DATASHEET

NanoBeam® ac

High-Performance airMAX® ac Bridge

Models: NBE-5AC-16, NBE-5AC-19

Uniform Beamwidth Maximizes Noise Immunity

Innovative Mechanical Design

High-Speed Processor for Superior Performance

UBIQUITI® NETWORKS

Overview

Ubiquiti Networks launches the latest generation of airMAX® CPE (Customer Premises Equipment), the NanoBeam® ac.

Improved Noise Immunity

The NanoBeam ac directs RF energy in a tighter beamwidth. With the focus in one direction, the NanoBeam ac blocks or spatially filters out noise, so noise immunity is improved. This feature is especially important in an area crowded with other RF signals of the same or similar frequency.

Integrated Design

The radio and antenna are combined to create a more efficient and compact CPE. The NanoBeam ac gets maximum gain out of the smallest footprint.

Providing high performance and an innovative form factor, the NanoBeam ac is versatile and cost-effective to deploy.

Software

airOS 7

Sporting an all-new design for improved usability, airOS® v7 is the revolutionary operating system for Ubiquiti® airMAX ac products.

Powerful Wireless Features

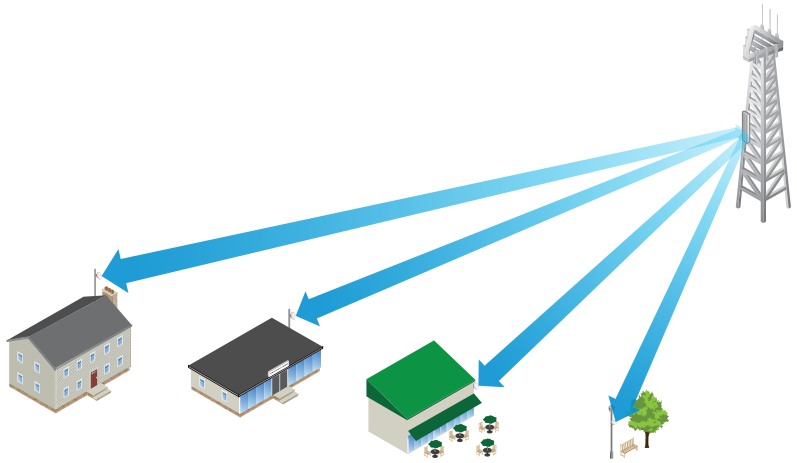
- airMAX ac Protocol Support
- Long-Range Point-to-Point (PtP) Link Mode
- Selectable Channel Width
  - PtP: 10/20/30/40/50/60/80 MHz
  - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection
- Transmit Power Control: Automatic/Manual
- Automatic Distance Selection (ACK Timing)
- Strongest WPA2 Security

Usability Enhancements

- Dynamic Configuration Changes
- Instant Input Validation
- HTML5 Technology
- Optimization for Mobile Devices
- Detailed Device Statistics
- Diagnostic Tools, including Ethernet Cabling Test, RF Diagnostics, and airView® Spectrum Analyzer

