

# Agilent PSA Series Spectrum Analyzers NADC and PDC Measurement Personality

Product Overview

The Agilent PSA series of high-performance spectrum analyzers offers powerful measurements by mixing an industry leading spectrum analyzer with digital modulation analysis capabilities. The result is an instrument that can help you measure NADC and PDC signals quickly and accurately, with the push of a button.

**NADC and PDC**



Agilent Technologies



## **Use the NADC and PDC personality to evaluate your TDMA signals throughout the design and manufacturing process.**

### **Time domain measurements for your most demanding tests**

Evaluating the performance of today's TDMA radio systems requires a powerful tool. Agilent's PSA series of high-performance spectrum analyzers provides a measurement personality for NADC and PDC that helps you make these measurements quickly, easily and accurately.

The Agilent PSA series spectrum analyzers offer a unique solution for your NADC and PDC measurement needs. The PSA series is an unmatched spectrum analyzer that can also perform as an NADC/PDC standard-based vector signal analyzer.

The NADC/PDC measurement personality (Option BAE) is designed to give you fast and accurate measurements. This personality allows you to examine the NADC and PDC signals based on the base station or mobile standard, and it also allows full or half traffic rates. It features one-button setups that quickly produce the results you need. The NADC/PDC personality is also flexible. You can set up custom limits, view and measure the I/Q components of your signal, or set up adjacent channel power (ACP) offset tables for your needs.

The PSA series also excels at making fast measurements. No level adjustments are necessary as the analyzer automatically sets all attenuator and reference levels as needed for the best overall measurement result. This reduces the set-up time required to make a measurement and guarantees the most dynamic range possible. You never need to worry about downtime due to software upgrades - the PSA series can be updated quickly via a PC-based interface in the lab or on the manufacturing floor, over your existing LAN.

All of this and many other features are built on top of a spectrum analyzer that features the world's best amplitude accuracy, unmatched flexibility, and a unique all-digital IF chain to maximize speed and accuracy. These characteristics combine to build the ultimate NADC/PDC measurement tool, no matter what area of production or manufacturing.

# NADC and PDC measurements

## PDC measurements

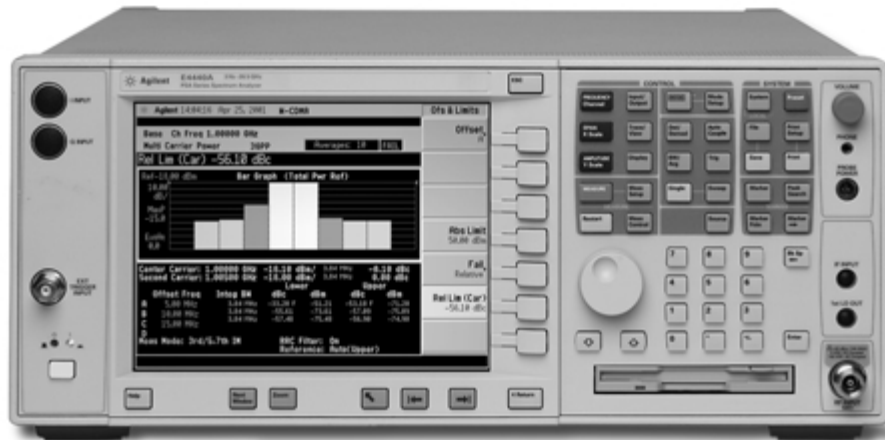
- adjacent channel power
- error vector magnitude
- occupied bandwidth

