

WLn-ABOARD

and variants /N, /24, /48, /72, /110, option /H4

Quick installation guide

802.11n multifunction Access Point for rugged environments

- ✓ Dual Wi-Fi 802.11n a/b/g/h: Bridge, AP, repeater
 - ✓ Dual 10/100/1000 Mbps autosensing Ethernet LAN
 - ✓ Dual power supply (insulated or not, see “specifications”)
 - ✓ POE 802.3at (WLn-ABOARD & WLn-ABOARD/48 only)
 - ✓ Cast aluminum housing, IP66 protection level, shock and vibrations proof, M12 Ultra-lock® connectors
 - ✓ Extended operating temperatures
 - ✓ Outdoor & indoor installations
 - ✓ Optional product configuration backup by C-Key
 - ✓ Programmable alarm contact input and output
 - ✓ RS422/RS485 port (available soon)
-

Before starting, please check the product kit part listing:

- One **WLn-ABOARD**, possibly with high power radio (WLn-RF400mW) and/or CKEY options
- The sticker at the rear side stating the exact model
- This quick installation guide, printed
- One 8-pin M12 to RJ45 male Ethernet cat. 5e cable, 2m length
- One 6-pin M12 cable for power supply, 2m length
- Two waterproof plastic caps for M12 connectors
- One CD ROM with ACKSYS products drivers and documentations.

Contact immediately your dealer if any item listed above is missing or damaged.

Before continuing, check for the latest documentations on the www.acksys.fr web site and read if necessary the full hardware & software user's manuals.

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HARDWARE INSTALLATION

The product will not be waterproof if any connector is left unplugged

1. Plug the antennas in

Connect the integrated antennas to the N-type connectors named ANT... "1A", "2A", "3A" and ANT... "1B", "2B", "3B". At least antenna 1 should be installed on each antenna set.

WARNING: Leaving an antenna connector unplugged may damage the high-power option WLn-RF400mW. Please make sure to install a 50 Ohm terminator on each unused antenna port.

2. Connect the power supply

See the "specifications" section about the characteristics of the power supply.

Dual power supply precautions

The two power supply sources (on the Power connector) have a common internal 0V reference. Thus **you must take care of the polarity of the power supply sources**, so that they will not interfere with each other.

On the insulated model with POE (*WLn-ABOARD/48*), though the product itself is insulated from all its power sources, the POE is not insulated from the regular power supplies; do not use POE at the same time as power supplies #1 and #2 if you wish to keep LAN isolation.

Earth grounding precautions

The insulated models use EARTHED power supply: isolated 0V is connected to Earth Ground. Do not connect the power input to Earth Ground, to keep insulation against the power supply.

The device has no ON/OFF switch. It turns on automatically when power is applied. Check LEDs PWR1 and PWR2. PWR1 turns on whenever POE or power source #1 is applied. PWR2 turns on when power source #2 is applied.

The Diag LED stays red until the device is fully ready to use, usually in around 40s. Then the Diag LED turns green.


3. Connect the Ethernet cable

Plug the Ethernet cable to the device's LAN1 or LAN2 M12 connector. Connect the RJ45 side to any RJ45 plug of the network, and then verify that the corresponding Link/activity LED (LAN1 or LAN2) turns on.

CONFIGURATION

4. Modifying the default IP address 192.168.1.253

Run the multi-platform **ACKSYS NDM** application (found on the CD ROM) from any P.C. of the network. Use **ACKSYS NDM version 2.4.0** or greater.

Product	IP address	Model	SSI
	192.168.1.253	WLn-ABOARD/N	(multiple

"User-defined" is a WLn-ABOARD/N, Product ID 00:09:90:00:00:03, Firmware
IP address: 192.168.1.253

Radio	SSID	Role	S
Radio A enabled	acksys	Access point	r
Radio B			

Go directly to step 5 if the default IP address is compatible with your network. Else, select the device and click on the « **Configure IP** » button. You can configure the IP address or activate the DHCP client.