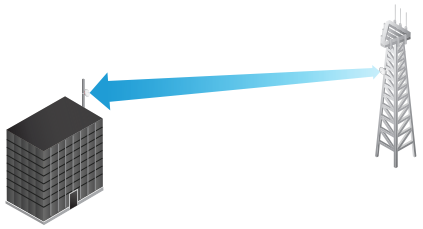
Application Examples

PtMP Client Links

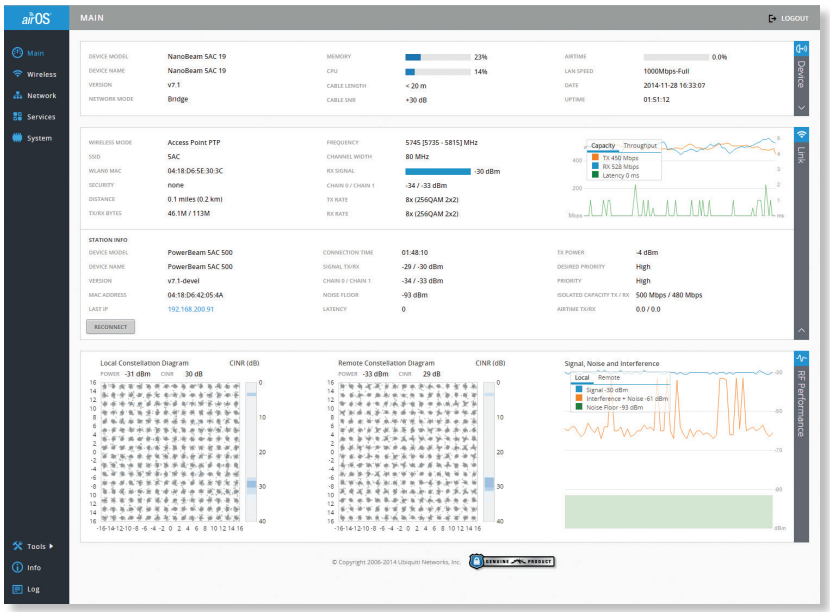


The NanoBeam ac used as a CPE device for each client in an airMAX PtMP network.

PtP Link



Use a NanoBeam ac on each side of a PtP link.



Advanced RF Analytics

airMAX ac devices feature a multi-radio architecture to power a revolutionary RF analytics engine.

An independent processor on the PCBA powers a second, dedicated radio, which persistently analyzes the full 5 GHz spectrum and every received symbol to provide you with the most advanced RF analytics in the industry.

Data from the spectrum analysis and RF performance monitoring is displayed on the *Main* tab and airView Spectrum Analyzer.

Real-Time Reporting

The *Main* tab displays the following RF information:

- Persistent RF Error Vector Magnitude (EVM) constellation diagrams
- Carrier to Interference-plus-Noise Ratio (CINR) histograms
- Signal-to-Noise Ratio (SNR) time series plots

Spectral Analysis

airView allows you to identify noise signatures and plan your networks to minimize noise interference. airView performs the following functions:

- Constantly monitors environmental noise
- Collects energy data points in real-time spectral views
- Helps optimize channel selection, network design, and wireless performance

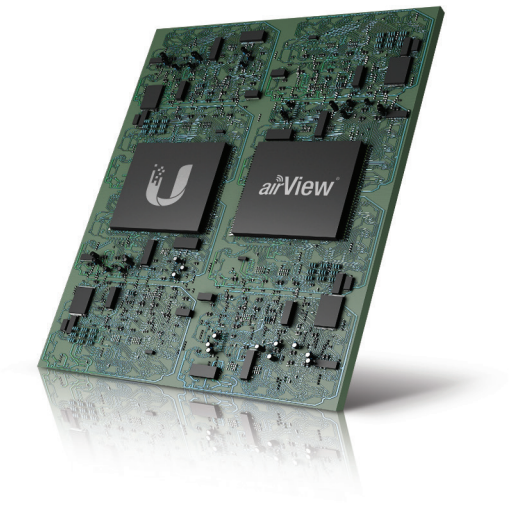
airView runs in the background without disabling the wireless link, so there is no disruption to the network.

In airView, there are three spectral views, each of which represents different data.

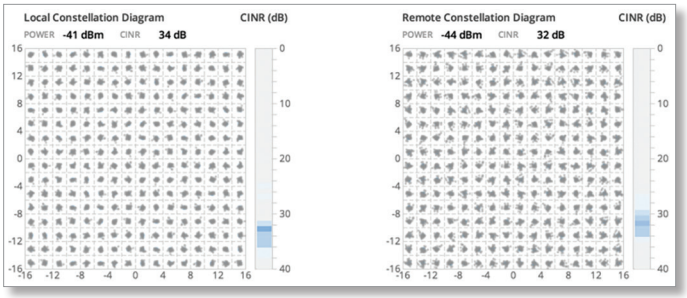
- **Waterfall** Aggregate energy collected for each frequency
- **Waveform** Aggregate energy collected
- **Ambient Noise Level** Background noise energy shown as a function of frequency

Available with a firmware upgrade to airOS v7.1, airView provides powerful spectrum analyzer functionality, eliminating the need to rent or purchase additional equipment for conducting site surveys.

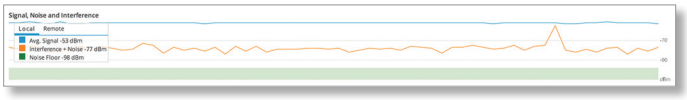
Multi-Radio Architecture



Constellation Diagrams and CINR Histograms



SNR Time Series Plots



Dedicated Spectral Analysis

Technology

airMAX ac

Unlike standard Wi-Fi protocol, Ubiquiti's Time Division Multiple Access (TDMA) airMAX protocol allows each client to send and receive data using pre-designated time slots scheduled by an intelligent AP controller.

