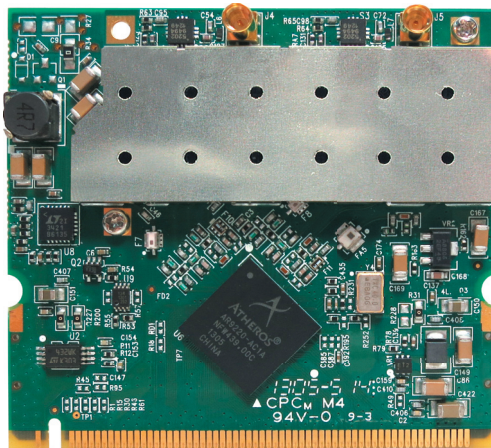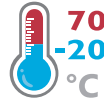# DNMA-H92 Information Sheet

extended-temperature high-power 802.11n a/b/g wifi 2x2 mini-PCI module w/ESD and Surge Protection, AR9220

Overview:

DNMA-H92 is an extended temperature high-power 802.11n a/b/g 2x2 wifi mini-PCI module integrated with 12KV RF ESD/Surge protection circuit designed specifically to enable highest - performance and reliability in the harshest outdoor environment such as mesh networking, military, bridging, and infrastructure applications.

Dual power supply plus heat sink design makes critical components temperature cooler by up to 10°C , significantly reduces components aging caused by thermal in high power application to secure long-term performance reliability, less than 50mV output ripple design ensures high performance while remaining conscious of power efficiency, low noise amplifier (LNA) dramatically improves sensitivity, and PA damage protection circuit enables

direct antenna switch behind MMCX connectors make DNMA-H92 the best performance and most feature-rich mini-PCI module valid in the market.

PCI interface, 2mm thickness heat sink, and ath9k driver support ease manufacturer's design cycles to accelerate time-to-market.

Key Features:

» High power on both 2.4/5GHz design to reach average power 250mW (24dBm) @ 5GHz and 300 mW (25dBm) @ 2.4GHz provides superior wifi coverage.

» Integrated 12KV ESD protector on RF port ensures highest levels of performance and reliability in the harshest outdoor mesh/military deployments.

» 3~5dB Tx linearity improvement than standard MB92 design on all data rate to gain better overall performance.

» Two MMCX antenna design can be configured through software to use one high gain 2.4GHz at antenna port 1 and another 5GHz high gain antenna at antenna port 2, the perfect alternative solution to replace high cost dual band high gain antenna.

» Dual power supply and heat sink design plus unique design know-how ensure +2.5/-2 dB target power in −20°C ~ +70°C temperature range.

» Less than 50mV output ripple design ensures high performance while remaining conscious of power efficiency.

» 2mm thickness heat sink design provides reliable high power RF performance for embedding into new ergonomic application-specific devices.

» PA fine-tuning gains balance of linearity and power consumption with enough margin while maintaining adequate Tx power to ensure no major performance degradation over time.

» Same EVM on both light and heavy loading maintain lower packet error to increase channel efficiency.

» Mini-PCI Type III A form factor (length is 4.3 mm longer than IIIA type) with screw hole is ideal for solid mounting onto motherboard.

» Supported by ath9k and FreeBSD providing Linux kernel driver drivers for industrial, academic, or personal projects at highest flexibility and lowest cost.

» Dual band 802.11 a/b/g/n support 2Tx/2Rx to enable data rate up to 300Mbps link rate for 40MHz channel, six times the throughput of 802.11a and 802.11g.

» Supports 64/128/152-bit WEP encryption, IEEE 802.1x authentication, AES and TKIP encryption.

» Two DIP type MMCX RF connector enables robust assembly and lower loss for external antenna.

» RoHS compliance meets environment-friendly requirement.

» Flexible power supply design to easily change from 3.3Vdc (default) to 3.3Vdc+5Vdc by only one on-board resistor shift to meet power budget requirement of different platforms.

