED1 anode
13	RF_Disable	Input,	Connect to GND (drive low) to disable RF, open (drive high) to enable RF.



14	LED2_YELN	Input,	Direct connect to GND
15	CHSGND	Ground	Digital Ground
16	RESERVED	NC	Reserved
17	INTB#	NC	No use
18	5V	NC	5V, no use
19	3.3V	Power	3.3V+/-10%
20	INTA#	CMOS, Output	PCI bus Interrupt A
21	RESERVED	NC	Reserved
22	RESERVED	NC	Reserved
23	GROUND	Ground	Digital ground
24	3.3VAUX	Power	3.3V+/-10%
25	CLK	Input, Weak pull down	Providing timing for all transactions on the PCI bus
26	RST#	Input, Weak pull up	PCI reset
27	GROUND	Ground	Digital ground
28	3.3V	Power	3.3V+/-10%
29	REQ#	Output	PCI bus request
30	GNT#	Input, Weak pull high	PCI bus grant
31	3.3V	Power	3.3V+/-10%
32	GROUND	Ground	Digital ground
33	AD[31]	BiDir,, Weak pull down	PCI address/data bus bit 31
34	PME#	Output	Power Management Event Output
35	AD[29]	BiDir,, Weak pull down	PCI address/data bus bit 29
36	RESERVED	NC	Reserved
37	GROUND	Ground	Digital ground
38	AD[30]	BiDir,, Weak pull down	PCI address/data bus bit 30
39	AD[27]	BiDir,, Weak pull down	PCI address/data bus bit 27



40	3.3V	Power	3.3V+/-10%
41	AD[25]	BiDir,, Weak pull down	PCI address/data bus bit 25
42	AD[28]	BiDir,, Weak pull down	PCI address/data bus bit 28
43	RESERVED	NC	Reserved
44	AD[26]	BiDir,, Weak pull down	PCI address/data bus bit 26
45	C/BE[3]#	BiDir,, Weak pull up	PCI bus commands and byte 3 enables
46	AD[24]	BiDir,, Weak pull down	PCI address/data bus bit 24
47	AD[23]	BiDir,, Weak pull down	PCI address/data bus bit 23
48	IDSEL	Input, Weak pull down	Initialization device select
49	GROUND	Ground	Digital ground
50	GROUND	Ground	Digital ground
51	AD[21]	BiDir,, Weak pull down	PCI address/data bus bit 21
52	AD[22]	BiDir,, Weak pull down	PCI address/data bus bit 22
53	AD[19]	BiDir,, Weak pull down	PCI address/data bus bit 19
54	AD[20]	BiDir,, Weak pull down	PCI address/data bus bit 20
55	GROUND	Ground	Digital ground
56	PAR	BiDir, Weak pull up	PCI bus parity
57	AD[17]	BiDir,, Weak pull down	PCI address/data bus bit 17
58	AD[18]	BiDir,, Weak pull down	PCI address/data bus bit 18
59	C/BE[2]#	BiDir,, Weak pull up	PCI bus commands and byte 2 enables
60	AD[16]	BiDir,, Weak pull down	PCI address/data bus bit 16
61	IRDY#	BiDir,, Weak pull up	PCI initiator ready
62	GROUND	Ground	Digital ground
63	3.3V	Power	3.3V+/-10%
64	FRAME#	BiDir,, Weak pull down	PCI frame.
65	CLKRUN#	Input, Weak pull up	Control signal for PCI clock