This time slot method eliminates hidden node collisions and maximizes airtime efficiency, so airMAX technology provides performance improvements in latency, noise immunity, scalability, and throughput compared to other outdoor systems in its class.

Intelligent QoS Priority assigned to voice/video for seamless streaming.

Scalability High capacity and scalability.

Long Distance Capable of high-speed, carrier-class links.

Superior Performance

The next-generation airMAX ac technology boosts the advantages of our proprietary TDMA protocol.

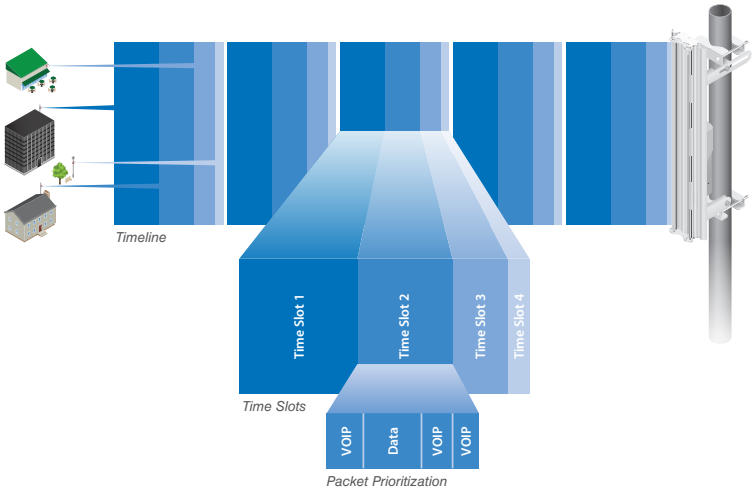
Ubiquiti's airMAX engine with custom IC dramatically improves TDMA latency and network scalability. The custom silicon provides hardware acceleration capabilities to the airMAX scheduler, to support the high data rates and dense modulation used in airMAX ac technology.

Throughput Breakthrough

airMAX ac supports high data rates, which require dense modulation: 256QAM – a significant increase from 64QAM, which is used in airMAX.

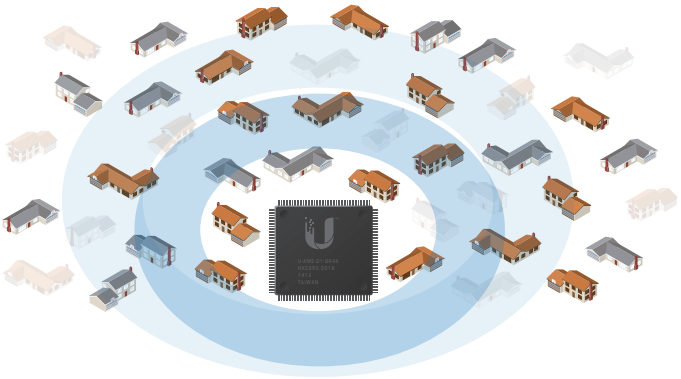
With their use of proprietary airMAX ac technology, airMAX ac products supports up to 450+ Mbps real TCP/IP throughput – up to triple the throughput of standard airMAX products.

airMAX ac TDMA Technology

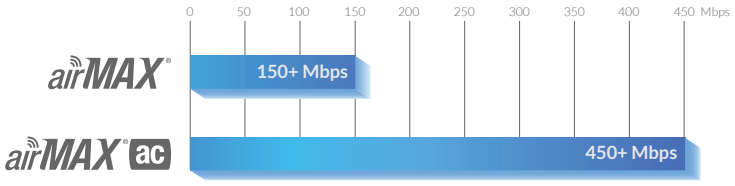


Up to 100 airMAX ac stations can be connected to an airMAX ac Sector; four airMAX ac stations are shown to illustrate the general concept.