5. Device configuration

Click on the « **Web** » button to access the built-in web-based interface using your web browser. The default page displays the device status. Now select the “SETUP” tab.



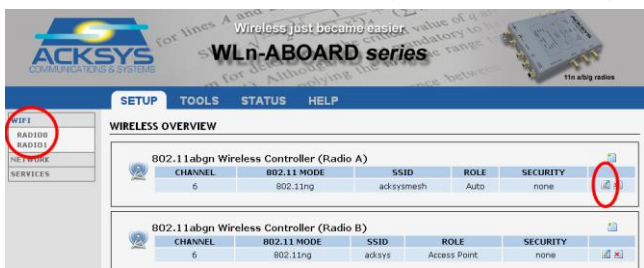
The screenshot shows the ACKSYS WLn-ABOARD series web interface. The top navigation bar includes "SETUP" (highlighted with a red circle), "TOOLS", "STATUS", and "HELP". On the left, a sidebar menu lists "DEVICE INFO", "NETWORK", "WIRELESS", and "SERVICES". The main content area is titled "DEVICE INFORMATIONS" and contains two sections:

- FIRMWARE INFORMATIONS**

Firmware version :	1.0.0
Firmware ID :	E2148.AC.1
- DEVICE INFORMATIONS**

Name :	WLn-ABOARD/N
Internal temperature :	36 °C

You will be asked for a username and a password. You must choose the **root** user. No password is required by default. You get access to the setup pages.



The screenshot shows the ACKSYS WLn-ABOARD series web interface with the "WIRELESS OVERVIEW" page. The "WIRELESS" menu item in the sidebar is highlighted with a red circle. The page displays two radio controllers:

- 802.11abgn Wireless Controller (Radio A)**

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	
6	802.11ng	acksysmesh	Auto	none	(edit/delete icons)
- 802.11abgn Wireless Controller (Radio B)**

CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	
6	802.11ng	acksys	Access Point	none	(edit/delete icons)

You can select any radio interface to set up its Wi-Fi parameters (you can also change IP configuration and services). Set the following essential parameters:

- The operating mode: Access point, Ethernet bridge, mesh network.
- Wi-Fi parameters: 802.11 mode, radio channel (take care about legislation), SSID
- Wi-Fi security parameters (WEP, WPA, WPA-PSK, WPA2, WPA2-PSK, SSID broadcast or not)

You'll find a complete description of both modes in the reference manual for the “WLn” line of products.

The HELP menu, integrated in the web server, explains all configuration parameters, with a detailed glossary (**available soon**).

Upon delivery, the default factory settings are:

- Both radio interfaces in access point mode,
- SSID : “acksys” (broadcasted)
- No security (no WEP, no WPA, no WPA2, no MAC filter)
- 802.11N mode on the 2.4 GHz band, channel 6, 20 MHz wide

FINAL INSTALLATION

6. Install the device

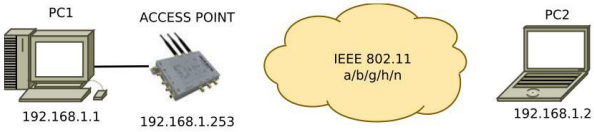
Place the device in an appropriate place. The device can be installed outside.

- Insure that the **position and radiation pattern** of the antennas allow proper communication with the peer Wi-Fi devices.
- Insure that there are **no obstacles** between the device and its peers (“line of sight” concept).

QUICKLY EVALUATE AP & BRIDGE MODES

Quickly evaluate the ACKSYS device in AP mode

You need a second P.C (PC2) with a valid Wireless connection.



Setup PC2 Wireless network interface according to the default parameters of the ACKSYS AP device (802.11b/g, SSID ACKSYS, no security).

Quickly evaluate the ACKSYS device in bridge mode

You need two ACKSYS devices, and a second P.C (PC2) with a classic LAN connection.



Setup the ACKSYS device connected to PC2 in bridge mode.

Setup the IP addresses according to the illustration below.

From each PC, run a command prompt and execute the ping command to verify the link.

