

## PowerBeam<sup>®</sup> (ac)

High-Performance airMAX<sup>®</sup> Bridge Models: PBE-5AC-300, PBE-5AC-400, PBE-5AC-500, PBE-5AC-620

Uniform Beamwidth Maximizes Noise Immunity

Innovative Mechanical Design

111,

High-Speed Processor for Superior Performance



## Overview

Ubiquiti Networks launches the latest generation of airMAX<sup>®</sup> CPE (Customer Premises Equipment), the PowerBeam<sup>®</sup> ac.

#### **Improved Noise Immunity**

The PowerBeam ac directs RF energy in a tighter beamwidth. With the focus in one direction, the PowerBeam 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**

Ubiquiti's InnerFeed® technology integrates the radio into the feedhorn of an antenna, so there is no need for a cable. This improves performance because it eliminates cable losses.

Featuring high performance and innovative mechanical design, the PowerBeam ac is versatile and cost-effective to deploy.

Software airOS<sup>°</sup>7

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

#### **Powerful Wireless Features**

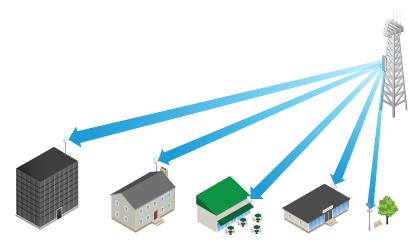
- airMAX ac Protocol Support
- Long-Range Point-to-Point (PtP) Link Mode
- Selectable Channel Width
  - PtP: 10/20/30/40/50/60/80 MHz
  - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection
- Transmit Power Control: Automatic/Manual
- Automatic Distance Selection
  (ACK Timing)
- Strongest WPA2 Security

#### **Usability Enhancements**

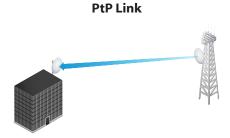
- Dynamic Configuration Changes
- Instant Input Validation
- HTML5 Technology
- Optimization for Mobile Devices
- Detailed Device Statistics
- Comprehensive Array of Diagnostic Tools, including Ethernet Cabling Test, RF Diagnostics, and airView<sup>®</sup> Spectrum Analyzer

#### **Application Examples**

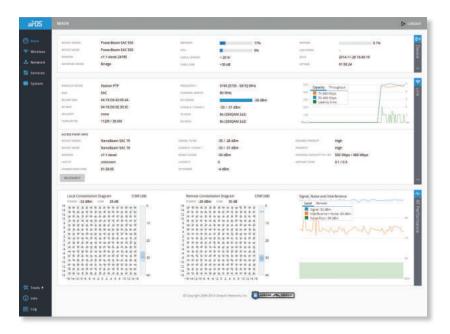
#### **PtMP Client Links**



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



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



# Datasheet

## **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 of airOS V7.

#### **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.

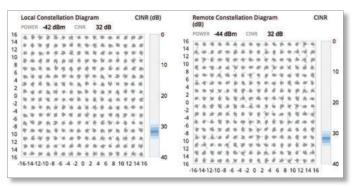
- Waterfall Aggregate energy collected for each frequency
- Waveform Aggregate energy collected
- Ambient Noise Level Background noise energy shown as a function of frequency

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®

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.

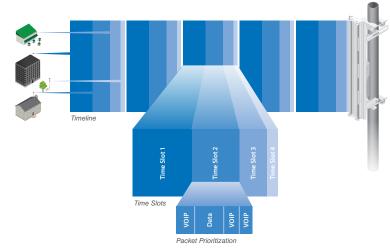
Ubiquiti's airMAX engine with custom IC dramatically improves TDMA latency and network scalability. The custom silicon provides hardware acceleration capabilities to the airMAX scheduler, to support the high data rates and dense modulation used in airMAX ac technology.

#### 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

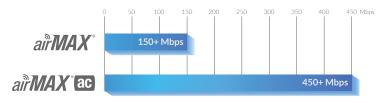


Up to 100 airMAX ac stations can be connected to an airMAX ac Sector; four airMAX ac stations are shown to illustrate the general concept.