airMAX Network Scalability



Superior Throughput Performance



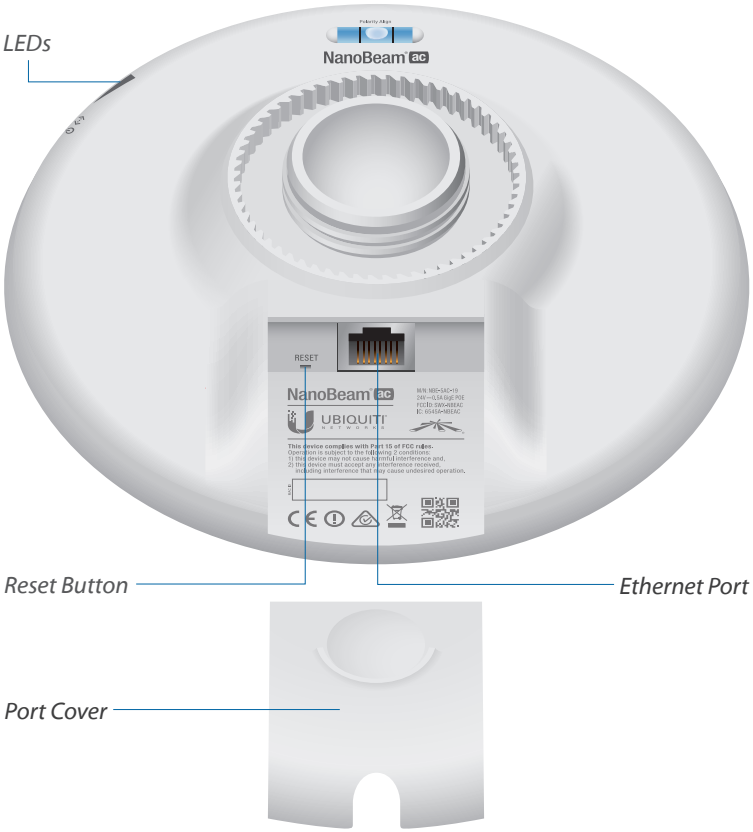
Hardware Overview

Innovative Mechanical Design

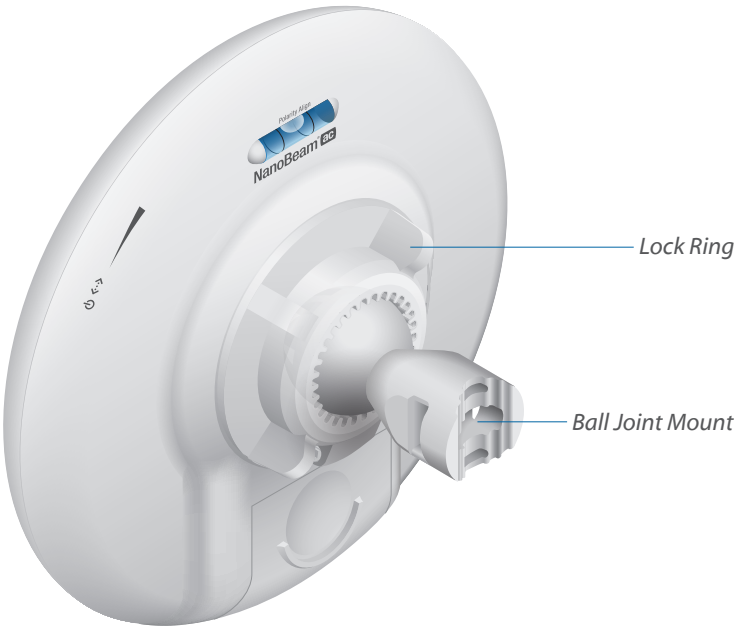
- **Efficient Footprint** The radio and antenna are combined into a single body that takes up minimal space.
- **Aesthetics** The NanoBeam ac is small enough to blend discreetly into the background at a customer's location.
- **Versatile Mounting** The NanoBeam ac can be mounted in almost any position needed for line of sight.

Ease of Installation

- **Quick Installation** No fasteners are required for pole-mounting, and a single wall fastener (not included) is required for wall-mounting.
- **Convenient Alignment** The NanoBeam ac pivots on its ball joint for easy aiming.



NBE-5AC-19



NBE-5AC-19 with Mounting Hardware

Models

NanoBeam ac

Model	Frequency	Gain
NBE-5AC-16	5 GHz	16 dBi

NanoBeam ac

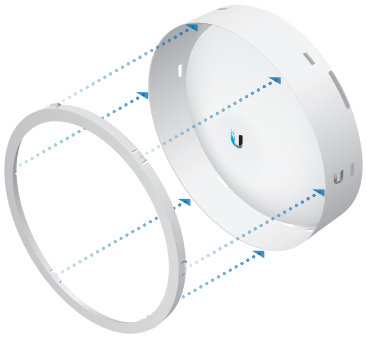
Model	Frequency	Gain
NBE-5AC-19	5 GHz	19 dBi

IsoBeam Accessory

IsoBeam™

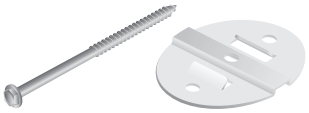
Model	NBE-5AC-16	NBE-5AC-19
ISO-BEAM-16	✓	
ISO-BEAM-19		✓

An RF isolator shield is available as an optional accessory to enhance signal isolation.



