DNXA-H1 Information Sheet

802.11n a/b/g wifi 3x3 3-stream PCIe mini card, XB114 / AR9390
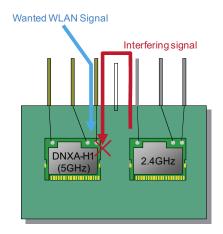

Overview:

DNXA-H1 is the world's first 3x3 3-stream 802.11n a/b/g wifi module in PCIe mini card form factor designed to deliver exceptional Wi-Fi ® performance for a variety of high-reliable and bandwidth-intensive video-over-wireless applications.

Latest XSPAN technology combines a powerful 3x3 3-stream 802.11n architecture to boost throughput by 50% across the entire wireless link, DNXA-H1 propels the industry forwarding and diverse needs of both consumer and enterprise applications. Power Architecture ® -based embedded processor deliver a powerful combination of performance and features that enable DNXA-H1 to achieve the high-throughput required for high-quality video streaming around the digital enterprise or home.

Key Features:

» Extra Rx filter provides the excellent radio rejection against the interfering signal from the 2nd WiFi module on con-current 2.4 & 5GHz (dual band dual con-current, DBDC) application to dramatically improve the data throughput/ range performance.
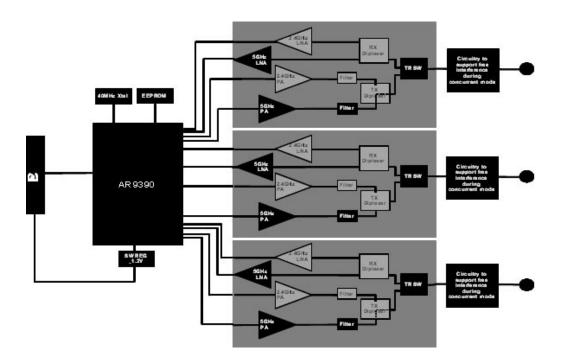

One DNXA-H1 and one 2.4GHz wifi module can work simultaneously (dual band dual con-current, DBDC) in the same platform under different frequency band, DNXA-H1 in 5GHz and the other WiFi module in 2.4GHz, without Rx sensitivity degradation.
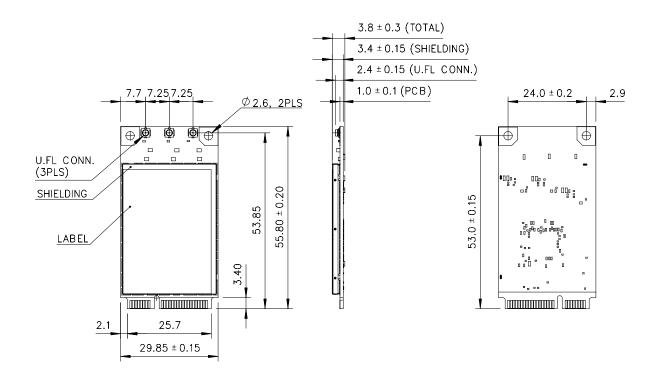
» Supports enterprise-grade WiFi applications including full packet rate for 90-byte packets with AES encryption, Loopback mode for FIPS certification, 5/10MHz channels, 8-bit resolution for Spectral Analysis, Fast Channel Switch (1 ms within band and 2 ms across bands), and TODA based distance measurement and locationing.

» Supports TxBF (Transmit Beam Forming, sometimes refer to as "smart antenna technology") to increase 400% the average received signal power by the client, improve range of a wifi system and indirectly improve throughput.

» Signal-Sustain Technology 3 (SST3) increases rate-over-range ~+100% at short range, ~+50% at mid. range, and ~+25% at long range.

» Dynamic MIMO Power Save supports 1x1 downshift to lower power consumption.

» RF ESD/Surge protection of ± 8KV Class B (air test) and ± 6KV Class B (contact test) ensures highest levels of performance and reliability in the harshest outdoor mesh or military deployments.

» Supports 5/10/20/40MHz channel to maximize bandwidth efficiency.