## NADC measurements

- adjacent channel power
- error vector magnitude

## The NADC and PDC personality allows the following radio settings

- device: base station (BTS) or mobile (MS)
- traffic rate: full or half



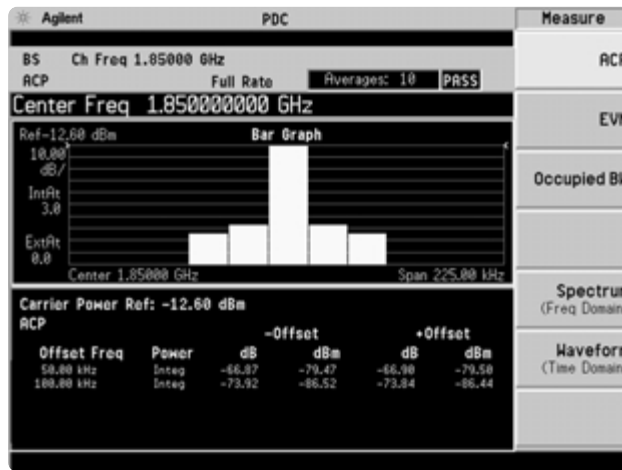
Adjacent channel power

Error vector magnitude

Occupied bandwidth

Spectrum

Time domain



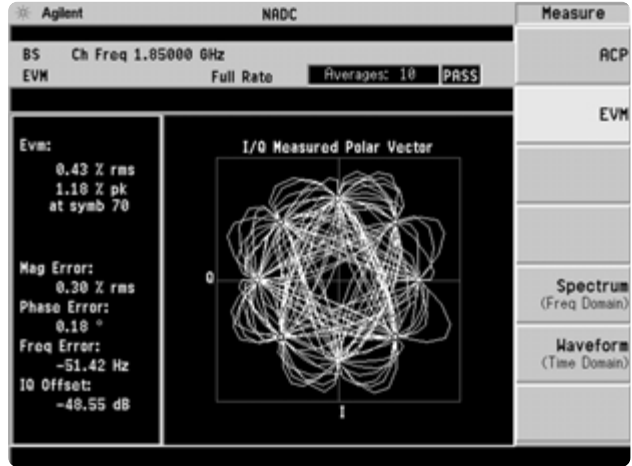
An NADC ACP measurement with two offsets

## Adjacent channel power (ACP) – NADC or PDC

This measurement quickly calculates the ACP for an NADC or PDC signal. It incorporates a standard-based setup, and gives results in tabular and graphical formats.

The following ACP measurement parameters can be configured:

- number of averages and type of average
- trigger mode – free run, RF burst, external, or frame
- offsets to measure
- offset frequencies
- control of each offset's limits



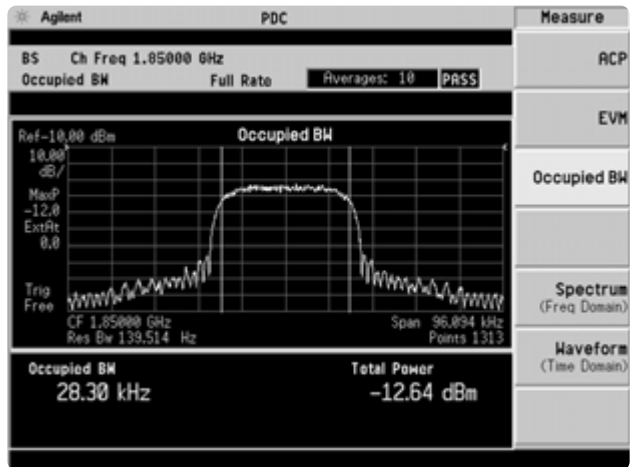
$\pi/4$  QPSK NADC constellation

## Error vector magnitude (EVM) – NADC or PDC

EVM can help diagnose problems in modulators, amplifiers and other radio subsystems. Visual constellation displays help guide you to where the errors are occurring and tabular data gives precise measurements of peak and rms EVM. Custom limit settings speed your production rate and help you identify problematic parts.

Set up the EVM measurement via the following parameters:

- number and type of averages
- trigger mode - free run, RF burst, external, or frame
- burst synchronization – none, RF amplitude, or synchronization word
- custom limit levels for rms EVM percentage, peak EVM percentage, and origin offset (dB)
- custom limit for first 10 symbol EVM in mobile station testing



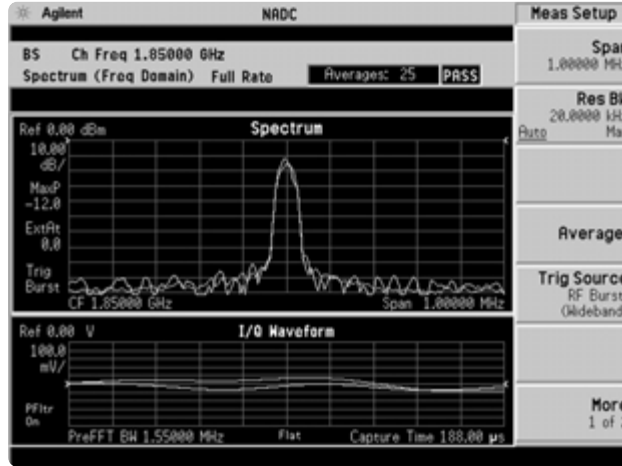
PDC's automated occupied bandwidth measurement

## Occupied bandwidth (OBW) - PDC only

Occupied bandwidth measurements show the width of the transmitted signal. This measurement verifies that the transmitter is well-controlled and not spilling excess energy into adjacent channels, as well as verifying good spectral control over varying power levels.