Installation Using the IsoBeam™

Mounting Accessories



NanoBeam® Wall Mount Kit

Model	NBE-5AC-16	NBE-5AC-19
NBE-WMK	✓	✓

A wall mount kit is available as an optional accessory to enhance stability for wall-mounting.

Installation Using the NanoBeam Wall Mount Kit

NanoBeam® Window Mount

Model	NBE-5AC-16	NBE-5AC-19
NBE-16-WM	✓	
NBE-19-WM		✓

A suction cup mount is available as an optional accessory to mount the NanoBeam on a window.

Installation Using the NanoBeam Window Mount

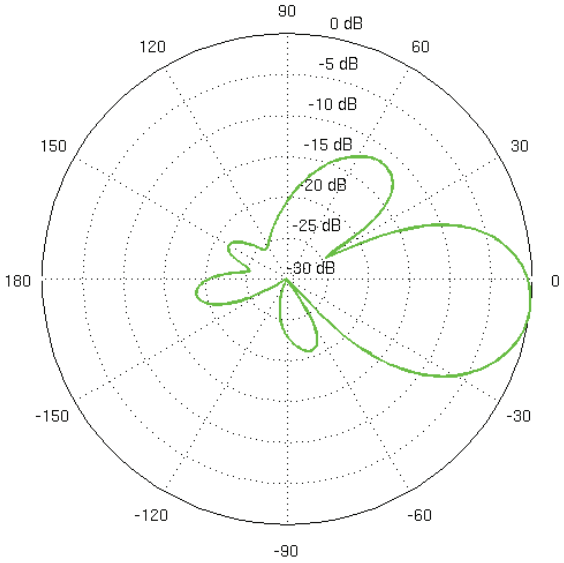
Specifications

NBE-5AC-16					
Dimensions	140 x 140 x 54 mm (5.51 x 5.51 x 2.13")				
Weight	0.320 kg (0.71 lb)				
Power Supply	24V, 0.5A Gigabit PoE				
Max. Power Consumption	6W				
Operating Frequency	Worldwide	USA: U-NII-1	USA: U-NII-2A	USA: U-NII-2C	USA: U-NII-3
	5150 - 5875 MHz	5150 - 5250 MHz*	5250 - 5350 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*
Gain	16 dBi				
Networking Interface	(1) 10/100/1000 Ethernet Port				
Processor Specs	Atheros MIPS 74Kc, 533 MHz				
Memory	64 MB DDR2, 8 MB Flash				
LEDs	(1) Power, (1) LAN, (4) WLAN				
Signal Strength LEDs	Software-Adjustable to Correspond to Custom RSSI Levels				
Max. VSWR	1.5:1				
Channel Sizes	PtP Mode		PtMP Mode		
	10/20/30/40/50/60/80 MHz		10/20/30/40 MHz		
Polarization	Dual Linear				
Enclosure	Outdoor UV Stabilized Plastic				
Mounting	Pole-Mount (Kit Included), Wall-Mount				
Wind Loading	21.4 N @ 200 km/h (4.8 lbf @ 125 mph)				
Wind Survivability	200 km/h (125 mph)				
ESD/EMP Protection	Air: ± 24 kV, Contact: ± 24 kV				
Operating Temperature	-40 to 70° C (-40 to 158° F)				
Operating Humidity	5 to 95% Noncondensing				
Wireless Approvals	FCC, IC, CE				
RoHS Compliance	Yes				
Salt Fog Test	IEC 68-2-11 (ASTM B117), Equivalent: MIL-STD-810 G Method 509.5				
Vibration Test	IEC 68-2-6				
Temperature Shock Test	IEC 68-2-14				
UV Test	IEC 68-2-5 at 40° C (104° F), Equivalent: ETS 300 019-1-4				
Wind-Driven Rain Test	ETS 300 019-1-4, Equivalent: MIL-STD-810 G Method 506.5				