#### airMAX Network Scalability



#### **Superior Throughput Performance**



## **Hardware Overview**

#### **Innovative Mechanical Design**

- **Built-in mechanical tilt** All mounting brackets conveniently offer elevation adjustments:
  - PBE-5AC-300: ± 20° tilt
  - PBE-5AC-400/PBE-5AC-500: 20° uptilt and 10° downtilt
  - PBE-5AC-620: ± 15° tilt
- Quick assembly Minimal fasteners simplify installation.
- **Easy removal** The antenna feed can be detached with the push of a button.

#### Industrial-Strength Construction

- **Fasteners** GEOMET-coated for improved corrosion resistance when compared with zinc-plated fasteners.
- Dish and brackets Made of galvanized steel that is powder-coated for superior corrosion resistance. The hardware also prevents paint from being removed from the metal brackets for improved corrosion resistance.
- Protective radome Shields the radio from the elements. It is included with the PBE-5AC-500 and available as an optional accessory for the PBE-5AC-400.

## Models

Using airMAX ac technology, the PowerBeam ac supports up to 450+ Mbps real TCP/IP throughput. The PowerBeam ac launches with PtP functionality, and a client mode feature will be added with a future firmware upgrade.



## PowerBeam<sup>®</sup> ac

Model	Model Frequency		Dish Reflector		
PBE-5AC-300	5 GHz	22 dBi	300 mm		

## PowerBeam<sup>®</sup> ac

Model	Frequency	Gain	Dish Reflector
PBE-5AC-400	5 GHz	25 dBi	400 mm



## **PowerBeam**<sup>®</sup> 400 mm Radome

Model	Frequency	PBE-5AC-400	Dish Reflector
PBE-RAD-400	5 GHz	$\checkmark$	400 mm

A protective radome is available as an optional accessory for the PBE-5AC-400. It is also compatible with the PBE-M2-400 and PBE-M5-400.

## Models





## PowerBeam<sup>®</sup> ac

Model	Frequency	Gain	Dish Reflector
PBE-5AC-500	5 GHz	27 dBi	500 mm

## PowerBeam<sup>®</sup> ac

Model	Model Frequency		Dish Reflector
PBE-5AC-620	5 GHz	29 dBi	620 mm

## PowerBeam<sup>®</sup> ac Accessories

## IsoBeam<sup>®</sup> Model: ISO-BEAM-620

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The IsoBeam  $^{\rm m}$  is an isolator radome that is available as an optional accessory for the PBE-5AC-620 and other models:

- PowerBeam PBE-M5-620
- RocketDish<sup>™</sup>RD-5G30-LW

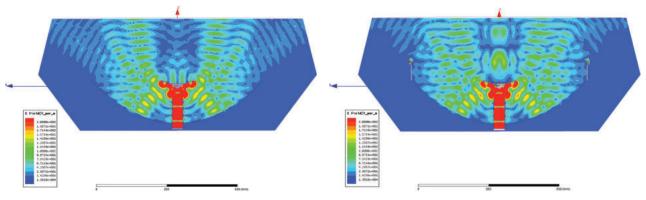
The innovative RF-choke perimeter of the IsoBeam delivers superior noise immunity in co-location deployments; its perimeter corrugation provides enhanced RF shielding. Compare the two near-field plots below, and note the breakthrough isolation performance of the IsoBeam.

Both near-field plots are displayed in watts and use a linear scale. The strength of the electromagnetic field is color-coded:

- Red: Highest strength
- Green: Medium strength
- Indigo: Lowest strength

#### Without IsoBeam

With IsoBeam



## Precision Alignment Kit

#### Model: PAK-620



The Precision Alignment Kit is available as an optional accessory for the PBE-5AC-620. It features 15° of azimuth adjustment and 15° of elevation adjustment to enable extremely accurate aiming for optimal PtP link performance.

The Precision Alignment Kit is also compatible with other dish antennas:

- airFiber® AF-5G30-S45
- PowerBeam PBE-M5-620
- RocketDish RD-5G30-LW

PBE-5AC-300									
Dimensions	325 x 325 x 256 mm (12.8 x 12.8 x 10.1")								
Weight	1.203 kg (2.65 lbs)								
Power Supply	24V, 0.5A Gigabit PoE								
Max. Power Consumption						5.5W			
Power Method					Passive PoE (	Pairs 4, 5+; 7, 8 Return)			
Supported Voltage Range						20-26VDC			
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 - 53	50 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*			
Gain						22 dBi			
Networking Interface					(1) 10/1	100/1000 Ethernet Port			
Processor Specs					Ather	os MIPS 74Kc, 560 MHz			
Memory					64	MB DDR2, 16 MB Flash			
LEDs					(1) Pc	ower, (1) LAN, (4) WLAN			
Signal Strength LEDs				Software-	Adjustable to Correspond	l 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 M	Hz			
Polarization						Dual Linear			
Enclosure					Outdo	or UV Stabilized Plastic			
Mounting					Pol	e-Mount (Kit Included)			
Wind Loading					145.2 N @ 120 k	km/h (33 lbf @ 75 mph)			
Wind Survivability						120 km/h (75 mph)			
ESD/EMP Protection					Air: ±	24 kV, Contact: ± 24 kV			
Operating Temperature					-40	to 70° C (-40 to 158° F)			
Operating Humidity					5 t	o 95% Noncondensing			
Wireless Approvals						FCC, IC, CE			
RoHS Compliance						Yes			
Salt Fog Test			IEC 68	-2-11 (ASTM	B117), Equivalent: MIL-ST	D-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), Equiv	valent: ETS 300 019-1-4			
Wind-Driven Rain Test				ETS 300 0	19-1-4, Equivalent: MIL-ST	D-810 G Method 506.5			

	PBE-5AC-300 Output Power: 25 dBm												
	TX Power Speci	fications			RX Power Spe	cifications							
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance						
	1x BPSK (1/2)	25 dBm	± 2 dB		1x BPSK (1/2)	-96 dBm Min.	± 2 dB						
	2x QPSK (1/2)	25 dBm	± 2 dB		2x QPSK (1/2)	-95 dBm	$\pm 2 \text{ dB}$						
	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB						
ac	4x 16QAM (1/2)	25 dBm	± 2 dB	ac	4x 16QAM (1/2)	-90 dBm	$\pm 2 \text{ dB}$						
	4x 16QAM (¾)	25 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB						
airMAX	6x 64QAM (⅔)	25 dBm	± 2 dB	airMAX	6x 64QAM (3)	-83 dBm	± 2 dB						
ai	6x 64QAM (¾)	24 dBm	±2dB	ai	6x 64QAM (¾)	-77 dBm	± 2 dB						
	6x 64QAM (%)	23 dBm	± 2 dB		6x 64QAM (%)	-74 dBm	± 2 dB						
	8x 256QAM (¾)	21 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB						
	8x 256QAM (%)	21 dBm	± 2 dB		8x 256QAM (%)	-65 dBm	± 2 dB						