Set up OBW measurement via the following parameters:

- number and type of averages
- trigger mode - free run, RF burst, external, or frame
- custom limit setting for BW

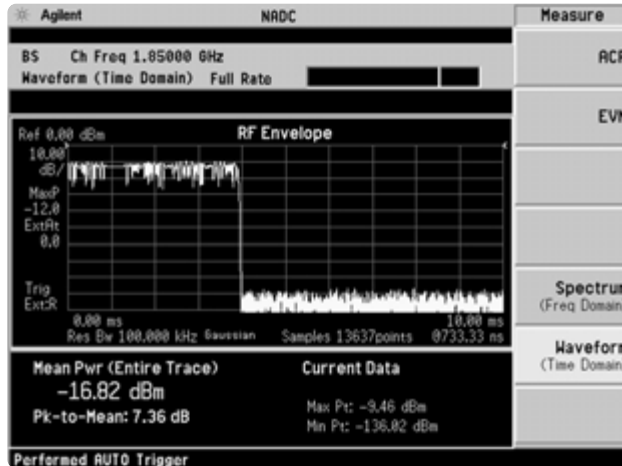


FFT spectrum and I/Q waveform of an NADC burst

## Basic spectrum measurement

View the frequency spectrum of an NADC or PDC signal along with the I/Q waveform over time via the following parameters:

- change the span range up to 10 MHz
- select the resolution bandwidth
- choose from three types of averaging: rms, video and voltage
- view the minimum and maximum value of the spectrum



Amplitude versus time display of an NADC burst

## Basic time domain measurement

Display the analog signal in amplitude versus time. Adjust the scale and time span for a closer look at the signal via the following parameters:

- select ADC range, auto or manual (0 to 24 dB)
- choose from three average types: rms, video and voltage
- adjust the sweep time and resolution bandwidth
- resolution bandwidth filter type can be selected (Gaussian or flat)
- trigger types are free run, video, RF burst, frame or line
- view the I/Q waveform or RF envelope

## Key specifications<sup>1</sup>

	<b>E4443A/E4445A/E4440A</b>	<b>E4446A/E4448A</b>
<b>Frequency range</b>	3 Hz to 6.7/13.2/26.5 GHz	3 Hz to 44/50 GHz
<b>Speed</b>		
Sweep time, span ≥ 10 Hz	1 ms to 2000 s	1 ms to 2000 s
Sweep time span = 0 Hz	1 μs to 6000 s	1 μs to 6000 s
Local measurement update rate	≥ 50 measurements/sec	≥ 50 measurements/sec
Remote measurement update rate	≥ 22 measurements/sec	≥ 22 measurements/sec
<b>Resolution</b>		
Resolution bandwidth range, swept and FFT	1 Hz to 3 MHz (10% steps), 4, 5, 8 MHz	1 Hz to 3 MHz (10% steps), 4, 5, 8 MHz
Variable sweep (trace) point range	101 to 8192	101 to 8192
Phase noise at 1 GHz		
10 kHz offset	-114 dBc/Hz	-114 dBc/Hz
1 MHz offset	-117 dBc/Hz (typical)	-117 dBc/Hz (typical)
10 MHz offset	-144 dBc/Hz	-144 dBc/Hz
	-148 dBc/Hz (nominal)	-148 dBc/Hz (nominal)
	-151 dBc/Hz	-151 dBc/Hz
	-157 dBc/Hz (nominal)	-157 dBc/Hz (nominal)
Residual FM	< (1 Hz x N2) p-p in 1 s	< (1 Hz x N2) p-p in 1 s
<b>Dynamic range</b>		
Displayed average noise level (DANL)		
10 MHz to 3 GHz	-152 dBm	-151 dBm
3 GHz to 20 GHz	-146 dBm	-144 dBm
20 GHz to 26.5 GHz	-143 dBm	-140 dBm
26.5 GHz to 44 GHz	N.A.	-131 dBm
44 GHz to 50 GHz	N.A.	-126 dBm
Preamplifier (DANL) - 10 MHz to 3 GHz	-166 dBm	-164 dBm
1 dB gain compression		
200 MHz to 3 GHz	+3 dBm (+7 dBm nominal)	+3 dBm (+7 dBm nominal)
Input attenuator range	0 to 70 dB in 2 dB steps	0 to 70 dB in 2 dB steps
TOI - 1.7 GHz to 3.0 GHz	+17 dBm (+19 dBm typical)	+18 dBm (+21 dBm typical)
SHI - 400 MHz to 1.25 GHz	+52 dBm	+51 dBm
ACPR, W-CDMA (5 MHz offset)		
Dynamic range	-74.5 dB (typical)	-74.5 dB (typical)
Dynamic range w/noise correction	-81 dB (typical)	-81 dB (typical)
<b>Accuracy</b>		
Absolute amplitude accuracy	±(0.24 dB + frequency response) ±(0.06 dB + frequency response), (typical)	±(0.24 dB + frequency response) ±(0.06 dB + frequency response), (typical)
95% confidence, 3 Hz to 3 GHz	±0.24 dB	±0.24 dB
Frequency response, 3 Hz to 3 GHz	±0.38 dB (±0.10 dB typical)	±0.38 dB (±0.10 dB typical)
Frequency accuracy at 1 GHz and a stable temperature	±100 Hz	±100 Hz
Span accuracy	±0.2% + $\frac{\text{span}}{\text{sweep points} - 1}$	±0.2% + $\frac{\text{span}}{\text{sweep points} - 1}$
W-CDMA ACPR accuracy (5 MHz offset)		
Mobile station	±0.12 dB	±0.12 dB
Base station	±0.22 dB	±0.22 dB
<b>Warranty</b>	3 years (standard)	3 years (standard)

1. See PSA series spectrum analyzers data sheet for more specification details (literature number 5980-1284E).

2. N is harmonic mixing mode.

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## NADC and PDC measurement

The following specifications are nominal for models E4446A and E4448A.