Higher Performance than MB92 Reference Design:
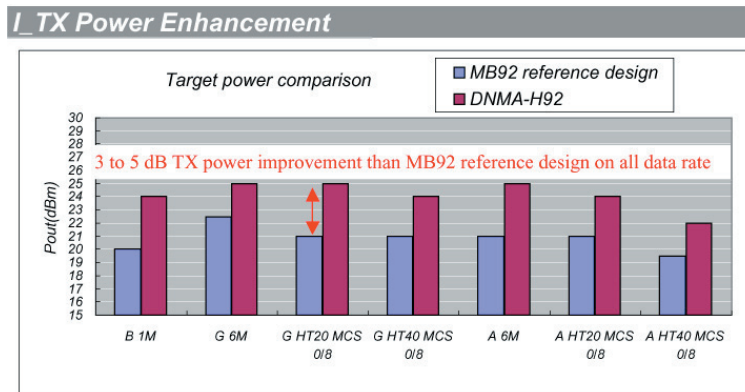
Superior Tx and Rx Throughput

Chariot setting:

Throughput Script: High_Performance_Script.scr
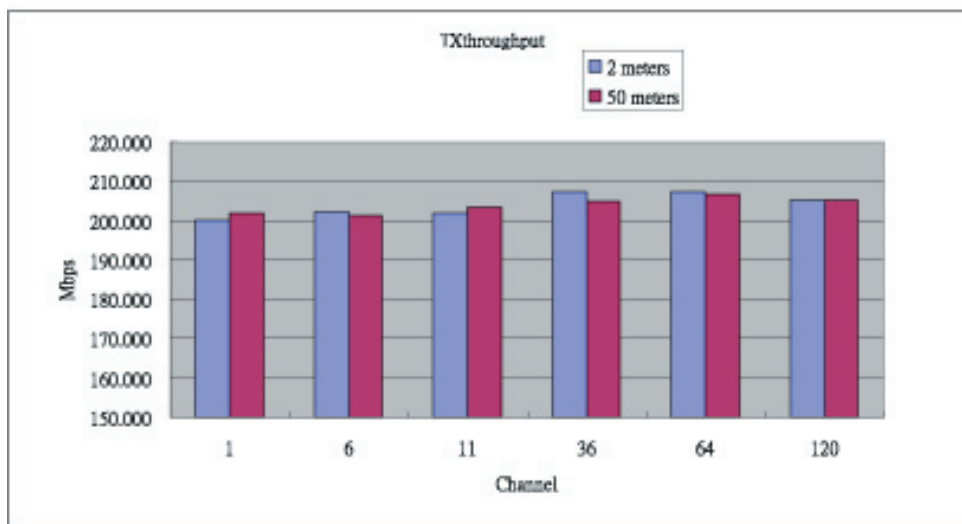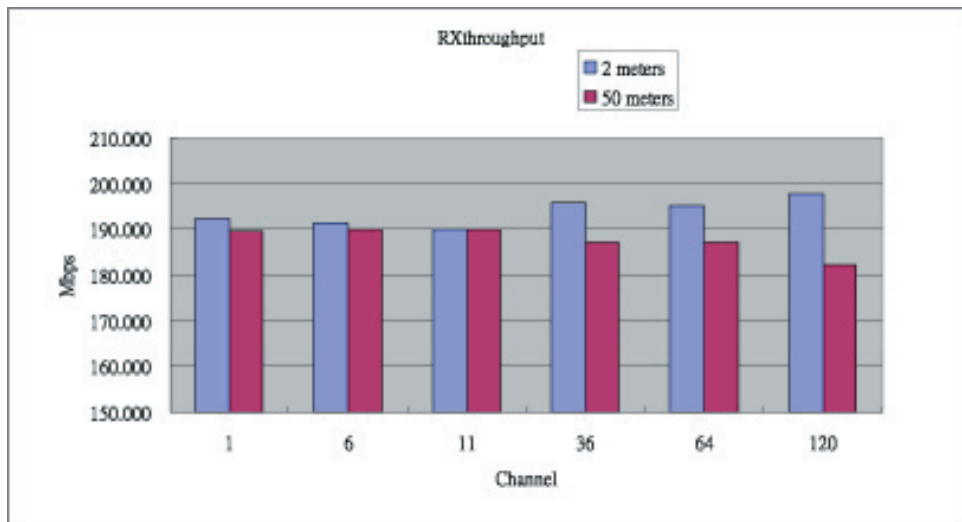
Advanced Dual Band 2.4/5GHz High Power WiFi Architecture

