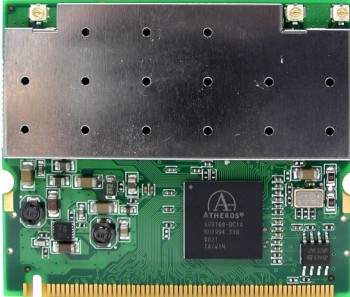




Model: DNMA-83



DNMA-83 is a 802.11n a/b/g wifi 3x3 mini-PCI module designed specifically to enable high-performance 3x3 MIMO access point (AP) and router solutions for dual-band (2.4/5GHz) applications that demand robust link quality and maximum throughput and range. Setting new standards in throughput, range, reliability, and power consumption, DNMA-83 delivers the ultimate wireless triple play experience for video, voice, and data transmission in the home, for the business, and on the road.

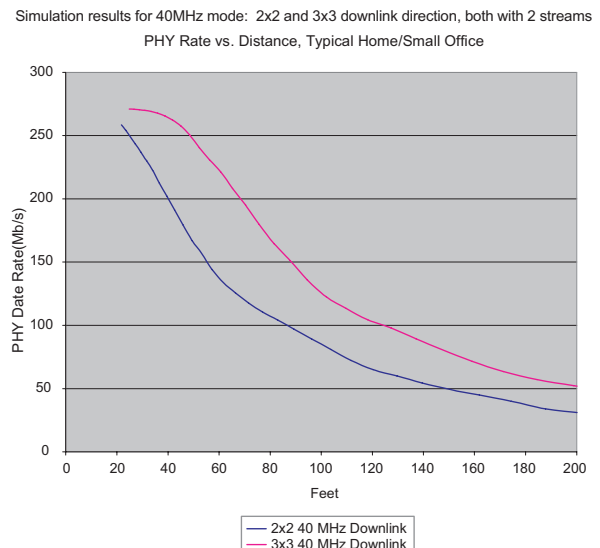
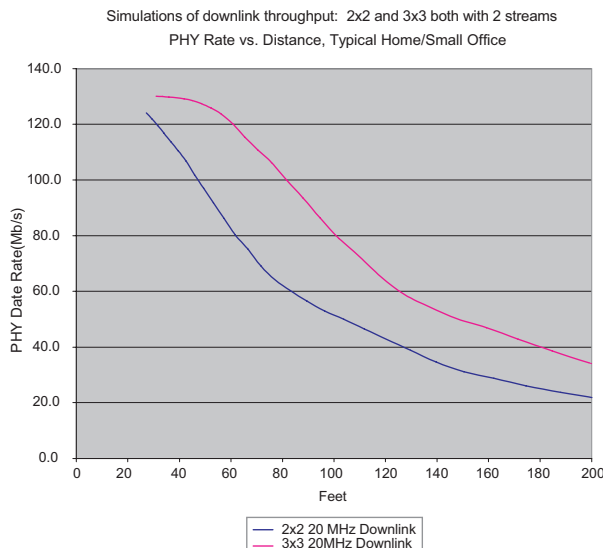
Atheros AR9160+AR9106 solution and 3 antennas design supports 2 simultaneous traffic MIMO streams using up to 3 integrated Tx and Rx for high throughput and range performance.

Key Features:

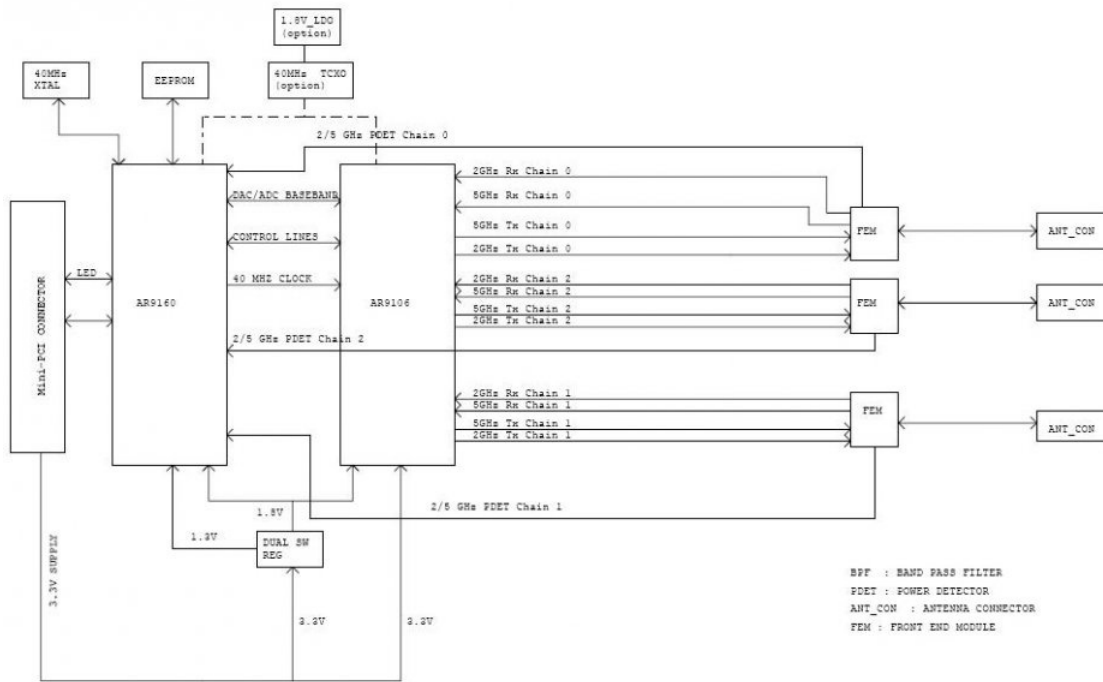
- Dual band 802.11 a/b/g/n support 3Tx/3Rx to enable data rate up to 300Mbps link rate for 40MHz channel, six times the throughput of 802.11a and 802.11g.
- Same EVM on both light and heavy loading maintain lower packet error to increase channel efficiency.
- Heat sink design provides reliable high power RF performance.
- Mini-PCI Type IIIA form factor with screw hole is ideal for solid mounting onto motherboard.
- Supported by ath9k providing Linux kernel AP/Station/IBSS/Monitor/Mesh/WDS-mode drivers for industrial, academic, or personal projects at highest flexibility and lowest cost.
- Atheros Linux SDK for AP and client-mode sub-license available by project.
- 802.11n compliance effectively interoperates with other chipsets.
- Supports IEEE 802.11a/802.11b/802.11g backward compatibility allowing inter-operability among multiple wifi networks.
- Supports 64/128/152-bit WEP encryption, 802.1x authentication, WPA, and AES-CCM & TKIP encryption enabling advanced LAN security.
- Three Hirose U.FL antenna connectors support MIMO functionality.
- Capable to be operated within FCC DFS2 or ETSI/EC DFS mid-5GHz band subjected to the regulatory approval done with the resided devices.
- RoHS compliance meets environment-friendly requirement.

What's the benefits to use 3x3 2-stream instead of other standard 2x2 2-stream?

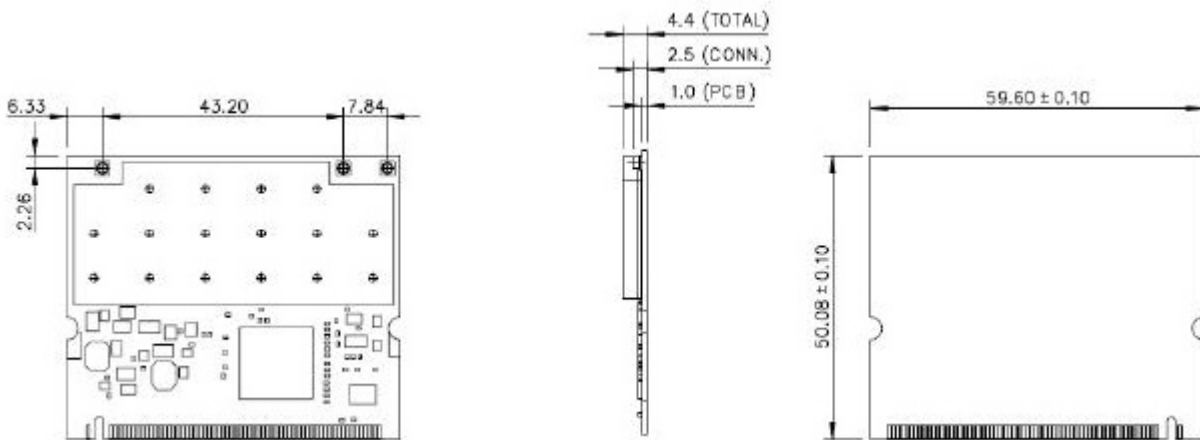
DNMA-83 3x3 2-stream outperforms other standard 2x2, 2-stream by better than 40% in the 20-100 ft range at 20MHz mode and 50% better in the critical 50-80 ft range at 40MHz mode.