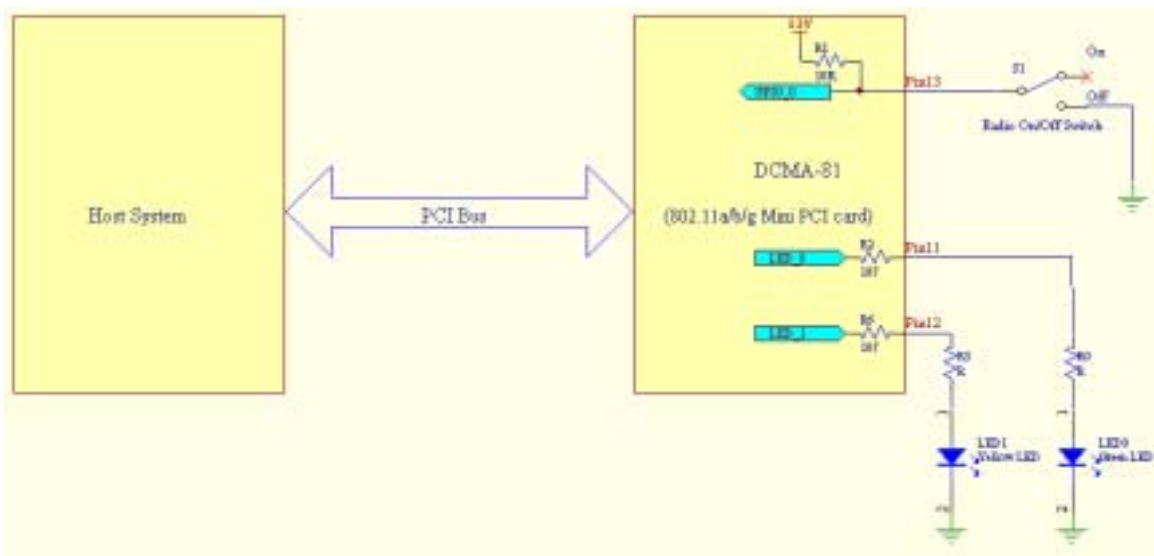


66	TRDY#	BiDir,, Weak pull up	PCI target ready
67	SERR#	BiDir, Weak pull up	PCI system error
68	STOP#	BiDir, Weak pull up	PCI cycle stop signal
69	GROUND	Ground	Digital ground
70	3.3V	Power	3.3V+/-10%
71	PERR#	BiDir, Weak pull up	PCI bus parity
72	DEVSEL#	BiDir, Weak pull up	PCI device select
73	C/BE[1]#	BiDir, Weak pull down	PCI bus commands and byte 1 enables
74	GROUND	Ground	Digital ground
75	AD[14]	BiDir, Weak pull down	PCI address/data bus bit 14
76	AD[15]	BiDir, Weak pull down	PCI address/data bus bit 15
77	GROUND	Ground	Digital ground
78	AD[13]	BiDir, Weak pull down	PCI address/data bus bit 13
79	AD[12]	BiDir, Weak pull down	PCI address/data bus bit 12
80	AD[11]	BiDir, Weak pull down	PCI address/data bus bit 11
81	AD[10]	BiDir, Weak pull down	PCI address/data bus bit 10
82	GROUND	Ground	Digital ground
83	GROUND	Ground	Digital ground
84	AD[09]	BiDir, Weak pull down	PCI address/data bus bit 9
85	AD[08]	BiDir, Weak pull down	PCI address/data bus bit 8
86	C/BE[0]#	BiDir, Weak pull up	PCI bus commands and byte 0 enables
87	AD[07]	BiDir, Weak pull down	PCI address/data bus bit 7
88	3.3V	Power	3.3V+/-10%
89	3.3V	Power	3.3V+/-10%
90	AD[06]	BiDir, Weak pull down	PCI address/data bus bit 6
91	AD[05]	BiDir, Weak pull down	PCI address/data bus bit 5

92	AD[04]	BiDir, Weak pull down	PCI address/data bus bit 4
93	RESERVED	NC	Reserved
94	AD[02]	BiDir, Weak pull down	PCI address/data bus bit 2
95	AD[03]	BiDir, Weak pull down	PCI address/data bus bit 3
96	AD[00]	BiDir, Weak pull down	PCI address/data bus bit 0
97	5V	NC	No use
98	RESERVED_WIP4	NC	Reserved
99	AD[01]	BiDir, Weak pull down	PCI address/data bus bit
100	RESERVED_WIP4	NC	Reserved
101	GROUND	Ground	Digital ground
102	GROUND	Ground	Digital ground
103	AC_SYNC	NC	No use
104	M66EN	NC	PCI 66MHz Enable, no use
105	AC_SDATA_IN	NC	No use
106	AC_SDATA_OUT	NC	No use
107	AC_BIT_CLK	NC	No use
108	AC_CODEC_ID0#	NC	No use
109	AC_CODEC_ID1#	NC	No use
110	AC_RESET#	NC	No use
111	MOD_AUDIO_MON	NC	No use
112	RESERVED	NC	Reserved
113	AUDIO_GND	Ground	Analog ground
114	GROUND	Ground	Digital ground
115	SYS_AUDIO_OUT	NC	No use
116	SYS_AUDIO_IN	NC	No use
117	SYS_AUDIO_OUT GND	NC	No use

