Installation Guide

For WMP-ND03

Operation Manual

Test Utility Installation:

1. Unzip "ART_V0_5_b25ALL.zip" to "C:\".
2. The utility must run on Win2000 or WinXP.

Hardware Installation:

Before insert the card, please execute the below instruction at first !!

1. **Win2000 OS :**
   Enter in the directory : C:\ v0_5_b25ALL\art_driver\bin\2000
   Execute the uninst_new_drv_2k.bat:
   Execute the inst_new_drv_2k.bat :
   WinXP OS :
   Enter in the directory : C:\ v0_5_b25ALL\art_driver\bin\xp
   Execute the uninst_new_drv_xp.bat:
   Execute the inst_new_drv_xp.bat
2. Insert the card, then install the driver , the driver is located at
   Win2000 OS :
   C:\ v0_5_b25ALL\art_driver\bin\2000
   WinXP OS :
   C:\ v0_5_b25ALL\art_driver\bin\xp

Configuration:

1. Enter the DOS command mode , then change the directory to :
   C:\ v0_5_b25ALL\art_driver\bin\xp
2. Input the instruction: art \id=2082

   Then press enter .

ART TEST MODE:

1. Once utility is executed, a menu with test options will appear. To run a test, press the character key that is assigned to the test option.
   For example, press "c" to run the continuous transmit test, or press "r " to run the continuous receive test.
   For example: press "o" to change 11g or 11b test mode, Press "c" to continuous transmit mode .

```
C:\WINNT\system32\cmd.exe                                          _ □ ×

Operating in 11b at channel 2.412GHz


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! Test Harness Main Options:                 !
!    o - Toggle M<o>de                        !
!    e - Ignore <E>EPROM Calibration          !
!    c - <C>ontinuous transmit mode           !
!    r - Continuous RF <R>eceive mode         !
!    l - <L>ink test menu                     !
!    t - <T>hroughput test menu               !
!    p - EE<P>ROM function                    !
!    s - <S>witch test card                   !
!    m - <M>anufacturing/Calibration Test     !
!    g - Enable lo<g>ging                      !
!    u - <U>tility Menu                        !
!    i - <N>oise Immunity Menu                 !
!    q - <Q>uit                                !
===============================================
```

2. Continuous Transmit Options.
    a. Before the Continuous Transmit test, need to press "e" first
       The command will load the calibrate data to the EEROM, then the card can transmit the target
       power
    b. The channel frequency, data rate and output power could be changed in continuous transmit
       options. Press "c" to increase the output power , 11g Power (data rate 6Mbps) is 17dBm, 11b
       Power is 17dBm , Press ESC to return to the main Test Options menu when finished.