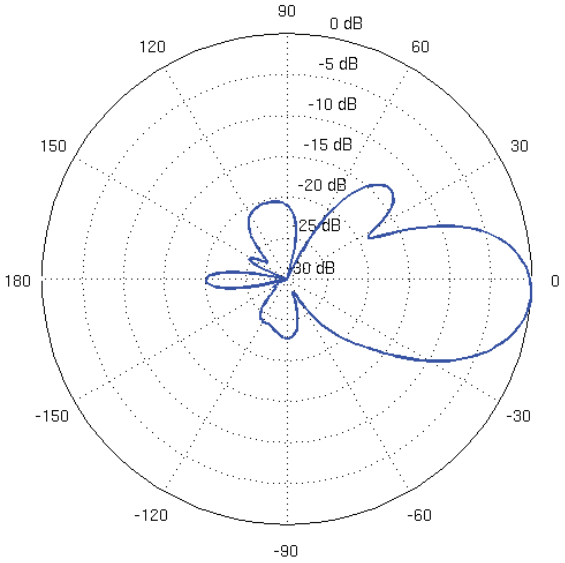
NBE-5AC-16 Output Power: 24 dBm							
TX Power Specifications				**RX Power Specifications**			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	24 dBm	± 2 dB	**airMAX ac**	1x BPSK (½)	-96 dBm	± 2 dB
	2x QPSK (½)	24 dBm	± 2 dB		2x QPSK (½)	-95 dBm	± 2 dB
	2x QPSK (¾)	24 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	24 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
	4x 16QAM (¾)	24 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB
	6x 64QAM (⅔)	23 dBm	± 2 dB		6x 64QAM (⅔)	-83 dBm	± 2 dB
	6x 64QAM (¾)	22 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (⅚)	21 dBm	± 2 dB		6x 64QAM (⅚)	-74 dBm	± 2 dB
	8x 256QAM (¾)	20 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (⅚)	19 dBm	± 2 dB		8x 256QAM (⅚)	-65 dBm	± 2 dB

* Some frequencies may require activation; visit: **https://www.ubnt.com/fcclabelrequest**