118	SYS_AUDIO_IN GND	NC	No use
119	AUDIO_GND	NC	No use
120	AUDIO_GND	Ground	Analog ground
121	RESERVED	NC	Reserved
122	MPCIACT#	NC	Mini PCI function active, no support
123	VCC5VA	NC	No use
124	3.3VAUX	Power	3.3V+/-10%

## 2.6 Radio On/Off Mechanism Suggestion:



Note:

The value of R2 and R6 are 187 ohm. The value of R0 and R3 are user defined for LED current limitation.



### 3. Software Specification

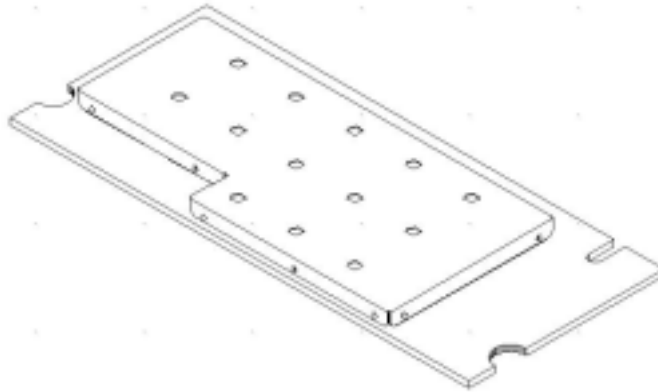
General Function	
Operation System Support	Windows® 98SE, Me, 2000, XP,
Network Access Mode	IEEE 802.11a Infrastructure / Ad-Hoc Mode, IEEE 802.11b Infrastructure / Ad-Hoc Mode , and IEEE 802.11g Infrastructure / Ad-Hoc Mode
Site Survey	Support Access Points and IEEE 802.11a/b/g Ad-Hoc Networks Scanning Capability
Information List	Selected Profile Information, Link Information, and TCP/IP Information
Profile	Configuration Name
Network Name (SSID)	This is the name of the IEEE 802.11a/b/g wireless network
Network Connection	Define whether the STA is configured for an ad-hoc or infrastructure network
Power Saving	Allow the power management options: Off, Normal, and Maximum
Wireless Mode	Specify 802.11a mode, 802.11b mode, 802.11g mode, or Auto-Select operation
Start Ad-Hoc Network	Specify a band to establish an Ad-Hoc network
802.11g Support	For 54Mbps mode at 2.4 GHz
QoS	Cooperate in a network using Quality of Service
Country Code Selector	Change Regulatory Domains

Security Setting	
Encryption Type	WEP, AES, and TKIP
Unique Key	Define the unique encryption key for security for the current network configuration
Shared Keys	Define a set of shared encryption keys
Shared Key Length	Full rate 40-bit, 104-bit, and 128-bit WEP encryption and decryption. Full rate 128-bit AES encryption and decryption