Most of high-power mini-PCI modules valid in the market are single band of either 2.4GHz or 5GHz only which are seriously lack flexibility and waste frequency efficiency in real world applications. DNMA-H92 is a real dual-band 2.4/5GHz high power mini-PCI module. Two independent DNMA-H92 modules can be used to form highly flexible and independent high power WiFi connections with both 2.4GHz and 5GHz frequencies to maximize frequency and bandwidth efficiency per application requirement.
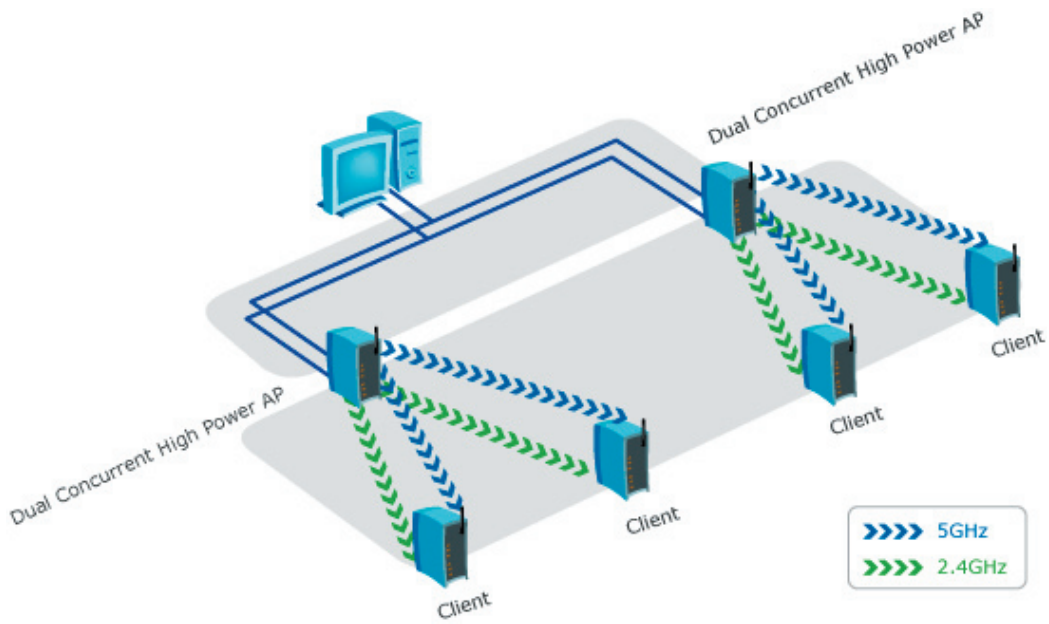
Block Diagram:

Mechanical Outline:

ISOMETRIC
REFERENCE ONLY

NOTES:
1. ALL UNSPECIFIED TOLERANCES ARE ± 0.15mm.
2. COMPONENTS AREA : 1.0mm.
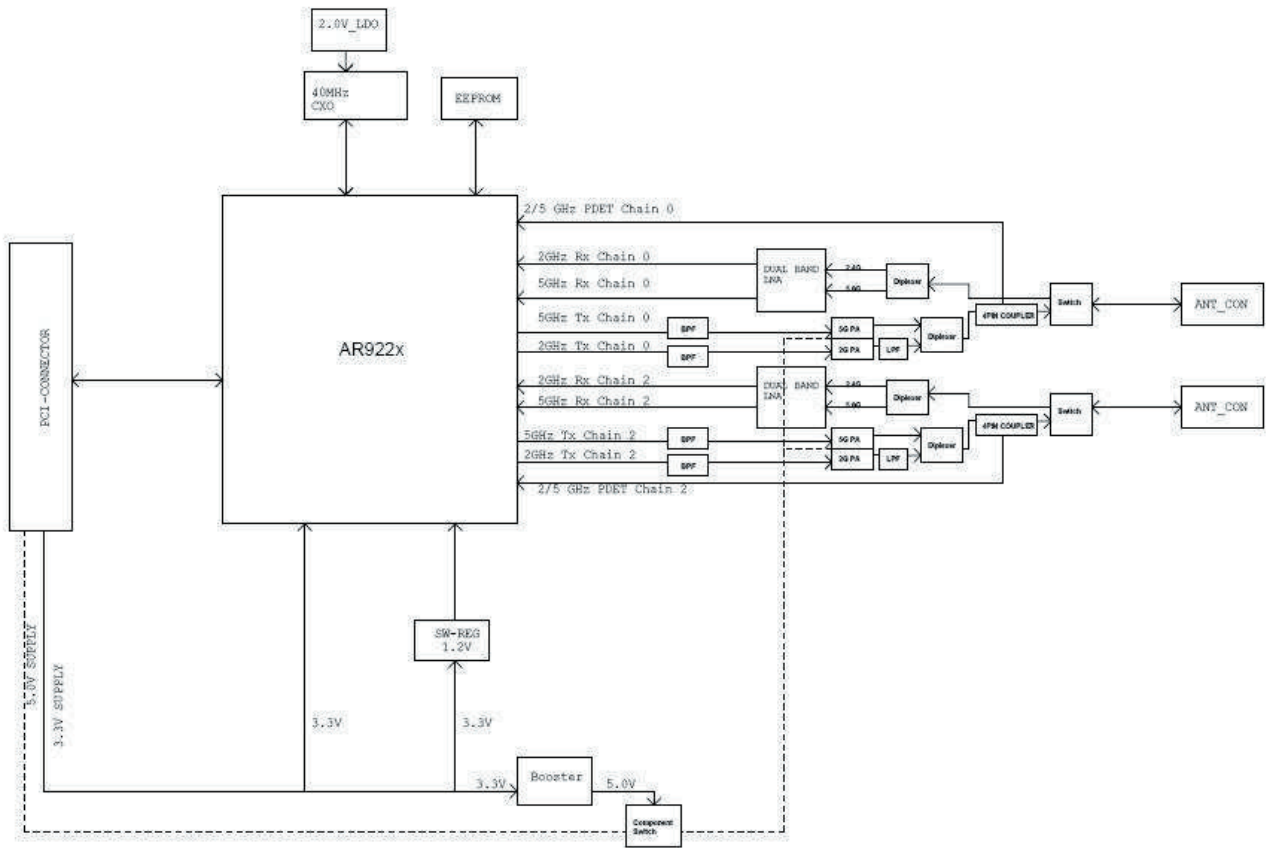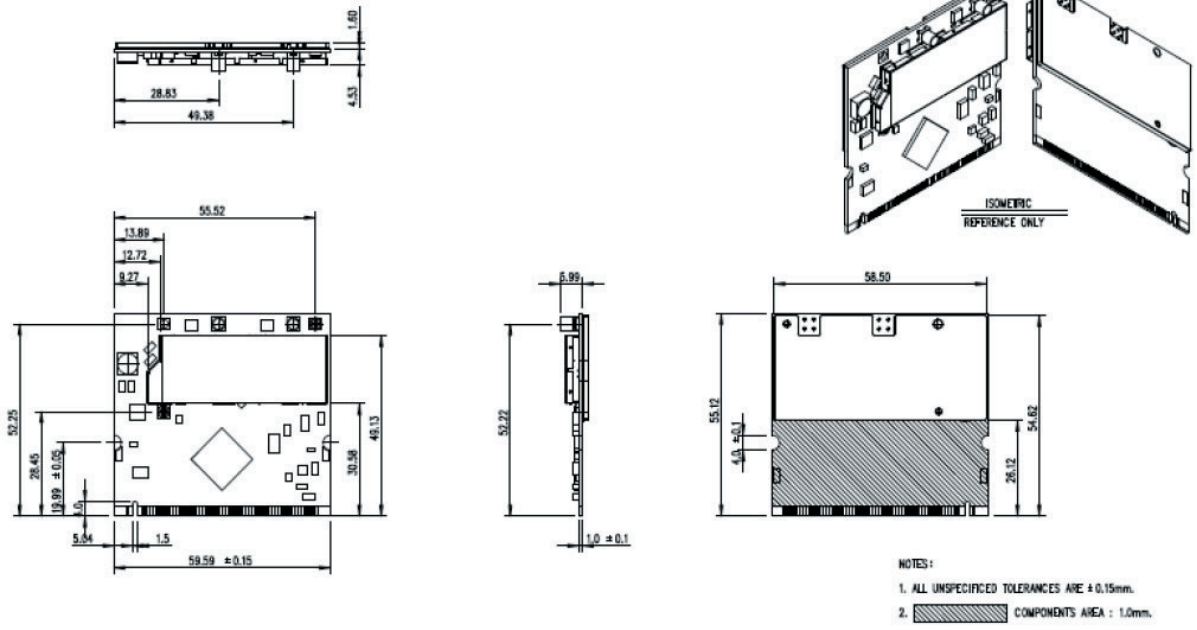
Pin Assignment:

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	General purpose GPIO pin	Connect to AR9220 GPIO1
12	LED2_YELP	General purpose GPIO pin	Connect to AR9220 GPIO2
13	LED1_GRNN	General purpose GPIO pin	Connect to AR9220 GPIO0
14	LED2_YELN	General purpose GPIO pin	Connect to AR9220 GPIO4
15	CHSGND	Ground	Digital Ground
16	RESERVED	NC	Reserved
17	INTB#	NC	No use
18	5V	NC	5V (optional)
19	3.3V	Power	3.3V±5%
20	INTA#	CMOS, Output	PCI bus Interrupt A
21	RESERVED	NC	Reserved
22	RESERVED	NC	Reserved

23	GROUND	Ground	Digital ground
24	3.3VAUX	NC	No use
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±5%
29	REQ#	Output	PCI bus request
30	GNT#	Input, Weak pull high	PCI bus grant
31	3.3V	Power	3.3V±5%
32	GROUND	Ground	Digital ground
33	AD[31]	BiDir,, Weak pull down	PCI address/data bus bit 31
34	PME#	NC	No use
35	AD[29]	BiDir,, Weak pull down	PCI address/data bus bit 29
36	RESERVED	NC	No use
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 30
40	3.3V	Power	3.3V±5%
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	No use
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	BiDir,, 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±5%
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±5%

71	PERR#	BiDir, Weak pull up	PCI parity error
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±5%
89	3.3V	Power	3.3V±5%
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	No use
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	5V (option)
98	RESERVED_WIP4	NC	No use
99	AD[01]	BiDir, Weak pull down	PCI address/data bus bit
100	RESERVED_WIP4	NC	No use
101	GROUND	Ground	Digital ground
102	GROUND	Ground	Digital ground
103	AC_SYNC	NC	No use
104	M66EN	Power	3.3V±5%(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	No use
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	NC	No use

Packing:

Box: 50 pcs/box
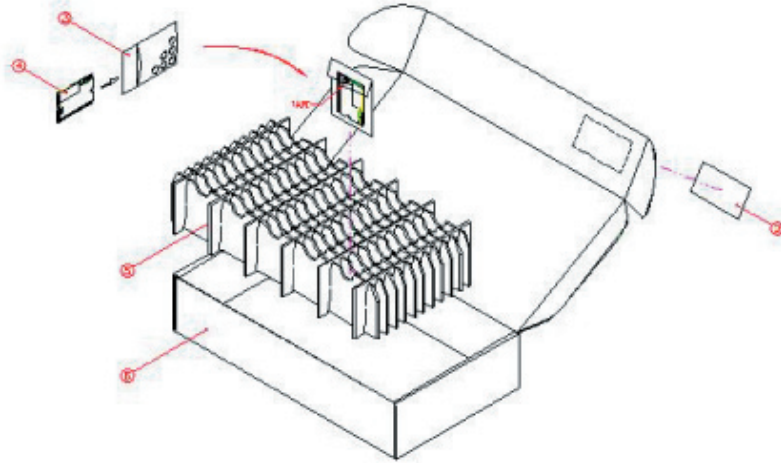
Carton: 250 pcs/carton
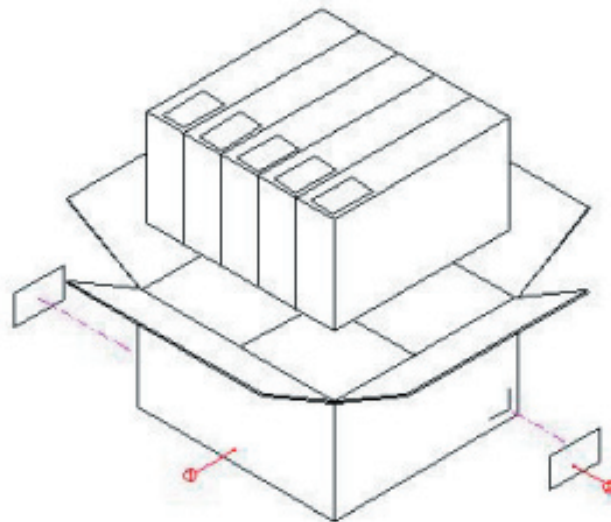
Specifications:

Chipset	Atheros AR9220
Standard Conformance	802.11a, 802.11b, 802.11g, and 802.11n
Frequency Range	» USA: 2.400 ~ 2.483GHz, 5.15 ~ 5.35GHz, 5.5 ~ 5.7GHz, 5.725 ~ 5.825GHz » Europe: 2.400 ~ 2.483GHz, 5.15 ~ 5.35GHz, 5.47 ~ 5.725GHz » Japan: 2.400 ~ 2.497GHz, 5.15 ~ 5.35GHz, 5.47 ~ 5.725GHz » China: 2.400 ~ 2.483GHz, 5.725 ~ 5.85GHz
Interface	32-bit mini-PCI Type III A (4.3mm longer than III A type)
Operation Voltage	3.3V ± 5%
Modulation Technique	» DSSS with CCK, DQPSK, DBPSK » OFDM with BPSK, QPSK, 16QAM, 64QAM

Data Rate	» 802.11a: 6, 9, 12, 18, 24, 36, 48,54Mbps
	» 802.11b: 1, 2, 5.5 and 11Mbps
	» 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
	» 802.11n:
	» 20MHz channel:
	» 1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI (Max.)
	» 2Nss: 130Mbps @ 800GI, 144.4Mbps @ 400GI (Max.)
	» 40MHz channel:
	» 1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.)
	» 2Nss: 270Mbps @ 800GI, 300Mbps @ 400GI (Max.)

Operating Channels	» 802.11a/n:
	» USA/Canada: 23 non-overlapping channels
	» Major Europe Countries: 19 non-overlapping channels
	» Japan: 19 non-overlapping channels
	» China: 5 non-overlapping channels
	» 802.11b/g/n:
	» USA/Canada: 11 (1~11)
	» Major Europe Countries: 13 (1~13)
	» France: 4 (10~13)
	» Japan: 14 for 802.11b (1~13 or 14th), 13 for 802.11g (1~13)
	» China: 13 (1~13)

Output Power [total 2 chains composite power level]	» 802.11a:
	» +24dBm @ 6, 9, 12, 18, 24Mbps
	» +23dBm @ 36Mbps
	» +22dBm @ 48Mbps
	» +21dBm @ 54Mbps
	» 802.11b: +24dBm
	» 802.11g:
	» +25dBm @ 6, 9, 12,18,24Mbps
	» +24dBm @ 36Mbps
	» +23dBm @ 48Mbps
	» +22dBm @ 54Mbps

- » 802.11n 2.4GHz/HT20:
    - » +25dBm @ MCS 0/8
    - » +25dBm @ MCS 1/9
    - » +25dBm @ MCS 2/10
    - » +25dBm @ MCS 3/11
    - » +24dBm @ MCS 4/12
    - » +23dBm @ MCS 5/13
    - » +22dBm @ MCS 6/14
    - » +21dBm @ MCS 7/15
- » 802.11n 2.4GHz/HT40:
    - » +24dBm @ MCS 0/8
    - » +24dBm @ MCS 1/9
    - » +24dBm @ MCS 2/10
    - » +23dBm @ MCS 3/11
    - » +22dBm @ MCS 4/12
    - » +21dBm @ MCS 5/13
    - » +21dBm @ MCS 6/14
    - » +20dBm @ MCS 7/15
- » 802.11n 5GHz/HT20:
    - » +24dBm @ MCS 0/8
    - » +23dBm @ MCS 1/9
    - » +22dBm @ MCS 2/10
    - » +21dBm @ MCS 3/11
    - » +20dBm @ MCS 4/12
    - » +19dBm @ MCS 5/13
    - » +18dBm @ MCS 6/14
    - » +18dBm @ MCS 7/15 (+17dBm @ 5.825GHz)

- » 802.11n 5GHz/HT40:
    - » +22dBm @ MCS 0/8
    - » +22dBm @ MCS 1/9
    - » +21dBm @ MCS 2/10
    - » +20dBm @ MCS 3/11
    - » +19dBm @ MCS 4/12
    - » +18dBm @ MCS 5/13
    - » +17dBm @ MCS 6/14
    - » +17dBm @ MCS 7/15 (+16dBm @ 5.795GHz)

Receiver Sensitivity (two chains typical sensitivity level with ± 3dB tolerance)

» 802.11a:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(2Rx dBm)
6M	-82	-95
9M	-81	-95
12M	-79	-94
18M	-77	-92/-91
24M	-74	-88
36M	-70	-86/-85
48M	-66	-82/-81
54M	-65	-80/-79