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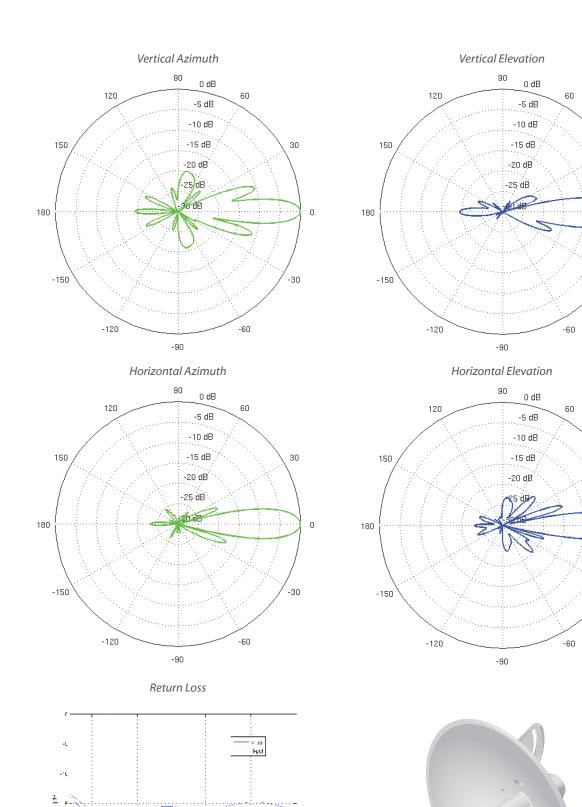
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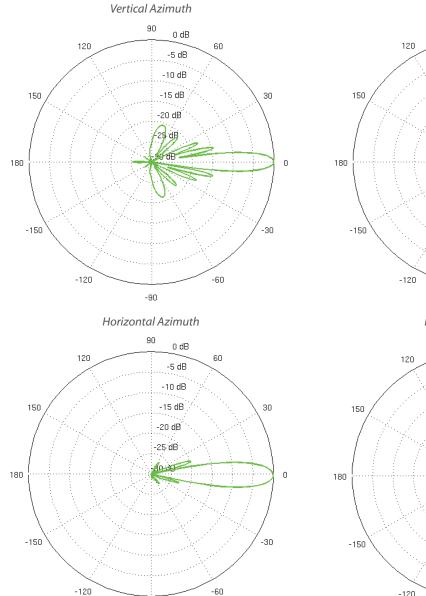
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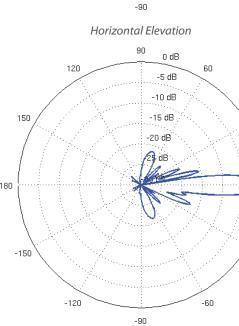
PBE-5AC-400									
Dimensions	420 x 420 x 275 mm (16.54 x 16.54 x 10.83")								
Weight	1.753 kg (3.87 lbs)								
Power Supply		24V, 0.5A Gigabit PoE							
Max. Power Consumption						8.5W			
Power Method					Passive PoE (	Pairs 4, 5+; 7, 8 Return)			
Supported Voltage Range						20-26VDC			
Operating 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 - 53	50 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*			
Gain						25 dBi			
Networking Interface					(1) 10/1	00/1000 Ethernet Port			
Processor Specs					Ather	os MIPS 74Kc, 560 MHz			
Memory					64	MB DDR2, 16 MB Flash			
LEDs					(1) Pc	wer, (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 M	Hz			
Polarization						Dual Linear			
Enclosure					Outdo	or UV Stabilized Plastic			
Mounting					Pol	e-Mount (Kit Included)			
Wind Loading					278.4 N @ 120 k	xm/h (63 lbf @ 75 mph)			
Wind Survivability						120 km/h (75 mph)			
ESD/EMP Protection					Air: ±	24 kV, Contact: ± 24 kV			
Operating Temperature					-40	to 70° C (-40 to 158° F)			
Operating Humidity					5 t	o 95% Noncondensing			
Wireless Approvals						FCC, IC, CE			
RoHS Compliance						Yes			
Salt Fog Test			IEC 68	-2-11 (ASTM	B117), Equivalent: MIL-ST	D-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), Equiv	valent: ETS 300 019-1-4			
Wind-Driven Rain Test				ETS 300 0	19-1-4, Equivalent: MIL-ST	D-810 G Method 506.5			

	PBE-5AC-400 Output Power: 25 dBm												
	TX Power Speci	fications			RX Power Spe	cifications							
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance						
	1x BPSK (1/2)	25 dBm	± 2 dB		1x BPSK (1/2)	-96 dBm Min.	± 2 dB						
	2x QPSK (1/2)	25 dBm	$\pm 2 \text{ dB}$		2x QPSK (1/2)	-95 dBm	± 2 dB						
	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB						
ac	4x 16QAM (½)	25 dBm	$\pm 2 \text{ dB}$	ac	4x 16QAM (1/2)	-90 dBm	± 2 dB						
	4x 16QAM (¾)	25 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB						
airMAX	6x 64QAM (⅔)	25 dBm	$\pm 2 \text{ dB}$	airMAX	6x 64QAM (3)	-83 dBm	± 2 dB						
ai	6x 64QAM (¾)	24 dBm	±2dB	ai	6x 64QAM (¾)	-77 dBm	± 2 dB						
	6x 64QAM (%)	23 dBm	± 2 dB		6x 64QAM (%)	-74 dBm	± 2 dB						
	8x 256QAM (¾)	21 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB						
	8x 256QAM (%)	21 dBm	± 2 dB		8x 256QAM (5%)	-65 dBm	± 2 dB						

PowerBeam ac

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Vertical Elevation

90

0 dB

-5 dB

-10 dB

-15 dB

-20 dB

-25 dB

n dB

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-60

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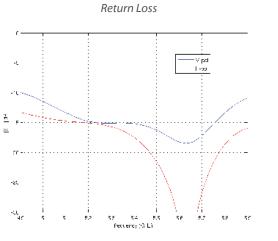
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-90