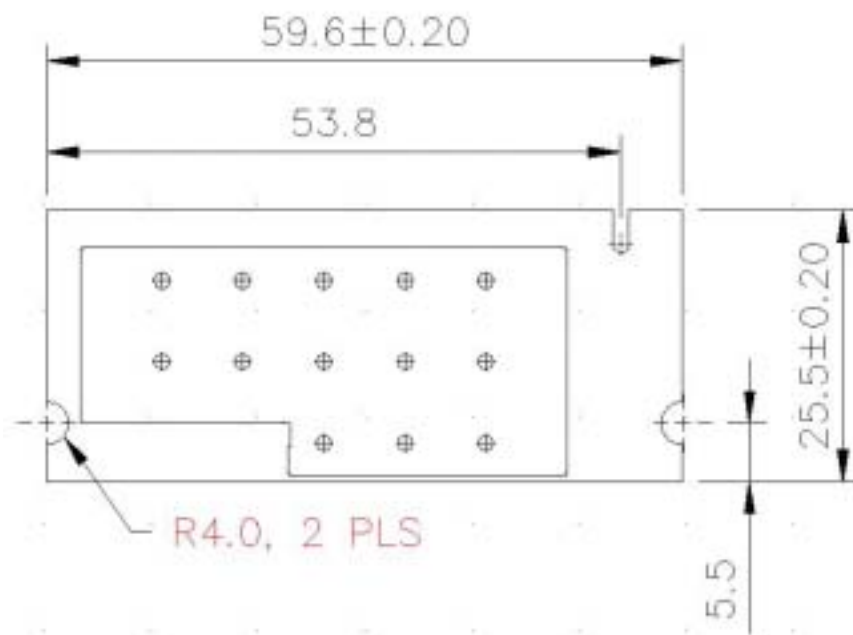
Feature
Smart Select --- Automatically scanning available either 802.11a, 802.11b, or 802.11g Access Point and switching connection by desire
Automatically fall back data rate if signal strength become weakness
Seamless roaming cross 802.11a, 802.11b, and 802.11g Access Point covered distance
Future support 802.11d(Regulatory Domain), 802.11e(Quality of Service, WMM), and 802.11h(TPC/DFS) by software upgraded
Automatic data rate and channel selection
Vivid and user-friendly configuration tool
802.11a --- High speed data rate at 54Mbps,
Wi-Fi / WPA compliant
Support 802.1x authentication, WPA, WPA2
Support WEP-64, WEP-128, WEP-152 and 128bit AES, and TKIP encryption
Support CCX3.0