Hardware Block Diagram



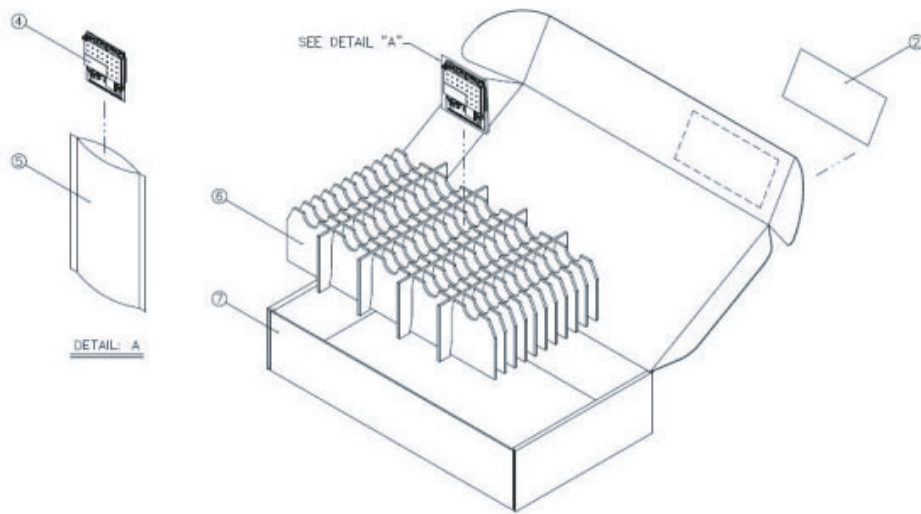
Mechanical Outline



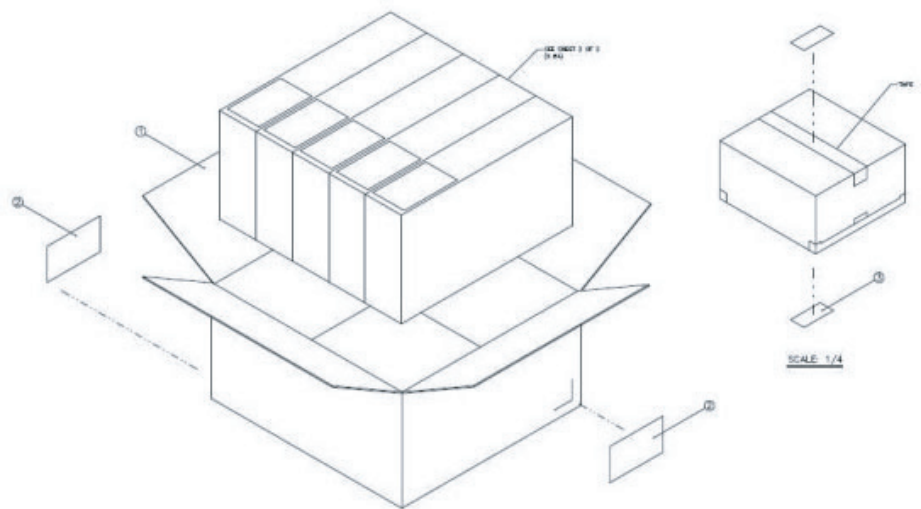
Unit: mm

Packing

Packing box: 100 pcs/box



Carton: 5 packing box/carton = 500 pcs/carton



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 AR9160 GPIO0
12	LED2_YELP	General purpose GPIO pin	Connect to AR9160 GPIO1
13	LED1_GRNN	NC	No use
14	LED2_YELN	NC	No use
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±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#	Output	PCI bus power management
35	AD[29]	BiDir,, Weak pull down	PCI address/data bus bit 29
36	RESERVED	General purpose GPIO pin	Connect to AR9160 GPIO7
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±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	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	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