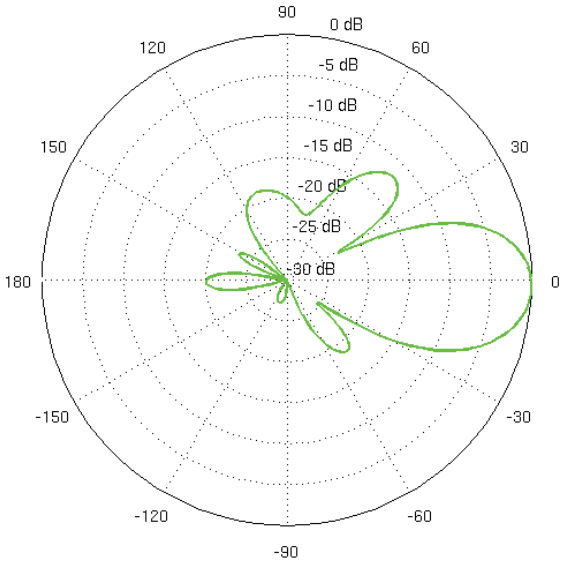
Vertical Azimuth



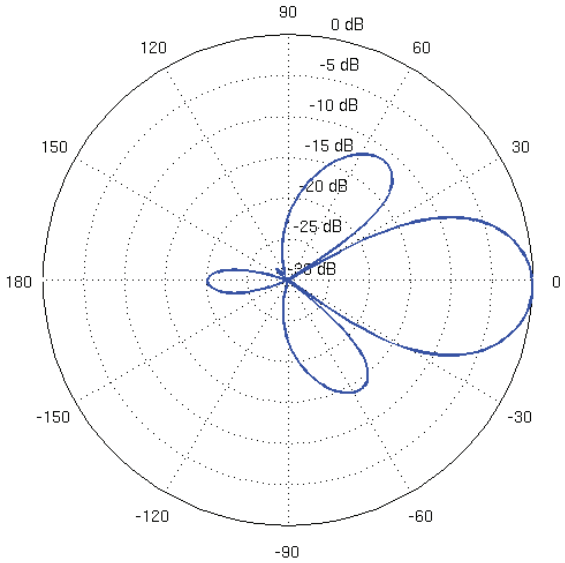
Vertical Elevation



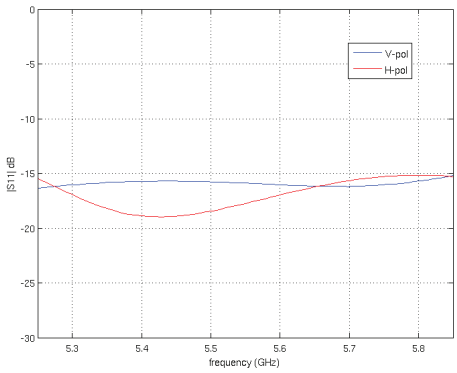
Horizontal Azimuth



Horizontal Elevation



Return Loss



Specifications

NBE-5AC-19					
Dimensions	189 x 189 x 125 mm (7.44 x 7.44 x 4.92")				
Weight	0.530 kg (1.17 lb)				
Power Supply	24V, 0.5A Gigabit PoE				
Max. Power Consumption	8W				
Operating Frequency	Worldwide	USA: U-NII-1	USA: U-NII-2A	USA: U-NII-2C	USA: U-NII-3
	5150 - 5875 MHz	5150 - 5250 MHz*	5250 - 5350 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*
Gain	19 dBi				
Networking Interface	(1) 10/100/1000 Ethernet Port				
Processor Specs	Atheros MIPS 74Kc, 720 MHz				
Memory	128 MB DDR2, 8 MB Flash				
LEDs	(1) Power, (1) LAN, (4) WLAN				
Signal Strength LEDs	Software-Adjustable to Correspond to Custom RSSI Levels				
Max. VSWR	1.5:1				
Channel Sizes	PtP Mode		PtMP Mode		
	10/20/30/40/50/60/80 MHz		10/20/30/40 MHz		
Polarization	Dual Linear				
Enclosure	Outdoor UV Stabilized Plastic				
Mounting	Pole-Mount (Kit Included), Wall-Mount				
Wind Loading	45.4 N @ 200 km/h (10.2 lbf @ 125 mph)				
Wind Survivability	200 km/h (125 mph)				
ESD/EMP Protection	Air: ± 24 kV, Contact: ± 24 kV				
Operating Temperature	-40 to 70° C (-40 to 158° F)				
Operating Humidity	5 to 95% Noncondensing				
Wireless Approvals	FCC, IC, CE				
RoHS Compliance	Yes				
Salt Fog Test	IEC 68-2-11 (ASTM B117), Equivalent: MIL-STD-810 G Method 509.5				
Vibration Test	IEC 68-2-6				
Temperature Shock Test	IEC 68-2-14				
UV Test	IEC 68-2-5 at 40° C (104° F), Equivalent: ETS 300 019-1-4				
Wind-Driven Rain Test	ETS 300 019-1-4, Equivalent: MIL-STD-810 G Method 506.5				

NBE-5AC-19 Output Power: 26 dBm							
TX Power Specifications				**RX Power Specifications**			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	26 dBm	± 2 dB	**airMAX ac**	1x BPSK (½)	-96 dBm	± 2 dB
	2x QPSK (½)	26 dBm	± 2 dB		2x QPSK (½)	-95 dBm	± 2 dB
	2x QPSK (¾)	26 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	26 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
	4x 16QAM (¾)	26 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB
	6x 64QAM (⅔)	25 dBm	± 2 dB		6x 64QAM (⅔)	-83 dBm	± 2 dB
	6x 64QAM (¾)	25 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (⅚)	24 dBm	± 2 dB		6x 64QAM (⅚)	-74 dBm	± 2 dB
	8x 256QAM (¾)	22 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (⅚)	22 dBm	± 2 dB		8x 256QAM (⅚)	-65 dBm	± 2 dB