#### 4. Appearance

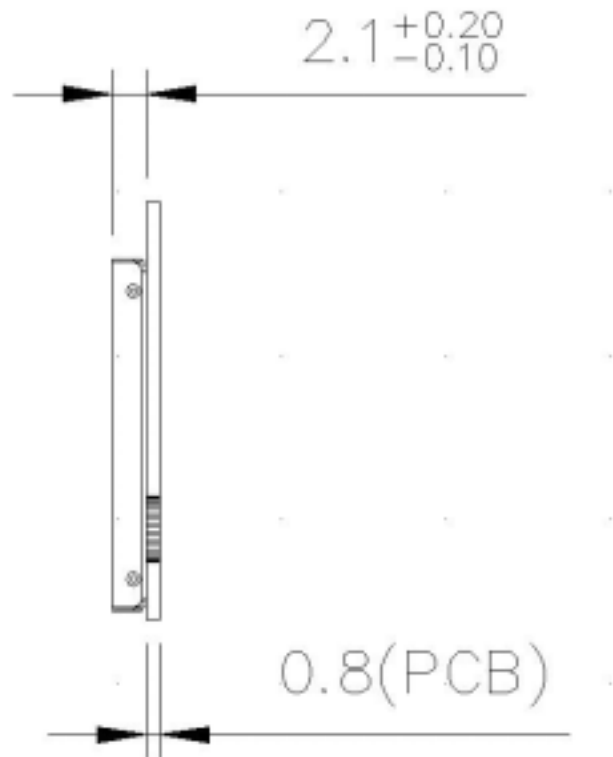
##### 4.1.1 3D View



##### 4.1.2 Top View

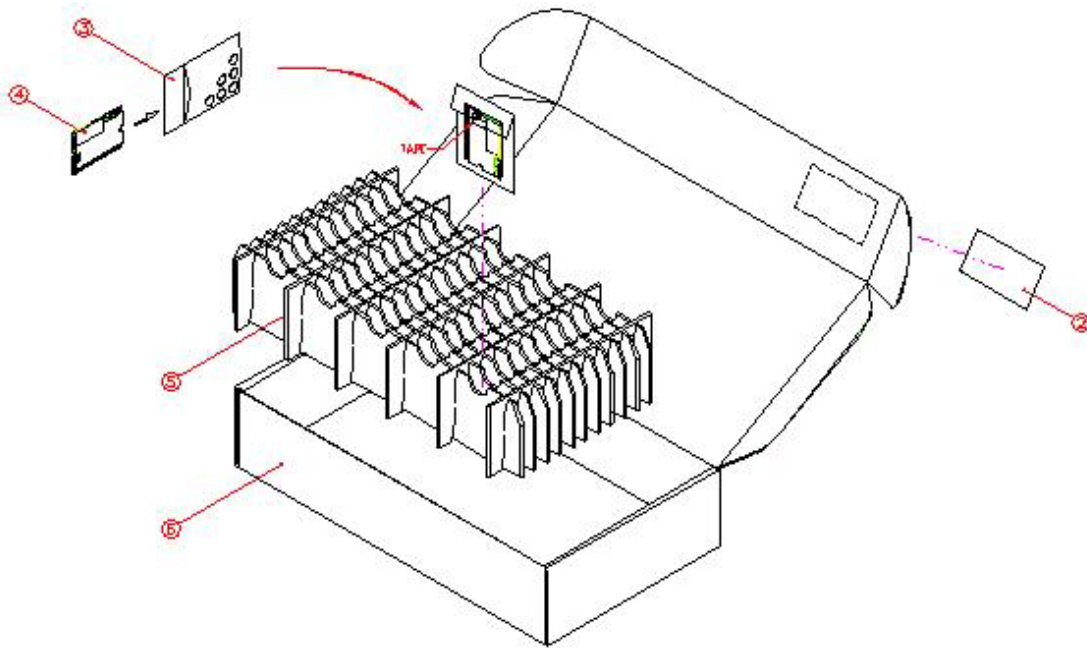


**4.1.3 Side View**

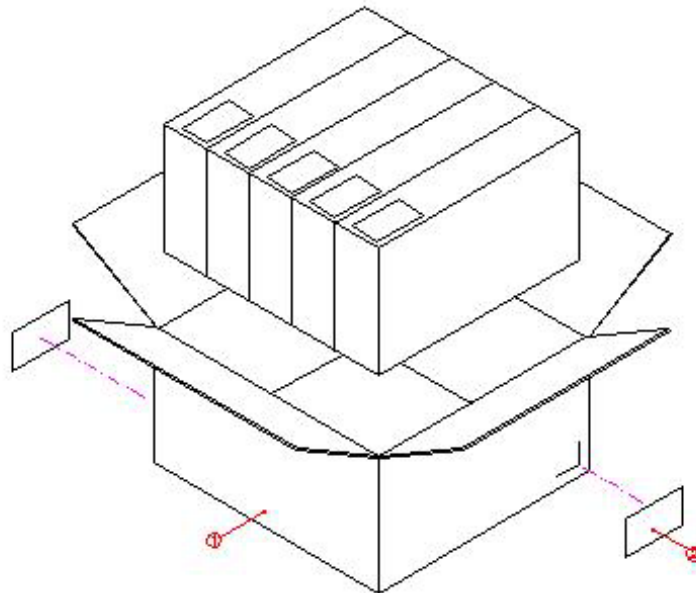


## 5. Packing Standard

### 5.1 Packing Box



### 5.2 Carton



## 6. Specifications

### 6.1 Wireless LAN

- Form Factor: half size Mini PCI Type 3A (25.45\*59.6mm)
- Frequency band:
  - A Mode: 5.15~5.35 & 5.725~ 5.825 GHz for US  
4.9~5.25 GHz for Japan (Subject to change)  
5.15~5.35 & 5.47~5.725 GHz for ETSI
  - B/G Mode: 2400~2483.5 MHz (for US, Canada, ETSI, and Japan)  
2471~2497 MHz (for Japan)
- Channel Spacing:
  - A Mode: 20MHz
  - B/G Mode: 5MHz
- Modulation:
  - A Mode: OFDM with BPSK, QPSK, QAM, and 64QAM
  - B Mode: DSSS with DBPSK, DQPSK, and CCK
  - G Mode: OFDM with BPSK, QPSK, QAM, and 64QAM  
DSSS with DBPSK, DQPSK, and CCK
- Host interface: Mini PCI V1.0
- Channels Support:
  - A Mode: US: 12 (Ch:36,40,44,48,52,56,60,64,149,153,157, 161)  
Japan: 5.17, 5.19, 5.21, 5.23Ghz (Ch:34,38,42,46) for J52  
5.18, 5.20, 5.22, 5.24, 5.26, 5.28, 5.30, 5.32Ghz ( Ch : 36, 40, 44, 48, 52, 56, 60, 64) for W52 & W53  
4.92, 4.94, 4.96, 4.98, 5.04, 5.06, 5.08GHz for 4.9Ghz band  
ETSI:19(Ch:36,40,44,48,52,56,60,64,100,104,108, 112,116,120,124,128,132,136,140)