3. Continuous Receive Options
Continuous receive options will put the radio into receive mode to allow for radio measurements. Press
ESC to return to the main Test Options menu when finished.

```
C:\WINNT\system32\cmd.exe                                          _ □ ×

==================================================================
! Continous RF Receive Options                                   !
!    p - Increase Center Frequency by 10 MHz <P inc by 100 MHz>   !
!    l - Decrease Center Frequency by 10 MHz <L dec by 100 MHz>   !
!    i - Increase rx Gain <I inc by 10>                           !
!    j - Decrease rx Gain <J dec by 10>                           !
!    a - Toggle antenna                                           !
!    s - Loop through antenna switch table                        !
! ESC - exit                                                      !
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Operating in 11g at channel 2.412GHz

ANT_A receive Gain set externally
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1.0 Scope

1.1 Document

This document is to specify the product requirements for **802.11 a/b/g/n Mini-PCI Card**. This mPCI is based on Atheros chipset that complied with complied with IEEE 802.11n Draft 2.0, and it is also backward complied with IEEE 802.11a standard from 5.15~5.825GHz wideband and IEEE 802.11b/g standard from 2.4~2.5GHz. It can be used to provide up to 54Mbps for IEEE 802.11a and IEEE 802.11g , 11Mbps for IEEE 802.11b and 300Mbps for IEEE 802.11n to connect your wireless LAN.

1.2 Product Features

- Compatible with IEEE 802.11a high rate standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11g high rate standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11b high rate standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11 draft n standard to provide wireless 300Mbps data rate
- Maximum reliability, throughput and connectivity with automatic data rate switching
- Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication

2.0 Requirements

The following sections identify the detailed requirements of the **802.11n a or g/b Mini-PCI Card.**

2.1 Functional Block Diagram
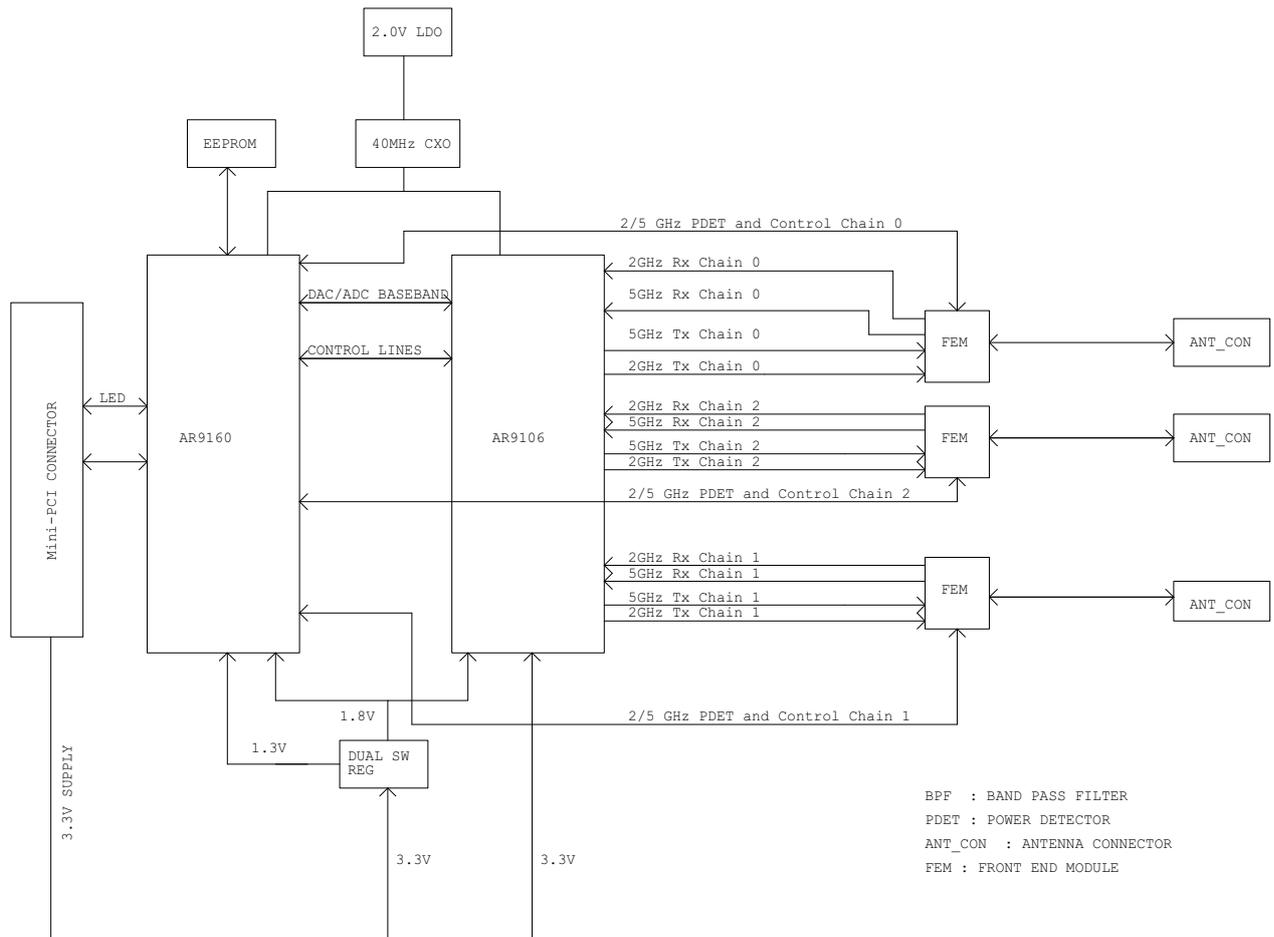
2.2 General Requirements

2.2.1 IEEE 802.11a Section

#	Feature	Detailed Description
2.2.1.1	Standard	• IEEE 802.11a
2.2.1.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.1.3	Operating Frequency	USA/ CANADA: 5150~5250MHz 5725~5850MHz TAIWAN: 5250~5350MHz 5725~5850MHz EUROPE: 5150~5250MHz 5250~5350MHz 5470~5725MHz AUSTRALIA: 5150~5250MHz 5250~5350MHz 5470~5725MHz 5725~5850MHz

#	Feature	Detailed Description
2.2.1.4	Data Rate	• 54, 48, 36, 24, 18, 12, 9 and 6Mbps
2.2.1.5	Media Access Protocol	• CSMA/CA with ACK
2.2.1.6	Maximum Transmitter Output Power at Antenna Connector	Typical RF Output Power at each Data Rate at room Temp. 25degree C Maximum 16 dBm at 6~54Mbps (AVG power for each chain) Note: The maximum power setting will vary according to individual country regulations.