		PBE-5AC-5	500				
Dimensions	Radome Excluded				Radome Included		
	520 x 520 x 308 mm (20.47 x 20.47 x 12.13")			52	5 x 525 x 315 mm (20.67	x 20.67 x 12.40")	
Weight	Ra	dome Excluded			Radome Includ	led	
	2	.35 kg (5.18 lb)			3.15 kg (6.95 l	b)	
Power Supply						24V, 0.5A Gigabit PoE	
Max. Power Consumption						8.5W	
Power Method					Passive PoE	(Pairs 4, 5+; 7, 8 Return)	
Supported Voltage Range						20-26VDC	
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 - 53	50 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*	
Gain						27 dBi	
Networking Interface					(1) 10/	100/1000 Ethernet Port	
Processor Specs					Ather	os MIPS 74Kc, 720 MHz	
Memory					128	MB DDR2, 16 MB Flash	
LEDs					(1) Po	ower, (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		
	10/20/3	30/40/50/60/80 MHz			10/20/30/40 N	IHz	
Polarization						Dual Linear	
Enclosure					Outdo	or UV Stabilized Plastic	
Mounting					Ро	le-Mount (Kit Included)	
Wind Loading					264.6 N @ 96	km/h (60 lbf @ 60 mph)	
Wind Survivability						96 km/h (60 mph)	
ESD/EMP Protection					Air: ±	24 kV, Contact: ± 24 kV	
Operating Temperature					-40	to 70° C (-40 to 158° F)	
Operating Humidity					5 t	o 95% Noncondensing	
Wireless Approvals						FCC, IC, CE	
RoHS Compliance						Yes	
Salt Fog Test			IEC 68	-2-11 (ASTM	B117), Equivalent: MIL-ST	D-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), Equi	valent: ETS 300 019-1-4	
Wind-Driven Rain Test				ETS 300 0	19-1-4, Equivalent: MIL-ST	D-810 G Method 506.5	

PBE-5AC-500 Output Power: 24 dBm												
	TX Power Speci	fications			RX Power Spec	cifications						
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance					
	1x BPSK (1/2)	24 dBm	$\pm 2 dB$		1x BPSK (1/2)	-96 dBm	± 2 dB					
	2x QPSK (1/2)	24 dBm	$\pm 2 dB$		2x QPSK (1/2)	-95 dBm	± 2 dB					
	2x QPSK (¾)	24 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB					
ac	4x 16QAM (1/2)	24 dBm	$\pm 2 \text{ dB}$	ac	4x 16QAM (1/2)	-90 dBm	± 2 dB					
	4x 16QAM (¾)	24 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB					
airMAX	6x 64QAM (⅔)	23 dBm	$\pm 2 dB$	airMAX	6x 64QAM (⅔)	-83 dBm	± 2 dB					
ai	6x 64QAM (¾)	22 dBm	± 2 dB	<b>a</b> :	6x 64QAM (¾)	-77 dBm	± 2 dB					
	6x 64QAM (5%)	21 dBm	$\pm 2 dB$		6x 64QAM (%)	-74 dBm	± 2 dB					
	8x 256QAM (¾)	20 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB					
	8x 256QAM (%)	19 dBm	± 2 dB		8x 256QAM (%)	-65 dBm	±2dB					

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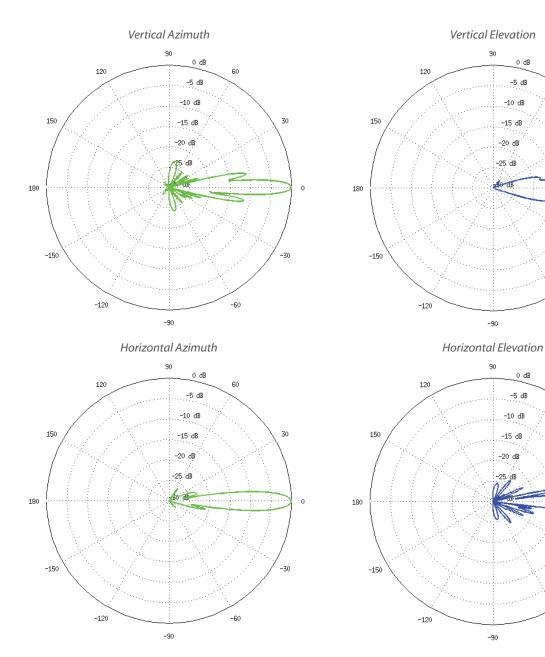
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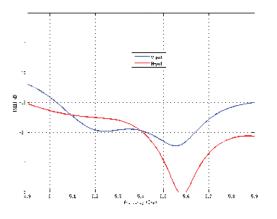
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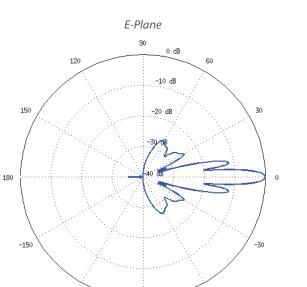
Return Loss