- B/G Mode:
  - US/Canada: 11 (1~11)
  - ETSI: 13 (1~13)
  - France: 4 (10~13)
  - Japan: 14 (1~14) for 11b mode
  - Japan: 13(1~13) for 11g mode
- Supply Voltage: 3.3V±10% DC
- Current Consumption:
  - A Mode:
    - FTP Tx: 310mA (typical)~360mA (max)
    - FTP Rx: 290mA (typical)~330mA (max)
    - Stand by: 270mA (typical)~300mA (max)
    - Cont. Tx: 470mA(typ.)~ 540mA(max) <18dBm output>
    - Cont. Rx: 220mA(typ.)~ 260mA(max)
  - B Mode:
    - FTP Tx: 300mA (typical)~360mA (max)
    - FTP Rx: 270mA (typical)~300mA (max)
    - Stand by: 230mA (typical)~250mA (max)
    - Cont. Tx: 270mA(typ.)~ 320mA(max) <17dBm output>
    - Cont. Rx: 180mA(typ.)~ 220mA(max)
  - G Mode:
    - FTP Tx: 300mA (typical)~350mA (max)
    - FTP Rx: 280mA (typical)~310mA (max)
    - Stand by: 290mA (typical)~330mA (max)
    - Cont. Tx: 310mA(typ.)~ 360mA(max) <17dBm output>
    - Cont. Rx: 220mA(typ.)~ 260mA(max)
  - Power saving: 35mA (typical)~55mA (max)
  - Radio off: 40mA (typical)~50mA (max)

- Radio Power (measured power tolerance is +1/-2dBm at production)

■ A Mode : (unit : dBm)

Mode	11a Target power(Measured power)							
channel	34ch	36ch	38-64ch	100ch	104-140ch	149	153-157	161-165
6Mbps	18.5(17.5)	18.5(17.5)	18.5(18)	18.5(18)	18.5(18)	18(17.5)	18(17.5)	17.5(17)
9Mbps	18.5(17.5)	18.5(17.5)	18.5(18)	18.5(18)	18.5(18)	18(17.5)	18(17.5)	17.5(17)
12Mbps	18.5(17.5)	18.5(17.5)	18.5(18)	18.5(18)	18.5(18)	18(17.5)	18(17.5)	17.5(17)
18Mbps	18.5(17.5)	18.5(17.5)	18.5(18)	18.5(18)	18.5(18)	18(17.5)	18(17.5)	17.5(17)
24Mbps	18.5(17.5)	18.5(17.5)	18.5(18)	18.5(18)	18.5(18)	18(17.5)	18(17.5)	17.5(17)
36Mbps	17(16)	17(16)	17(16)	17(16)	17(16)	16(15.5)	16(15.5)	16(15.5)
48Mbps	15.5(14.5)	15.5(14.5)	15.5(14.5)	15.5(14.5)	15.5(14.5)	15(14)	15(14)	14.5(14)
54Mbps	14.5(13.5)	14.5(13.5)	14.5(13.5)	14.5(13.5)	14.5(13.5)	13.5(12.5)	13.5(12.5)	13.5(12.5)

■ B/G Mode: (unit : dBm)