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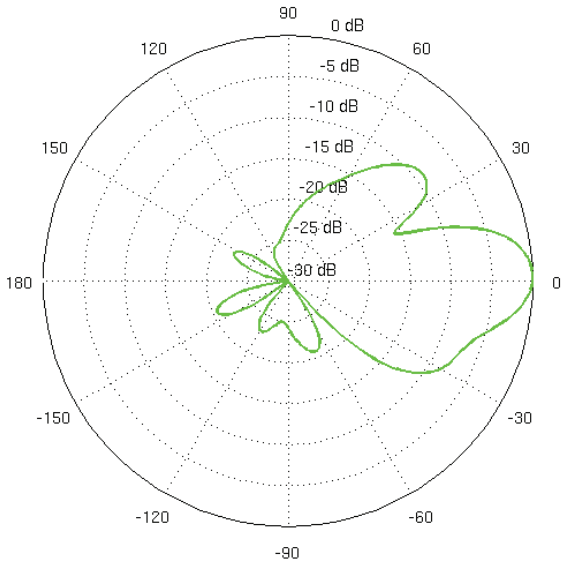
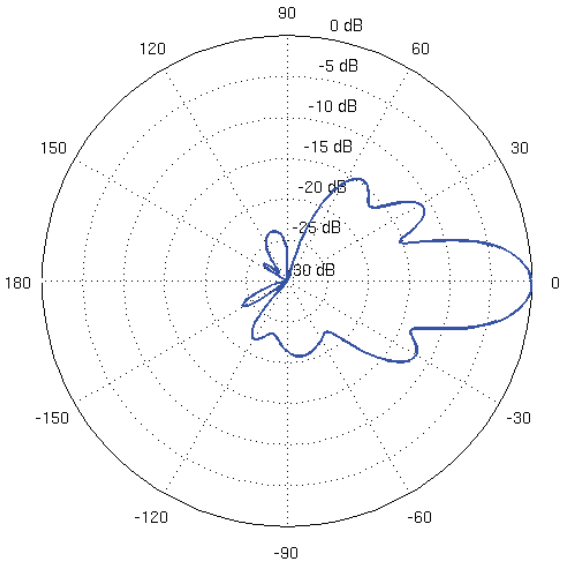
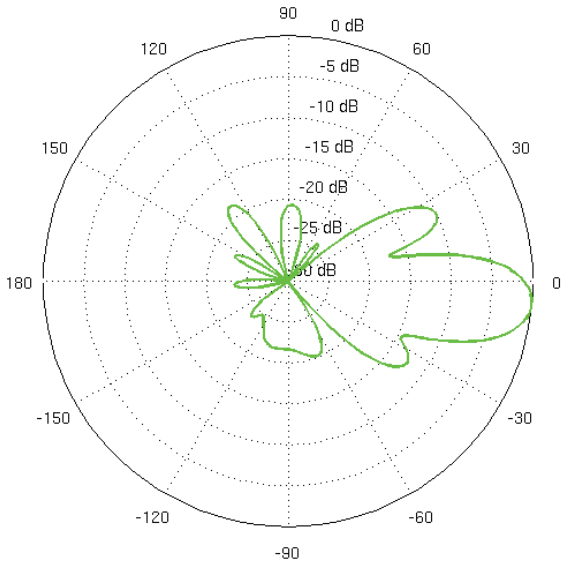
Vertical Azimuth



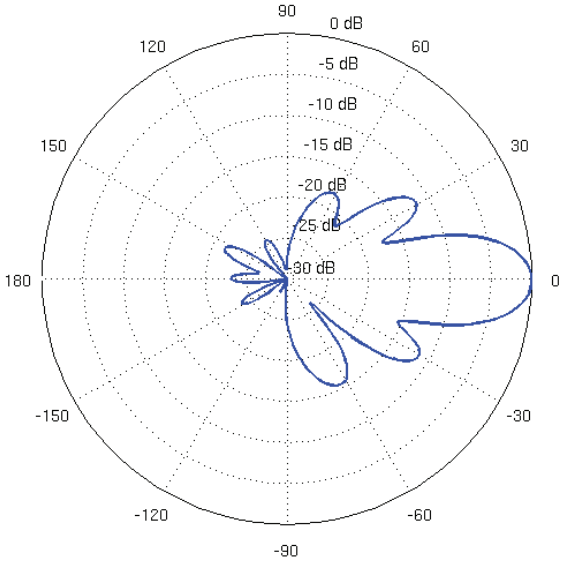
Vertical Elevation



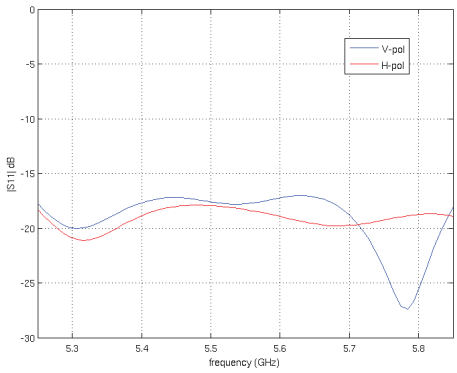
Horizontal Azimuth



Horizontal Elevation



Return Loss



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