Pin Assignment:			
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	General purpose GPIO pin	Connect to AR9160 GPIO6
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	Power	3.3V±5%
105	AC_SDATA_IN	NC	No use
106	AC_SDATA_OUT	NC	No use
107	AC_BIT_CLK	NC	No use
108	AC_CODECD_ID0#	NC	No use
109	AC_CODECD_ID1#	NC	No use
110	AC_RESET#	NC	No use
111	MOD_AUDIO_MON	NC	No use

Pin Assignment:			
112	RESERVED	General purpose GPIO pin	Connect to AR9160 GPIO8
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

Specifications:																																					
Main Chipset	Atheros® AR9160, AR9106																																				
Standard Conformance	802.11a, 802.11b, 802.11g, and 802.11n																																				
Frequency Range	<ul style="list-style-type: none"> ▪ 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 ~ 5.351GHz, 5.47 ~ 5.725GHz ▪ China: 2.400 ~ 2.483GHz, 5.725 ~ 5.85GHz 																																				
Interface	32-bit mini-PCI Type IIIA																																				
Operation Voltage	3.3V ±5%																																				
Modulation Technique	<ul style="list-style-type: none"> ▪ DSSS with CCK, DQPSK, DBPSK ▪ OFDM with BPSK, QPSK, 16QAM, 64QAM 																																				
Data Rate	<ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ◦ 20MHz channel: <ul style="list-style-type: none"> 1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI (Max.) 2Nss: 130Mbps @ 800GI, 144.4Mbps @ 400GI (Max.) ◦ 40MHz channel: <ul style="list-style-type: none"> 1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.) 2Nss: 270Mbps @ 800GI, 300Mbps @ 400GI (Max.) 																																				
Operating Channels	<ul style="list-style-type: none"> ▪ 802.11a/n• <ul style="list-style-type: none"> ◦ 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• <ul style="list-style-type: none"> ◦ 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) 																																				
Power Consumption of 3T3R	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">802.11a</th> <th style="text-align: center;">802.11b</th> <th style="text-align: center;">802.11g</th> <th style="text-align: center;">802.11n(2.4GHz)</th> <th style="text-align: center;">802.11n(5GHz)</th> </tr> <tr> <th></th> <th style="text-align: center;">Avg./Max. (mA)</th> <th style="text-align: center;">Avg./Max. (mA)</th> <th style="text-align: center;">Avg./Max. (mA)</th> <th style="text-align: center;">Avg./Max. (mA)</th> <th style="text-align: center;">Avg./Max. (mA)</th> </tr> </thead> <tbody> <tr> <td>Continue Tx</td> <td style="text-align: center;">833/909</td> <td style="text-align: center;">787/862</td> <td style="text-align: center;">744/856</td> <td style="text-align: center;">803/884</td> <td style="text-align: center;">836/910</td> </tr> <tr> <td>FTP Tx</td> <td style="text-align: center;">514/851</td> <td style="text-align: center;">451/679</td> <td style="text-align: center;">425/694</td> <td style="text-align: center;">419/676</td> <td style="text-align: center;">480/800</td> </tr> <tr> <td>FTP Rx</td> <td style="text-align: center;">427/855</td> <td style="text-align: center;">378/681</td> <td style="text-align: center;">398/701</td> <td style="text-align: center;">408/678</td> <td style="text-align: center;">444/800</td> </tr> <tr> <td>Standby mode</td> <td style="text-align: center;">417/796</td> <td style="text-align: center;">379/644</td> <td style="text-align: center;">377/646</td> <td style="text-align: center;">381/635</td> <td style="text-align: center;">418/787</td> </tr> </tbody> </table>		802.11a	802.11b	802.11g	802.11n(2.4GHz)	802.11n(5GHz)		Avg./Max. (mA)	Avg./Max. (mA)	Avg./Max. (mA)	Avg./Max. (mA)	Avg./Max. (mA)	Continue Tx	833/909	787/862	744/856	803/884	836/910	FTP Tx	514/851	451/679	425/694	419/676	480/800	FTP Rx	427/855	378/681	398/701	408/678	444/800	Standby mode	417/796	379/644	377/646	381/635	418/787
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FTP Rx	427/855	378/681	398/701	408/678	444/800																																
Standby mode	417/796	379/644	377/646	381/635	418/787																																
Antenna	three SMT Hirose U.FL ultra-miniature coaxial antenna connectors																																				

Specifications:

Transmit Power Settings

- 802.11a:
- +18dBm @ 6, 9, 12, 18, 24Mbps
 - +17dBm @ 36Mbps
 - +16dBm @ 48Mbps
 - +15dBm @ 54Mbps

- 802.11b:
- +19dBm

- 802.11g:
- +18dBm @ 6, 9, 12,18,24Mbps
 - +18dBm @ 36Mbps
 - +17dBm @ 48Mbps
 - +16dBm @ 54Mbps

- 802.11n 2.4GHz/HT20:
- +19dBm @ MCS 0/8
 - +19dBm @ MCS 1/9
 - +19dBm @ MCS 2/10
 - +19dBm @ MCS 3/11
 - +18dBm @ MCS 4/12
 - +16dBm @ MCS 5/13
 - +13dBm @ MCS 6/14
 - +10dBm @ MCS 7/15

- 802.11n 2.4GHz/HT40:
- +17dBm @ MCS 0/8
 - +17dBm @ MCS 1/9
 - +17dBm @ MCS 2/10
 - +17dBm @ MCS 3/11
 - +17dBm @ MCS 4/12
 - +16dBm @ MCS 5/13
 - +13dBm @ MCS 6/14
 - +10dBm @ MCS 7/15

- 802.11n 5GHz/HT20:
- +18dBm @ MCS 0/8
 - +18dBm @ MCS 1/9
 - +18dBm @ MCS 2/10
 - +17dBm @ MCS 3/11
 - +17dBm @ MCS 4/12
 - +16dBm @ MCS 5/13
 - +12dBm @ MCS 6/14
 - +10dBm @ MCS 7/15

- 802.11n 5GHz/HT40:
- +17dBm @ MCS 0/8
 - +17dBm @ MCS 1/9
 - +17dBm @ MCS 2/10
 - +17dBm @ MCS 3/11
 - +17dBm @ MCS 4/12
 - +16dBm @ MCS 5/13
 - +12dBm @ MCS 6/14
 - +10dBm @ MCS 7/15

Receiver Sensitivity

	Data Rate	IEEE Spec (1 Rx dBm)	Typical/Maximum (3Rx dBm)
802.11a	6M	-82	-95/-91
	9M	-81	-95/-91
	12M	-79	-95/-91
	18M	-77	-94/-90
	24M	-74	-90/-86
	36M	-70	-87/-83
	48M	-66	-83/-79
	54M	-65	-82/-78

Specifications:

Receiver Sensitivity	Data Rate	IEEE Spec (1 Rx dBm)	Typical/Maximum (3Rx dBm)
802.11b	1M	-82	-96/-92
	5.5M	-80	-94/-90
	11M	-76	-91/-87
802.11g	6M	-82	-96/-92
	9M	-81	-96/-92
	12M	-79	-96/-92
	18M	-77	-95/-91
	24M	-74	-92/-88
	36M	-70	-89/-85
	48M	-66	-85/-81
	54M	-65	-83/-78
802.11a/n HT20	MCS0	-82	-95/-91
	MCS1	-79	-94/-90
	MCS2	-77	-92/-87
	MCS3	-74	-88/-84
	MCS4	-70	-85/-81
	MCS5	-66	-81/-77
	MCS6	-65	-80/-76
	MCS7	-64	-77/-73
	MCS8	-82	-93/-89
	MCS9	-79	-90/-86
	MCS10	-77	-88/-84
	MCS11	-74	-85/-81
	MCS12	-70	-82/-78
	MCS13	-66	-78/-74
	MCS14	-65	-76/-72
MCS15	-64	-75/-71	
802.11a/n HT40	MCS0	-79	-91/-87
	MCS1	-76	-90/-86
	MCS2	-74	-88/-84
	MCS3	-71	-85/-81
	MCS4	-67	-82/-78
	MCS5	-63	-79/-75
	MCS6	-62	-77/-73
	MCS7	-61	-75/-71
	MCS8	-79	-90/-86
	MCS9	-76	-87/-83
	MCS10	-74	-85/-81
	MCS11	-71	-82/-78
	MCS12	-67	-79/-75
	MCS13	-63	-75/-71
	MCS14	-62	-73/-69
MCS15	-61	-71/-67	