2.2.1.7	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% and at room Temp. 25degree C • –dBm at 54Mbps • –dBm at 48Mbps • –dBm at 36Mbps • –dBm at 24Mbps • –dBm at 18Mbps • –dBm at 12Mbps • –dBm at 9Mbps • –dBm at 6Mbps (TBC)

2.2.2 IEEE 802.11b Section

#	Feature	Detailed Description
2.2.2.1	Standard	• IEEE 802.11b
2.2.2.2	Radio and Modulation Schemes	• DQPSK, DBPSK, DSSS, and CCK
2.2.2.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band
2.2.2.4	Channel Numbers	• 11 channels for United States/Canada/ Taiwan 13 channels for Europe Countries 14 channels for Japan
2.2.2.5	Data Rate	• 11, 5.5, 2, and 1Mbps
2.2.2.6	Media Access Protocol	• CSMA/CA with ACK
2.2.2.7	Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain, Data Rate and at room Temp. 25degree C Maximum 18dBm at 1,2,5.5,11Mbps(AVG Power for each chain) Note: The maximum power setting will vary according to individual country regulations.
2.2.2.8	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 8% and at room Temp. 25degree C • –dBm at 11Mbps • –dBm at 5.5Mbps • –dBm at 2Mbps • –dBm at 1Mbps (TBC)

2.2.3 IEEE 802.11g Section

#	Feature	Detailed Description
2.2.3.1	Standard	• IEEE 802.11g
2.2.3.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.3.3	Operating Frequency	• 2400 ~ 2483.5MHz ISM band
2.2.3.4	Channel Numbers	• 11 channels for United States/Canada/ Taiwan 13 channels for Europe Countries 13 channels for Japan

#	Feature	Detailed Description
2.2.3.5	Data Rate	• 6,9,12,18,24,36,48,54Mbps
2.2.3.6	Media Access Protocol	• CSMA/CA with ACK
2.2.3.7	Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain, Data Rate and at room Temp. 25degree C Maximum 17dBm at 6~54 Mbps(AVG Power for each chain) Note: The maximum power setting will vary according to individual country regulations.
2.2.3.8	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% and at room Temp. 25degree C • –dBm at 54Mbps • –dBm at 48Mbps • –dBm at 36Mbps • –dBm at 24Mbps • –dBm at 18Mbps • –dBm at 12Mbps • –dBm at 9Mbps • –dBm at 6Mbps (TBC)

2.2.4 IEEE 802.11 Draft n Section

#	Feature	Detailed Description
2.2.4.1	Standard	• Draft n
2.2.4.2	Radio and Modulation Type	• BPSK, QPSK, 16QAM, 64QAM with OFDM
2.2.4.3	Operating Frequency	USA/ CANADA: 2400-2483.5MHz 5150~5250MHz 5725~5850MHz TAIWAN: 2400-2483.5MHz 5250~5350MHz 5725~5850MHz EUROPE: 2400-2483.5MHz 5150~5250MHz 5250~5350MHz 5470~5725MHz AUSTRALIA: 2400-2483.5MHz 5150~5250MHz 5250~5350MHz 5470~5725MHz 5725~5850MHz

2.2.4.4 Data Rate	MCS	GI=800ns		GI=400ns	
		20MHz	40MHz	20MHz	40MHz
	0	6.5	13.5	7.2	15
	1	13	27	14.4	30
	2	19.5	40.5	21.7	45
	3	26	54	28.9	60
	4	39	81	43.3	90
	5	52	108	57.8	120
	6	58.5	121.5	65.0	135
	7	65	135	72.2	150

#	Feature	Detailed Description				
		8	13	27	14.444	30
		9	26	54	28.889	60
		10	39	81	43.333	90
		11	52	108	57.778	120
		12	78	162	86.667	180
		13	104	216	115.556	240
		14	117	243	130.000	170
		15	130	270	144.444	300
2.2.4.5	Media Access Protocol	• CSMA/CA with ACK				
2.2.4.6	Maximum Transmitter Output Power at Antenna Connector	• Typical RF Output Power at each RF chain, Data Rate and at room Temp. 25degree C 5GHz Band/HT-20(TBC) Maximum 16dBm at MCS0~15(AVG power for each chain) 5GHz Band/HT-40(TBC) Maximum 16dBm at MCS0~15 (AVG power for each chain) 2.4GHz Band/HT-20(TBC) Maximum 16dBm at MCS0~15 (AVG power for each chain) 2.4GHz Band/HT-40(TBC) Maximum 16dBm at MCS0~15 (AVG power for each chain) Note: The maximum power setting will vary according to individual country regulations.				