From PC 1 : type **ping 192.168.1.2**, verify the answer returned by PC2
« Answer from 192.168.1.2 ... »

From PC 2 : type **ping 192.168.1.1**, verify the answer returned by PC1
« Answer from 192.168.1.1 ... »

TROUBLESHOOTING

All 22 LED indicators are OFF

- Verify the power supply (voltage, cabling).

The relevant LAN1 or LAN2 led indicator stays OFF

- Check the Ethernet plug of your network; try to connect another device.
- Use the provided ACKSYS M12/RJ45 cable to connect the device.

Remote Wi-Fi clients cannot connect to the AP

- Make sure that the clients support the Wireless parameters that the AP is set to (SSID case sensitive, 802.11 mode, radio channel, security).
- Check the radio conditions: distance, placement of antennas.
- Try with all securities and encryption settings temporary disabled.
- Try another radio channel.

“ACKSYS NDM” doesn’t find your device

- ACKSYS NDM only scans the local network. Devices located behind a gateway are not seen automatically.
- If you use a firewall on your P.C, check if that application is not blocked.

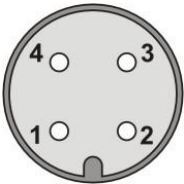
How to restore factory settings

- If the built-in web-based interface is reachable, you can use your browser to restore factory settings.
- Else, power up the unit, wait for the red “Diag” LED to turn green, then hold down the reset button for at least 2 seconds. Then release it and wait for the Diag LED to turn on again, meaning that the product rebooted with its factory settings.

CONNECTORS

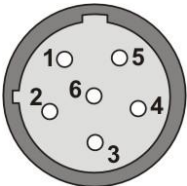
Input/Output connector

M12 Ultra-lock® 4 poles Male connector A-coded

	Alarm Contactor	Signal Name	Pin (M12)	Wire color
		AC1	2	White
	Digital Input	AC2	1	Brown
		IN+	4	Black
		IN-	3	Blue

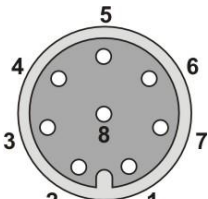
Power Supply & heater connector

M12 6 poles Male connector A-Coded

	Power 1	Signal Name	Pin (M12)	Wire color
		VDC1	1	Blue
	Power 2	GND1	5	Yellow
		VDC2	3	Brown
	Heater	GND2	4	White
		Heater1	2	Green
	Heater2	6	Red	

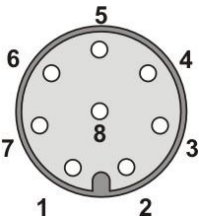
Serial connector

M12 Ultra-lock® 8 poles Female connector

	Signal Name		Pin (M12)
	RS422	RS485	
	GND	GND	1
	TXA	TXA/RXA	2
	TXB	TXB/RXB	3
	RXA	NC	4
	RXB	NC	5
	NC	NC	6
	NC	NC	7
	NC	NC	8

Ethernet connectors

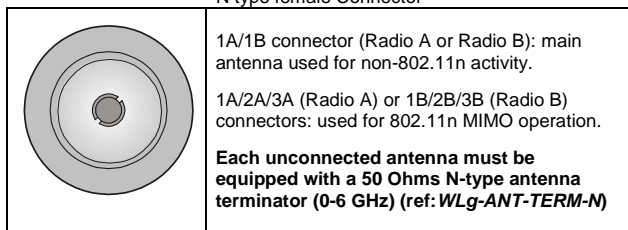
M12 Ultra-lock® 8 poles Male connector

	Signal Name	Pin (M12)
	DC-	1
	DD+	2
	DD-	3
	DA-	4
	DB+	5
	DA+	6
	DC+	7
DB-	8	

The auto-sensing Ethernet ports allow either a cross-over or straight-through cable.

Antenna connectors

N type female Connector



1A/1B connector (Radio A or Radio B): main antenna used for non-802.11n activity.