PBE-5AC-620										
Dimensions	620 x 620 x 386 mm (24.41 x 24.41 x 15.2")									
Weight	6.4 kg (14.11 lbs)									
Power Supply		24V, 0.5A Gigabit PoE								
Max. Power Consumption						8.5W				
Power Method					Passive PoE (	(Pairs 4, 5+; 7, 8 Return)				
Supported Voltage Range						20-26VDC				
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 - 53	50 MHz*	5470 - 5725 MHz*	5725 - 5850 MHz*				
Gain						29 dBi				
Networking Interface					(1) 10/1	100/1000 Ethernet Port				
Processor Specs					Ather	os MIPS 74Kc, 720 MHz				
Memory					128	MB DDR2, 16 MB Flash				
LEDs					(1) Pc	ower, (1) LAN, (4) WLAN				
Signal Strength LEDs				Software-	Adjustable to Correspond	l to Custom RSSI Levels				
Max. VSWR						1.6:1				
Channel Sizes		PtP Mode			PtMP Mode					
	10/20/	30/40/50/60/80 MHz			10/20/30/40 M	IHz				
Polarization						Dual Linear				
Enclosure					Outdo	or UV Stabilized Plastic				
Mounting					Pol	le-Mount (Kit Included)				
Wind Loading	Ra	dome Excluded			Radome Include	ed				
Wind Eddding	1510 N @ 200	km/h (340 lbf @ 125 mph	n)	1	830 N @ 200 km/h (411 lb	f @ 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 t	o 95% Noncondensing				
Wireless Approvals						FCC, IC, CE				
RoHS Compliance						Yes				
Salt Fog Test			IEC 68	-2-11 (ASTM	B117), Equivalent: MIL-ST	D-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), Equiv	valent: ETS 300 019-1-4				
Wind-Driven Rain Test		ETS 300 019-1-4, Equivalent: MIL-STD-810 G Method 506.5								

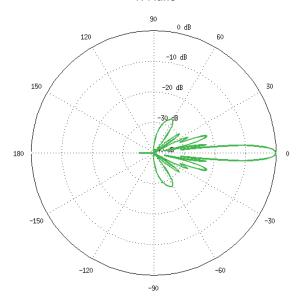
PBE-5AC-620 Output Power: 24 dBm							
TX Power Specifications				RX Power Specifications			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (1/2)	24 dBm	± 2 dB	airMAX ac	1x BPSK (1/2)	-96 dBm Min.	± 2 dB
	2x QPSK (1/2)	24 dBm	± 2 dB		2x QPSK (1/2)	-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 (1/2)	-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 (3)	-83 dBm	± 2 dB
	6x 64QAM (¾)	23 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (5%)	22 dBm	± 2 dB		6x 64QAM (%)	-74 dBm	± 2 dB
	8x 256QAM (¾)	20 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (%)	20 dBm	± 2 dB		8x 256QAM (5%)	-65 dBm	± 2 dB



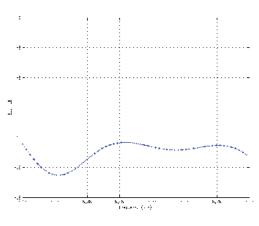


-60

-120

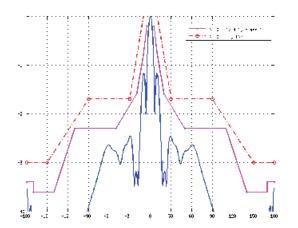




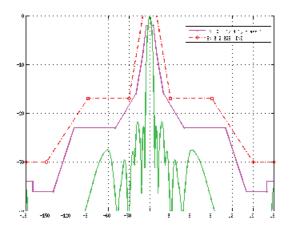


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