2.2.4.7	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate = 10% and at room Temp. 25degree C ■ 5GHz Band/HT-20 (TBC) • –dBm at MCS7/15 • –dBm at MCS6/14 • –dBm at MCS5/13 • –dBm at MCS4/12 • –dBm at MCS3/11 • –dBm at MCS2/10 • –dBm at MCS1/9 • –dBm at MCS0/8 ■ 5GHz Band/HT-40 (TBC) • –dBm at MCS7/15 • –dBm at MCS6/14 • –dBm at MCS5/13 • –dBm at MCS4/12 • –dBm at MCS3/11 • –dBm at MCS2/10 • –dBm at MCS1/9 • –dBm at MCS0/8 ■ 2.4GHz Band/HT-20(TBC) • –dBm at MCS7/15 • –dBm at MCS6/14 • –dBm at MCS5/13 • –dBm at MCS4/12 • –dBm at MCS3/11 • –dBm at MCS2/10 • –dBm at MCS1/9 • –dBm at MCS0/8 ■ 2.4GHz Band/HT-40(TBC) • –dBm at MCS7/15 • –dBm at MCS6/14 • –dBm at MCS5/13 • –dBm at MCS4/12 • –dBm at MCS3/11 • –dBm at MCS2/10 • –dBm at MCS1/9 • –dBm at MCS0/8				

2.2.5 General Section

#	Feature	Detailed Description
2.2.5.1	Antenna Type	• I-pex compatible connectors
2.2.5.2	Operating Voltage	• 3.3VDC +/- 10%
2.2.5.3	Current Consumption	• mA at transmit mode • mA at receive mode
2.2.5.4	Form Factor and Interface	• Mini-PCI type III A form factor

2.3 Software Requirements

The Configuration Software supports Linux 2.6.15. This configuration software includes the following functions:

- **Security**

  Supports enhanced security WEP, 802.1x,WPA, WPA2.

2.3.1 Security

#	Feature	Detailed Description
2.3.3.1	Encryption	• RC4 encryption algorithm • Support 64-bit, 128-bit and 152-bit WEP encryption • Support open system (OSA) and shared key authentication (SKA)
2.3.3.2	WEP Management	• Four WEP keys can be selected • STA with WEP off will never associate any AP with WEP enabled • WEP Key Format: Option for Hex format
2.3.3.3	802.1x	• Support EAP-TLS, EAP-TTLS, and EAP-PEAP
2.3.3.4	WPA/WPA2	• Support WPA/WPA2-PSK and WPA/WPA2-EAP • Support Cipher Mode AES and TKIP

2.4 PCB Dimension Requirements

#	Feature	Detailed Description
2.4.1	Length	• 60.00 mm
2.4.2	Width	• 50.00 mm
2.4.3	High	• 1.00mm

2.5 Compatibility Requirements

This device passes the following compatibility requirements.

#	Feature	Detailed Description
2.5.1	Wi-Fi	• Meet Wi-Fi certification for IEEE 802.11a/b/g/ draft n product
2.5.2	WHQL	• Meet applicable WHQL certification requirements
2.5.3	Physical Layer and Functionality	• Meet Alpha Networks Engineering Test Plan and Test Report

2.6 Regulatory Requirements

#	Detailed Description
2.6.1	FCC , CE, C-Tick , NCC , IC ,TELEC, VCCI, CSA international

2.7 Requirements of Reliability, Maintainability and Quality

#	Feature	Detailed Description
2.7.1	MTBF	• Mean Time Between Failure > 30,000 hours
2.7.2	Maintainability	• There is no scheduled preventive maintenance required
2.7.3	Quality	• The product quality is followed-up by Alpha Networks factory quality control system

2.8 Environmental Requirements

#	Feature	Detailed Description
2.8.1	Operating Temperature Conditions	• The product is capable of continuous reliable operation when operating in ambient temperature of 0 ℃ to +50℃.