» Dual band 802.11 a/b/g/n supports 3Tx/3Rx 3-stream MIMO to enable data rate up to 450Mbps link rate for 40MHz channel.

» The small PCIe form factor (length is 5mm longer than standard mini card) with optimized 3Tx/3Rx MIMO design is ideal to embed into ultra-compact devices for a variety of high-reliable and bandwidth-intensive video-over-wireless applications.

» Windows XP/Vista/7 drivers enable system integrators to quickly and easily bring new bandwidth-intensive applications to market with trouble-free WiFi integration.

» Supported by ath9k and FreeBSD providing Linux kernel driver 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.

- » Supports 2/3/4/6-wire Bluetooth coexistence.

- » Supports 802.11x authentication, WPA, WEP-64, WEP-128, WEP-152 and 128-bit AES/TKIP encryption.

- » Three Hirose U.FL antenna connectors enable transmit and receive diversity for flexible 3x3 MIMO design.

- » REACH SVHC 73 (2011/12/19) and RoHS compliance ensure a high level protection of human health and the environment from risks that can be posed by chemicals.

Block Diagram:

Mechanical Outline:

3.8 ± 0.3 (TOTAL)
3.4 ± 0.15 (SHIELDING)
2.4 ± 0.15 (U.FL CONN.)
1.0 ± 0.1 (PCB)

7.7 7.25 7.25

Ø 2.6, 2PLS

U.FL CONN.
(3PLS)

SHIELDING

LABEL

53.85

55.80 ± 0.20

3.40

2.1   25.7

29.85 ± 0.15

24.0 ± 0.2   2.9

53.0 ± 0.15
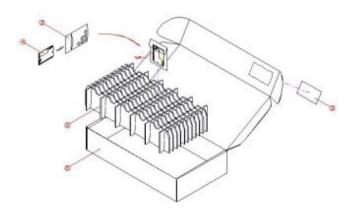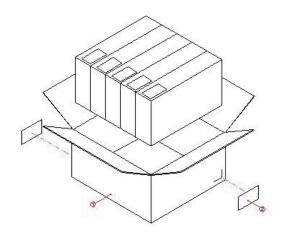
Packing:

Packing Box : Q'TY = 50pcs/Box , Weight N.W.=1.1Kgs , G.W.=1.2Kgs

Carton = 250pcs , Dimension : 428(L)x400(W)x225(H) mm, Weight N.W.=5.5Kgs , G.W.=6Kgs
Pallet= 16carton x 250pcs= 4000pcs , Dimension:105(L)x110(W)x110(H)cm, Weight N.W=88Kgs , G.W. =100Kgs

Pin Assignment:

Pin #	PCI-e V1.1	DNXA-H1	Pin #	PCI-e V1.1	DNXA-H1
51	Reserved	GPIO15	52	+3.3Vaux	3.3V
49	Reserved	GPIO14	50	GND	GND
47	Reserved	GPIO13	48	+1.5V	No connection
45	Reserved	No connection	46	LED_WPAN#	No connection
43	GND	GND	44	LED_WLAN#	GPIO10
41	+3.3Vaux	3.3V	42	LED_WWAN#	No connection
39	+3.3Vaux	3.3V	40	GND	GND
37	GND	No connection	38	USB_D+	No connection
35	GND	GND	36	USB_D-	No connection
33	PETp0	PETp0	34	GND	GND
31	PETn0	PETn0	32	SMB_DATA	TEMP_SDA
29	GND	GND	30	SMB_CLK	TEMP_SCL
27	GND	GND	28	+1.5V	No connection
25	PERp0	PERp0	26	GND	GND
23	PERn0	PERn0	24	+3.3Vaux	No connection
21	GND	GND	22	PERST#	RESET
19	Reserved (UIM_C4)	No connection	20	W_DISABLE#	GPIO7
17	Reserved (UIM_C8)	No connection	18	GND	GND
Mechanical Key					
15	GND	GND	16	UIM_VPP	No connection
13	REFCLK+	REFCLK-	14	UIM_RESET	No connection
11	REFCLK-	REFCLK-	12	UIM_CLK	No connection