Specifications:				
Receiver Sensitivity	802.11b/g/n HT20	Data Rate	IEEE Spec (1 Rx dBm)	Typical/Maximum (3Rx dBm)
		MCS0	-82	-96/-92
		MCS1	-79	-95/-91
		MCS2	-77	-93/-89
		MCS3	-74	-90/-86
		MCS4	-70	-87/-83
		MCS5	-66	-83/-79
		MCS6	-65	-81/-77
		MCS7	-64	-79/-75
		MCS8	-82	-95/-91
		MCS9	-79	-93/-89
		MCS10	-77	-90/-85
		MCS11	-74	-87/-83
		MCS12	-70	-84/-80
		MCS13	-66	-80/-76
	MCS14	-65	-78/-74	
	MCS15	-64	-77/-73	
	802.11b/g/n HT40	MCS0	-79	-90/-86
		MCS1	-76	-90/-86
		MCS2	-74	-89/-85
		MCS3	-71	-87/-83
		MCS4	-67	-84/-80
		MCS5	-63	-80/-76
		MCS6	-62	-78/-74
		MCS7	-61	-75/-70
		MCS8	-79	-90/-86
		MCS9	-76	-89/-85
		MCS10	-74	-87/-83
		MCS11	-71	-84/-80
		MCS12	-67	-81/-77
MCS13		-63	-76/-72	
MCS14		-62	-75/-71	
MCS15	-61	-73/-69		
Operation Distance		Outdoor	Indoor	
	802.11a	<ul style="list-style-type: none"> 50m @ 54Mbps 300m @ 6Mbps 	<ul style="list-style-type: none"> 30m @ 54Mbps 100m @ 6Mbps 	
	802.11b	<ul style="list-style-type: none"> 150m @ 11Mbps 300m @ 1Mbps 	<ul style="list-style-type: none"> 30m @ 11Mbps 100m @ 1Mbps 	
	802.11g	<ul style="list-style-type: none"> 50m @ 54Mbps 300m @ 6Mbps 	<ul style="list-style-type: none"> 30m @ 54Mbps 100m @ 6Mbps 	
	802.11n	<ul style="list-style-type: none"> 30m @ 300Mbps 30m @ 130Mbps 300m @ 6.5Mbps 	<ul style="list-style-type: none"> 20m @ 300Mbps 20m @ 130Mbps 100m @ 6.5Mbps 	
Frequency Tolerance	the transmitted center frequency tolerance shall be +/- 20 ppm max.			
MAC Protocol	CSMA/CA with ACK architecture 32-bit MAC			
Security	<ul style="list-style-type: none"> 64-bit, 128-bit and 152-bit WEP encryption 802.1x authentication, WPA AES-CCM & TKIP <p>Remark: For the system integrator adopting DNMA-83 with resided devices, the security features are subject to the compile of Atheros Communication</p>			

Specifications:	
Operation System Supported	<ul style="list-style-type: none"> Linux Atheros Linux SDK for AP and client-mode sub-license available by project.
Dimension	59.6 x 50.08 x 1.0mm
Operation Temperature Range	0°C ~ +60°C
Storage Temperature Range	-20°C ~ +80°C
Operating Humidity	15% ~ 95%, non-condensing
Storage Humidity	max. 95%, non-condensing
Radio & EMC Certificate	FCC Part 15.401 ~ Part 15.407 (5.150 ~ 5.350GHz & 5.725 ~ 5.825GHz), Part 15.247 (5.725 ~ 5.850GHz), FCC Part 15.247 (2.400 ~ 2.4835GHz), FCC Class-B, FCC Part 15.107 & Part 15.109; limited module level approval. IC RSS210, RSS139-1, ICES-003, limited module level approval. ETSI, EN301893, EN60950, EN 300328, EN 301489- 1/17, EN 55022, EN 55024
Environment-Friendly Compliance	RoHS

Note:

If DNMA-83 used to design 802.11n dual-concurrent 2.4 plus 5GHz access point (AP)/Router, Unex recommends a 50dB antenna isolation between any two-2.4GHz-and-5GHz antenna or having an external band-path-filtering design to avoid deteriorating DNMA-83 performance.

Ordering Information:	
DNMA-83	802.11n a/b/g wifi 3x3 mini-PCI module, MB82/AR9160+AR9106



Unex Technology Corp.
- Durable Bridge to Wireless

Sales-a@unex.com.tw
<http://www.unex.com.tw>