Mode	11b/g Target power						
channel	h	2-4ch	5-7ch	8ch	9-10ch	11-13ch	14ch
1Mbps long	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
2Mbps long	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
2Mbps short	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
5.5Mbps long	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
5.5Mbps short	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
11Mbps long	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
11Mbps short	17(16)	16.5(15.5)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)
6Mbps	17(16)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)	16(15)
9Mbps	17(16)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)	16(15)
12Mbps	17(16)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)	16(15)
18Mbps	17(16)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)	16(15)
24Mbps	17(16)	16.5(15.5)	16.5(15.5)	16(15)	16(15)	16(15)	16(15)
36Mbps	16.5(15.5)	16(15)	15.5(14.5)	15(14)	15(14)	15(14)	15(14)
48Mbps	15.5(14.5)	15(14)	14.5(13.5)	14(13)	14(13)	14(13)	14(13)
54Mbps	14.5(13.5)	14(13)	13.5(12.5)	13(12)	13(12)	12.5(11.5)	12.5(11.5)

● Sensitivity:

- A Mode: (PER<10% at PSDU length of 1000 bytes)

Parameters	Conditions	Max	Unit
A mode 4.92Ghz	54Mbps	-65	dBm
	48Mbps	-70	dBm
	36Mbps	-76	dBm
	24Mbps	-79	dBm
	18Mbps	-84	dBm
	12Mbps	-86	dBm
	9Mbps	-86	dBm
	6Mbps	-86	dBm

Parameters	Conditions	Max	Unit
A mode 5.22Ghz	54Mbps	-67	dBm
	48Mbps	-72	dBm
	36Mbps	-78	dBm
	24Mbps	-81	dBm
	18Mbps	-85	dBm
	12Mbps	-87	dBm
	9Mbps	-87	dBm
	6Mbps	-87	dBm

Parameters	Conditions	Max	Unit
A mode 5.5Ghz	54Mbps	-68	dBm
	48Mbps	-73	dBm
	36Mbps	-79	dBm
	24Mbps	-82	dBm
	18Mbps	-86	dBm
	12Mbps	-88	dBm
	9Mbps	-88	dBm
	6Mbps	-88	dBm

Parameters	Conditions	Max	Unit
A mode 5.825Ghz	54Mbps	-67	dBm
	48Mbps	-72	dBm
	36Mbps	-78	dBm
	24Mbps	-81	dBm
	18Mbps	-85	dBm
	12Mbps	-87	dBm
	9Mbps	-87	dBm
	6Mbps	-87	dBm

- B Mode: (PER<8% at PSDU length of 1000 bytes)

Parameters	Conditions	Max	Unit
B mode 2.412Ghz	1Mbps	-91	dBm
	2Mbps	-89	dBm
	5.5Mbps	-87	dBm
	11Mbps	-85	dBm
Parameters	Conditions	Max	Unit
B mode 2.472Ghz	1Mbps	-89	dBm
	2Mbps	-88	dBm
	5.5Mbps	-86	dBm
	11Mbps	-84	dBm



- G Mode: (PER<10% at PSDU length of 1000 bytes)

Parameters	Conditions	Max	Unit
A mode 2.412Ghz	54Mbps	-69	dBm
	48Mbps	-73	dBm
	36Mbps	-78	dBm
	24Mbps	-80	dBm
	18Mbps	-84	dBm
	12Mbps	-86	dBm
	9Mbps	-86	dBm
	6Mbps	-86	dBm
Parameters	Conditions	Max	Unit
A mode 2.472Ghz	54Mbps	-67	dBm
	48Mbps	-72	dBm
	36Mbps	-77	dBm
	24Mbps	-79	dBm
	18Mbps	-83	dBm
	12Mbps	-85	dBm
	9Mbps	-85	dBm
	6Mbps	-85	dBm



- Operating Range( **The range are subject to the environment**)
  - A Mode: Indoor: 35~100 meter @ 6Mbps  
Outdoor: over 350 meter @ 6Mbps
  - B Mode: Indoor: 35~100 meter @ 11Mbps  
Outdoor: over 350 meter @ 11Mbps
  - G Mode: Indoor: 35~100 meter @ 6Mbps  
Outdoor: over 350 meter @ 6Mbps
- Media Access Protocol: CSMA/CA with ACK

### **5.2 Environmental Spec.**

- Operating Temperature Range: 0degree C~70degree C
- Storage Temperature Range: -20degree C~80degree C
- Operating Humidity Range: 10%~90%