9	GND	GND	10	UIM_DATA	No connection
7	CLKREQ#	CLKREQ_L	8	UIM_PWR	No connection
5	COEX2	No connection	6	1.5V	No connection
3	COEX1	GPIO12	4	GND	GND
1	WAKE#	WAKE_L	2	3.3Vaux	3.3V

CON PCI EXPRESS MINI-1.1

(50 ohm single ended, 100 ohm differential)

Specifications:

Main Chipset	Atheros® AR9390
Tx/Rx	3T3R MIMO
Standard Conformance	802.11a, 802.11b, 802.11g, and 802.11n

Frequency Range	» USA:
	   » 2.400 – 2.483GHz
	   » 5.15 – 5.35GHz
	   » 5.47 – 5.725GHz
	   » 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	PCI Express ® mini-card rev. 1.2 (5mm longer than standard mini-card)
Operation Voltage	3.3V ± 5%

Channel Spacing	5MHz

Operating Channels	» 802.11a/n:
	» USA/Canada: 12 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 on 802.11b (1-13 or 14th), 13 on 802.11g (1-13)
	» China: 13 (1-13)

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 bandwidth:
	» 1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI (Max.)
	» 2Nss: 130Mbps @ 800GI, 144.4Mbps @ 400GI (Max.)
	» 3Ns: 195Mbps @ 800GI, 216.6Mbps @ 400GI (Max.)
	» 40MHz bandwidth:
	» 1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.)
	» 2Nss: 270Mbps @ 800GI, 300Mbps @ 400GI (Max.)
	» 3Ns: 405Mbps @ 800GI, 450Mbps @ 400GI (Max.)

Power Consumption

	Typical./Max. (mA)
11b continue Tx	750/850
11g continue Tx @ 6M	750/850
11a continue Tx @ 6M	860/960
11ng continue Tx @ HT20 MCS0	750/850
11ng continue Tx @ HT40 MCS0	750/850
11na continue Tx @ HT20 MCS0	860/960
11ng continue Tx @ HT40 MCS0	860/960
11g continue Rx	250/300
11a continue Rx	250/300
Standby	250/300

Output Power (total 3 chains composite power level)

» 802.11a:
  » +16.77- 17.77dBm @ 6, 9, 12, 18, 24, 36,48Mbps
  » +12.77 – 14.77dBm @ 54Mbps

» 802.11b: +21.77dBm

» 802.11g:
  » +21.77dBm @ 6, 9, 12,18,24,36Mbps
  » +19.77dBm @ 48Mbps
  » +17.77dBm @ 54Mbps

» 802.11n 2.4GHz/HT20:
  » +21.77dBm @ MCS 0/8/16
  » +20.77dBm @ MCS 1/9/17
  » +20.77dBm @ MCS 2/10/18
  » +20.77dBm @ MCS 3/11/19
  » +19.77dBm @ MCS 4/12/20
  » +18.77dBm @ MCS 5/13/21
  » +17.77dBm @ MCS 6/14/22
  » +16.77dBm @ MCS 7/15/23

- » 802.11n 2.4GHz/HT40:
    - » +20.77dBm @ MCS 0/8/16
    - » +20.77dBm @ MCS 1/9/17
    - » +20.77dBm @ MCS 2/10/18
    - » +20.77dBm @ MCS 3/11/19
    - » +19.77dBm @ MCS 4/12/20
    - » +18.77dBm @ MCS 5/13/21
    - » +16.77dBm @ MCS 6/14/22
    - » +14.77dBm @ MCS 7/15/23

- » 802.11n 5GHz/HT20:
    - » +16.77 - 17.77dBm @ MCS 0/8/16
    - » +16.77 - 17.77dBm @ MCS 1/9/17
    - » +16.77 - 17.77dBm @ MCS 2/10/18
    - » +16.77 - 17.77dBm @ MCS 3/11/19
    - » +15.77 - 17.77dBm @ MCS 4/12/20
    - » +14.77 - 15.77dBm @ MCS 5/13/21
    - » +11.77 - 13.77dBm @ MCS 6/14/22
    - » +10.77 - 12.77dBm @ MCS 7/15/23