1A/2A/3A (Radio A) or 1B/2B/3B (Radio B) connectors: used for 802.11n MIMO operation.

Each unconnected antenna must be equipped with a 50 Ohms N-type antenna terminator (0-6 GHz) (ref: WLg-ANT-TERM-N)

LEDs definition

22 status LED indicate:

Group	LED	Color	Description
Radio A Radio B	State	Green	Off when radio is disabled, blinking when unassociated, solid “on” when associated.
	Activity	Blue	Flashing for WLAN Tx/Rx activity.
	Signal Strength	Green	<u>In bridge mode</u> : represents the RSSI when connected. <u>In AP mode</u> : Always off .
LAN 1 LAN 2	Link/ Activity	Green	On when the link to the remote device on LAN1 is established, and flashing for Tx/Rx activity.
	10/100/ 1000	Green/ Yellow	This LED is Yellow when LAN1 is connected to a 1000 BASE T device, Green when connected to 100 BASE T device and remains off when connected to a 10 BASE T device.
Dual power	Power 1	Green	This led is “on” when a power supply is connected to pin 1/pin 5 of the power connector, or if a POE source is applied.
	Power 2	Green	This led is “on” when a power supply is connected to pin 3/pin 4 of the power connector.
Diag	Diagnostic	Red/ Green	This led indicates the unit operational state. OFF : Failed Red : Initialization during 40s after power is applied then goes Green Red for more 120s : hardware failure. Green : Ready to use Blinking : Firmware in flash is not valid. Please load new firmware with NDM.
	C-KEY	Red/ Green	Off : C-Key not detected. Red : the C-Key data is invalid or corrupted. Green : the C-Key data is valid. Blinking : during reads and writes to the C-Key.
Serial	Tx	Green	Flashing for Serial Tx activity.
	Rx	Green	Flashing for Serial Rx activity.

C-KEY REPLACEMENT

The C-KEY is an optional storage device used to save and restore the product configuration. It should be removed and inserted only when all power supply sources are OFF.

To remove the C-KEY, unscrew the two lateral screws, and then gently pull the device out. If needed, use the screwdriver as a lever, with the help of the notches intended for this purpose at the base of the screw guides.



DIGITAL INPUT

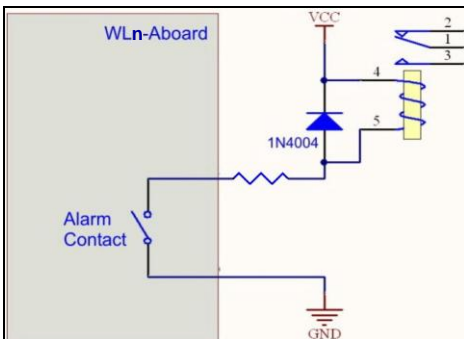
A digital input can be used to trigger an event in the product. IO connector pins 1 (+) and 2 (-) (brown and white wires) are used to achieve this goal.

The voltage applied to the input circuit must not exceed 24 V. The product detects any voltage between 0V and 2V as a logical "0", and any voltage greater than 3V as a logical "1". Between 2V and 3V the state is undefined.

ALARM CONTACTOR

The product provides an alarm contactor in order to signal a predefined event to the user. IO connector pins 3 and 4 (blue and black wires) are used to achieve this goal. The contact is closed during normal product operation and opens when the alarm condition occurs. It is open as well when the product is powered off or not in an operational state.

The alarm contact can switch 200V maximum voltage, with a current up to 100mA, and is protected against surges over 200V. This is a first stage alarm contactor, which must not be used to drive power directly. To carry out this function, consider the use of a power relay, as shown in the picture below:



Regulatory compliance

Please note: the following targeted regulatory compliance statements have not been verified/certified yet at the time of writing.