2.8.2	Non-Operating	• Neither subassemblies is damaged nor the operational

#	Feature	Detailed Description
	Temperature Conditions	performance is degraded when restored to the operating temperature after exposing to storage temperature in the range of −20 ℃ to +75 ℃.
2.8.3	Operating Humidity conditions	• The product is capable of continuous reliable operation when subjected to relative humidity in the range of 10% and 90% non-condensing.
2.8.4	Non-Operating Humidity Conditions	• The product is not damaged nor the performance is degraded after exposure to relative humidity ranging from 5% to 95% non-condensing

Federal Communication Commission Interference Statement

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 instructions, 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 of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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 radio/TV technician for help.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only
IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

This device is intended only for OEM integrators under the following conditions:

1)   The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2)   The transmitter module may not be co-located with any other transmitter or antenna,

3)   For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 3 conditions above are met, further <u>transmitter</u> test will not be required. However, the 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 <u>can not be met</u> (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID <u>can not</u> 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.

<u>**End Product Labeling**</u>

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 FCC ID: RRKWMPND03".

<u>**Manual Information To the End User**</u>

The OEM integrator has to be aware not to provide information to the end user

regarding how to install or remove this RF module in the user's manual of the end

product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Industry Canada Statement

This device complies with RSS-210 of the Industry Canada Rules.
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 the device

This device has been designed to operate with an antenna having a maximum gain of 7.12dBi.
Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna
impedance is 50 ohms.

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

Caution:
The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

Because high power radars are allocated as primary users (meaning they have priority) in 5250-5350 MHz and 5650-5850 MHz, these radars could cause interference and/or damage to license exempt LAN devices.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC 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.

以下警語適用台灣地區：

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。

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，指依電信法規定作業之無線電通信。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。

本模組於取得認證後將依規定於模組本體標示審合格籤，並要求平台上標示「本產品內含射頻模組：ID 編號」