- » 802.11n 5GHz/HT40:
    - » +15.77 - 16.77dBm @ MCS 0/8/16
    - » +15.77 - 16.77dBm @ MCS 1/9/17
    - » +15.77 - 16.77dBm @ MCS 2/10/18
    - » +15.77 - 16.77dBm @ MCS 3/11/19
    - » +14.77 - 16.77dBm @ MCS 4/12/20
    - » +12.77 - 14.77dBm @ MCS 5/13/21
    - » +9.77 - 12.77dBm @ MCS 6/14/22
    - » +8.77 - 11.77dBm @ MCS 7/15/23

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

» 802.11a:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
BPSK(6M)	-82	-93
BPSK(9M)	-81	-93
QPSK(12M)	-79	-93
QPSK(18M)	-77	-91~-92
16-QAM(24M)	-74	-88~-89
16-QAM(36M)	-70	-85~-86
64-QAM(48M)	-66	-81~-82
64-QAM(54M)	-65	-79~-80

» 802.11b:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
DBPSK(1M)	-82	-101
DQPSK(5.5M)	-80	-94
CCK(11M)	-76	-90~-91

» 802.11g:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
BPSK(6M)	-82	-94
BPSK(9M)	-81	-94
QPSK(12M)	-79	-94
QPSK(18M)	-77	-92~-93
16-QAM(24M)	-74	-89~-90
16-QAM(36M)	-70	-86
64-QAM(48M)	-66	-82~-83
64-QAM(54M)	-65	-80~-81

» 802.11a/n, HT20:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
BPSK(MCS0)	-82	-93
QPSK(MCS1)	-79	-93
QPSK(MCS2)	-77	-91
16-QAM(MCS3)	-74	-87
16-QAM(MCS4)	-70	-83~-84
64-QAM(MCS5)	-66	-79~-80
64-QAM(MCS6)	-65	-78
64-QAM(MCS7)	-64	-77

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

» 802.11a/n, HT40:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
PBSK(MCS0)	-79	-89~-90
QPSK(MCS1)	-76	-87~-89
QPSK(MCS2)	-74	-84~-88
16-QAM(MCS3)	-71	-81~-84
16-QAM(MCS4)	-64	-76~-81
64-QAM(MCS5)	-63	-74~-77
64-QAM(MCS6)	-62	-72~-76
64-QAM(MCS7)	-61	-69~-74

» 802.11b/g/n, HT20:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
BPSK(MCS0)	-82	-94
QPSK(MCS1)	-79	-94
QPSK(MCS2)	-77	-92~-93
16-QAM(MCS3)	-74	-88
16-QAM(MCS4)	-70	-84~-85
64-QAM(MCS5)	-66	-80~-81
64-QAM(MCS6)	-65	-79
64-QAM(MCS7)	-64	-77~-78

» 802.11b/g/n, HT40:

Data Rate	IEEE Spec(1 Rx dBm)	Typical(3Rx dBm)
BPSK(MCS0)	-79	-91
QPSK(MCS1)	-76	-90~-91
QPSK(MCS2)	-74	-89~-90
16-QAM(MCS3)	-71	-85~-89
16-QAM(MCS4)	-67	-82~-85
64-QAM(MCS5)	-63	-78~-81
64-QAM(MCS6)	-62	-77~-78
64-QAM(MCS7)	-61	-75~-76

Security

» 64-bit, 128-bit and 152-bit WEP encryption

» 802.1x authentication

» AES-CCM & TKIP

Operation Systems Supported	ath9k, FreeBSD, Windows XP, Windows Vista; Windows 7
	Atheros Linux SDK for AP and client-mode sub-license available by project.
Dimension	29.85(W) x 55.8(L) x 3.8(H) mm (5mm longer than standard mini-card)
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
Regulation Compliance	FCC, CE
Human Health & Environment-Friendly Compliance	REACH and RoHS
Antenna	three Hirose U.FL ultra-miniature coaxial antenna connectors

Ordering Information:

DNXA-H1   802.11n a/b/g wifi 3x3 3-stream PCIe mini card, XB114 / AR9390

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

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