» 802.11b:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(2Rx dBm)
1M	-82	-92
5.5M	-80	-92
11M	-76	-92

» 802.11g:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(2Rx dBm)
6M	-82	-95
9M	-81	-95
12M	-79	-94
18M	-77	-92
24M	-74	-90
36M	-70	-86/-85
48M	-66	-82
54M	-65	-81/-80

» 802.11a/n, HT20:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(2Rx dBm)
MCS0	-82	-96/-94
MCS1	-79	-93/-92
MCS2	-77	-91/-90
MCS3	-74	-88/-87
MCS4	-70	-85/-84
MCS5	-66	-81/-80
MCS6	-65	-79/-78
MCS7	-64	-77/-76

» 802.11a/n, HT40:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(2Rx dBm)
MCS0	-79	-91/-90
MCS1	-76	-89
MCS2	-74	-88/-87
MCS3	-71	-84/-83
MCS4	-67	-81/-80
MCS5	-63	-78/-77
MCS6	-62	-76/-75
MCS7	-61	-74/-73

» 802.11b/g/n, HT20:

Data Rate	IEEE Spec(1 Rx dBm)	Typical/Maximum(2Rx dBm)
MCS0	-82	-95
MCS1	-79	-94
MCS2	-77	-92/-91
MCS3	-74	-88/-87
MCS4	-70	-85/-84
MCS5	-66	-81
MCS6	-65	-80/-79
MCS7	-64	-78/-77

» 802.11b/g/n, HT40:

Data Rate	IEEE Spec(1 Rx dBm)	Typical/Maximum(2Rx dBm)
MCS0	-79	-92/-91
MCS1	-76	-91
MCS2	-74	-89
MCS3	-71	-86/-85
MCS4	-67	-82
MCS5	-63	-79/-78
MCS6	-62	-77
MCS7	-61	-75/-74

Power Consumption [2T2R @ 25°C]

	3.3V Power Supply	
	Typ.(W)	Max. (W)
11b Cont. Tx	4	6
11g Cont. Tx @ 6M	4	6
11a Cont. Tx @ 6M	5	7
11ng Cont. Tx @ HT20 MCS0	4	6
11ng Cont. Tx @ HT40 MCS0	4	6
11na Cont. Tx @ HT20 MCS0	5	7
11na Cont. Tx @ HT40 MCS0	5	7
11g Cont. Rx	0.4	0.7
11a Cont. Rx	0.7	1.0
StandBy	0.4	0.7

Antenna

two DIP MMCX RF connector for robust antenna assembly

ESD

EN 61000-4-2 Class B ± 12KV

MAC Protocol

CSMA/CA with ACK architecture 32-bit MAC

Security

» 64-bit, 128-bit and 152-bit WEP encryption
» 802.1x authentication
» AES-CCM & TKIP encryption

Operation Systems Supported

» ath9k / FreeBSD Linux, Windows XP, Windows Vista; Windows 7

Dimension

55.1mm (L) x 59.6mm (W) x 1.0mm (T)

Operation Temperature Range	-20°C ~ +70°C
Operating Humidity	10% ~ 95%, non-condensing
Storage Humidity	max. 95%, non-condensing
Regulation Compliance	FCC (ID: NUK-DNMAH92), IC (ID: 4779A-DNMAH92)
Environment-Friendly Compliance	REACH and RoHS

Ordering Information:

DNMA-H92	extended-temperature high-power 802.11n a/b/g wifi 2x2 mini-PCI module w/ESD and Surge Protection, AR9220
ESD Cable	UL 1007 18AWG, length 19cm, for ground end to enclosure point tied to Earth Ground.

Wireless radio modules are ESD sensitive, especially the components such as RF switch and the power amplifier. To avoid damage by electrostatic discharge, the following installation procedure is recommended:

» Touch your hands and the bag or tray containing the radio module to a ground point on the host board (for example one of the mounting holes).

» Install the radio module in the corresponding socket of host board.

» Install the pigtail cable in the cutout of the enclosure. This will ground the pigtail to the enclosure.

» Touch the I-PEX connector of the pigtail to the mounting hole (discharge), then plug onto the radio module.

» Use external lightning protection for outdoor applications.

» Make sure all antennas are being connected with the radio module (don't leave I-PEX connector open) before powering on the host device.

Unex Technology Corp.
- All Connected

http://www.unex.com.tw

sales-a@unex.com.tw