The unit with 100mW radio conforms to the following council Directives :

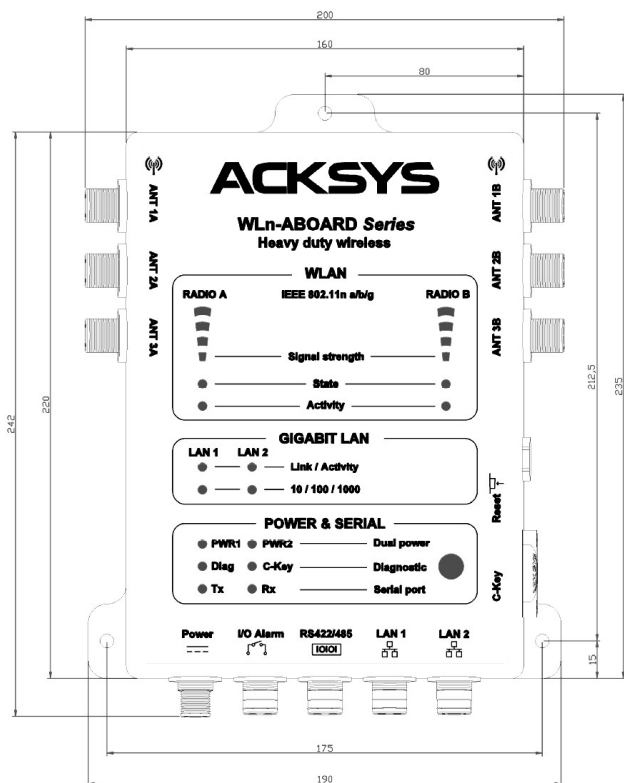
N°	Title
1999/5/CE	Radio and Telecommunications Terminal Equipment Directive (R&TTE)

The device has been certified to comply with the European directives and is appropriately CE marked.

N°	Title
EN301-489-17	EMC for radio equipment 2.4Ghz & 5GHz
EN300 328	Electromagnetic compatibility and Radio spectrum Matters (ERM) ; Wideband transmission systems, 2.4 GHz ISM band
EN301 893	Broadband Radio Access Networks (BRAN) ; 5 GHz high performance WLAN
EN50155 EN50121-3-2 EN60068-2 EN61373	Railway, Electronic equipment used on rolling stock (EMC, Climatic, Mechanical shocks & vibrations)
UTAC E2	CE standard for electronic equipments installed aboard vehicle

The device also complies with Part 15 of the FCC rules (Common testing standard for most electronic equipment).

SPECIFICATIONS



All dimensions are given in mm.

Mechanical characteristics	
Dimensions (w/o antennas)	L x l x h = 257 x 200 x 37 mm L x l x h = 10.12 x 7.88 x 1.47 in
Weight ($\pm 1\%$) /24, /48, /72, /110 option /H4 option	1630 g (58 oz) 1705 g (61 oz) Add 36 g (1.3 oz)
Enclosure	IP66, cast aluminum housing
Operating temperatures range /H4 option WLn-PTC option	-25 to +70°C (-13 to +158°F) -40 to +75°C (-40 to +167°F) -55 to +70°C (-67 to +158°F)
Environmental specifications	Support Railway, automotive specifications
Status indicators	22 LEDs: see LEDs definition section
Push button	Short push, anytime: → Reset Long push (> 2 sec.): - while operating: → Restore factory settings - while in emergency upgrade mode: → Restore factory settings - at startup: → enter emergency upgrade

Software	
Device configuration	Automatic device discovery Built in web based utility for easy configuration from any web browser (username/password protection & https)
Firmware upgrade	Yes (via web browser or "Acksys NDM")
SNMP	SNMP V1, V2C (V3 not yet available)
Operating mode	AP (Access Point), Repeater, Bridge/Client, Mesh, WDS
AP mode only	
Network topology	Infrastructure or mesh modes
Security	WEP, WPA-PSK/WPA2-PSK, WPA/WPA2 with 802.1x authenticator, SSID visibility status.
Client/Bridge mode only	
Network topology	infrastructure mode, ad-hoc mode
Security	WEP, WPA-PSK, WPA2-PSK. 802.1x supplicant. AES/TKIP/WEP by hardware encryption
Mesh mode only	
Network topology	mesh mode
Security	WEP, WPA-PSK, WPA2-PSK. 802.1x supplicant. AES/TKIP/WEP by hardware encryption

Power supply Input	
Models WLn-ABOARD Models WLn-ABOARD/N	Wide range dual input power supplies, from 9V to 56VDC, with polarity protection. A 15W min. power supply is required. M12 6-pole connector.
Model WLn-ABOARD/24	Dual input insulated power supply, 24V nominal (9V to 36VDC), with polarity protection. A 15W min. power supply is required. M12 6-pole connector
Model WLn-ABOARD/48	Dual input Insulated power supply, 48V nominal (36V to 68VDC), with polarity protection. A 15W min. power supply is required. M12 6-pole connector.
Model WLn-ABOARD/72	Dual input Insulated power supply, 72V nominal (43V to 110VDC), with polarity protection. A 15W min. power supply is required. M12 6-pole connector.
Model WLn-ABOARD/110	Dual input Insulated power supply, 110V nominal (66V to 154VDC), with polarity protection. A 15W min. power supply is required. M12 6-pole connector.
POE (only for WLn-ABOARD and WLn-ABOARD/48)	These products can be powered by a PoE+ power source connected to LAN2 . (802.3at)
high power options: /H4 and WLn-RF400MW	These options require a 25W min. power supply.

Ethernet interface	
Number of ports	2
Type of ports	Auto MDI/MDI-X 10 Base T/100 Base Tx/ 1000 Base T with automatic negotiation (HDX/FDX, 10/100 Mbps), according to 802.3u.
Connectors	Ultra-lock® M12 8-pole male connectors
Cables	Ethernet cat.5e, M12 to RJ45 connectors T568B standard cabling

Digital input	
Type	Opto-isolated
Max voltage	24VDC, protected against overvoltage
Isolation	2500VDC

Alarm contact	
Type	Solid state relay 1 form A (normally open)
Max voltage	170VDC, not polarized, protected against transient overvoltage
Max load current	100mA
ON-Resistance	25 ohms typ., 35 ohms max
Isolation	1500V

Wi-Fi interface	
Radio modes	Support for IEEE 802.11a/h, 802.11b, 802.11g and 802.11n.
Chipset	ATHEROS AR9xxx
Data rates	802.11n : up to 300 Mbps 802.11a/h : 6 to 54 Mbps 802.11b : 1 to 11 Mbps 802.11g : 1 to 54 Mbps
Frequency band for 802.11a/n	5 GHz; 4.900 to 5.850 GHz
Frequency band for 802.11b/g/n	2.4 GHz; 2.300 to 2.500 GHz
Antennas	6 N-type plugs (antennas not provided)

Information given for 100mW standard radio card

Tx output power (Radio card output)	802.11b	19 dBm
	802.11g	18 dBm @6-36M
		17 dBm @48M 16 dBm @54M
	802.11a	18 dBm @6-24M
		17 dBm @36M 16 dBm @48M
		15 dBm @54M
	802.11n HT20 g band	19 dBm @MCS 0/8 to MCS 3/11 18 dBm @MCS 4/12 16 dBm @MCS 5/13 13 dBm @MCS 6/14 10 dBm @MCS 7/15
17 dBm @MCS 0/8 to MCS 4/12 16 dBm @MCS 5/13 13 dBm @MCS 6/14 10 dBm @MCS 7/15		
802.11n HT20 a/h band	18 dBm @MCS 0/8 to MCS 2/10 17 dBm @MCS 3/11 to MCS 4/12 16 dBm @MCS 5/13 12 dBm @MCS 6/14 10 dBm @MCS 7/15	
	17 dBm @MCS 0/8 to MCS 4/12 16 dBm @MCS 5/13 12 dBm @MCS 6/14 10 dBm @MCS 7/15	

Rx sensitivity (Radio card input)	Antenna configuration	1 Rx	3 Rx
	802.11b	-82 dBm @1M -76 dBm @11M	-96/-92 dBm @1M -91/-87 dBm @11M
	802.11g	-82 dBm @6M -65 dBm @54M	-96/-92 dBm @6M -83/-78 dBm @54M
	802.11a	-82 dBm @6M -65 dBm @54M	-95/-91 dBm @6M -82/-78 dBm @54M
	802.11n HT20 g band	-82 dBm @MCS0 -64 dBm @MCS7 -82 dBm @MCS8 -64 dBm @MCS15	-96/-92 dBm @MCS0 -79/-75 dBm @MCS7 -95/-91 dBm @MCS8 -77/-73 dBm @MCS15
	802.11n HT40 g band	-79 dBm @MCS0 -61 dBm @MCS7 -79 dBm @MCS8 -61 dBm @MCS15	-90/-86 dBm @MCS0 -75/-70 dBm @MCS7 -90/-86 dBm @MCS8 -73/-69 dBm @MCS15
	802.11n HT20 a/h band	-82 dBm @MCS0 -64 dBm @MCS7 -82 dBm @MCS8 -64 dBm @MCS15	-95/-91 dBm @MCS0 -77/-73 dBm @MCS7 -93/-89 dBm @MCS8 -75/-71 dBm @MCS15
	802.11n HT40 a/h band	-79 dBm @MCS0 -61 dBm @MCS7 -79 dBm @MCS8 -61 dBm @MCS15	-91/-87 dBm @MCS0 -75/-71 dBm @MCS7 -90/-86 dBm @MCS8 -71/-67 dBm @MCS15

Information given for high-power 400mW radio card

Tx output power (Radio card output)	802.11b	27.8 dBm
	802.11g	27.8 dBm @6-24M 26.8 dBm @36M 25.8 @48M 24.8 @54M
	802.11a	24.8 dBm @6-24M 23.8 dBm @36M 22.8 dBm @48M 22.8 dBm @54M
	802.11n HT20 g band	27.8 dBm @MCS 0/8 to MCS 3/11 26.8 dBm @MCS 4/12 25.8 dBm @MCS 5/13 24.8 dBm @MCS 6/14 to MCS 7/15
	802.11n HT40 g band	24.8 dBm @MCS 0/8 to MCS 5/13 23.8 dBm @MCS 6/14 to MCS 7/15
	802.11n HT20 a/h band	25.8 dBm @MCS 0/8 to MCS 1/9 24.8 dBm @MCS 2/10 23.8 dBm @MCS 3/11 22.8 dBm @MCS 4/12 21.8 dBm @MCS 5/13 20.8 dBm @MCS 6/14 19.8 dBm @MCS 7/15
	802.11n HT40 a/h band	25.8 dBm @MCS 0/8 to MCS 2/10 22.8 dBm @MCS 3/11 21.8 dBm @MCS 4/12 20.8 dBm @MCS 5/13 19.8 dBm @MCS 6/14 18.8 dBm @MCS 7/15

Rx sensitivity (Radio card input)	Antenna configuration	1 Rx	3 Rx
	802.11b	-82 dBm @1M -76 dBm @11M	-96/-92 dBm @1M -90/-86 dBm @11M
	802.11g	-82 dBm @6M -65 dBm @54M	-95/-91 dBm @6M -82/-78 dBm @54M
	802.11a	-82 dBm @6M -65 dBm @54M	-93/-89 dBm @6M -80/-76 dBm @54M
	802.11n HT20 g band	-82 dBm @MCS0 -64 dBm @MCS7	-93/-89 dBm @MCS0 -76/-72 dBm @MCS7
	802.11n HT40 g band	-79 dBm @MCS0 -61 dBm @MCS7	-90/-87 dBm @MCS0 -73/-69 dBm @MCS7
	802.11n HT20 a/h band	-82 dBm @MCS0 -64 dBm @MCS7	-95/-91 dBm @MCS0 -77/-73 dBm @MCS7
	802.11n HT40 a/h band	-79 dBm @MCS0 -61 dBm @MCS7	-91/-85 dBm @MCS0 -74/-70 dBm @MCS7