### ACPR measurement

Minimum power at RF input	-50 dBm (NADC)	
	-36 dBm (PDC)	
Dynamic range		
Offset frequency	Integrated bandwidth	Dynamic range
30 kHz (NADC)	32.8 kHz	35 dB (typical)
60 kHz (NADC)	32.8 kHz	74 dB
90 kHz (NADC)	32.8 kHz	77 dB
50 kHz (PDC)	21.0 kHz	74 dB
100 kHz (PDC)	21.0 kHz	78 dB
Relative accuracy	±0.08 dB	

### EVM measurement

Minimum power at RF input	-45 dBm (NADC)
	-50 dBm (PDC)
EVM Accuracy	±0.6 % (nominal)
Carrier frequency error accuracy	±2.0 Hz + (transmitter frequency x frequency reference accuracy)

### OBW measurement (PDC only)

Minimum power at RF input	-60 dBm (nominal)
Frequency	
Resolution	100 Hz
Accuracy	-50 to -150 Hz (nominal)



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## Ordering information

### PSA series spectrum analyzer

E4443A	3 Hz to 6.7 GHz
E4445A	3 Hz to 13.2 GHz
E4440A	3 Hz to 26.5 GHz
E4446A	3 Hz to 44 GHz
E4448A	3 Hz to 50 GHz

### Options

To add options to a product, use the following ordering scheme:

Model	E444xA (x = 0, 3, 5, 6 or 8)
Example options	E4440A-B7J E4448A-1DS

### Digital demodulation hardware

E444xA-B7J	Digital demodulation hardware (required for digital demodulation measurement personalities)
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### Digital demodulation measurements

E444xA-BAF	W-CDMA measurement personality
E444xA-202	GSM w/ EDGE measurement personality
E444xA-B78	cdma2000 measurement personality
E444xA-204	1xEV-DO measurement personality
E444xA-BAC	cdmaOne measurement personality
E444xA-BAE	NADC, PCD measurement personality

### Phase noise measurement

E444xA-226	Phase noise measurement personality
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### Amplifiers

E444xA-1DS	100 kHz to 3 GHz built-in preamplifier
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### Inputs and outputs

E4440A-BAB	Replaces type "N" input connector with APC 3.5 connector
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### Connectivity software

E444xA-230	BenchLink Web Remote Control Software
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### Code compatibility

E444xA-266	HP 8566B/8568B code compatibility measurement personality
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### Accessories

E444xA-1CM	Rack mount kit
E444xA-1CN	Front handle kit
E444xA-1CP	Rack mount with handles
E444xA-1CR	Rack slide kit
E444xA-045	Millimeter wave accessory kit

### Documentation

E444xA-0B1	Extra manual set including CD ROM
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### Calibration documentation

E444xA-UK6	Commercial calibration certificate with test data
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### Warranty and service

For warranty and service of 5 years, please order 60 months of R-51B (quantity = 60). Standard warranty is 36 months.

R-51B	Return-to-Agilent warranty and service plan
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### Calibration<sup>1</sup>

For 3 years, order 36 months of the appropriate calibration plan shown below. For 5 years, specify 60 months.

R-50C-001	Standard calibration
R-50C-002	Standards compliant calibration
E444xA-0BW	Service manual and calibration software

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1.Options not available in all countries.

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## Product literature

*PSA Series - The Next Generation*, brochure, literature number 5980-1283E

*PSA Series*, data sheet, literature number 5980-1284E

*Phase Noise Measurement Personality*, product overview, literature number 5988-3698EN

*W-CDMA Measurement Personality*, product overview, literature number 5988-2388EN

*GSM with EDGE Measurement Personality*, product overview, literature number 5988-2389EN

*cdma2000 Measurement Personality*, product overview, literature number 5988-3694EN

*1xEV-DO Measurement Personality*, product overview, literature number 5988-4828EN

*cdmaOne Measurement Personality*, product overview, literature number 5988-3695EN

*NADC/PDC Measurement Personality*, product overview, literature number 5988-3697EN

*PSA Series Spectrum Analyzers, Option H70, 70 MHz IF Output*, product overview, literature number 5988-5261EN

*Self-Guided Demonstration for Spectrum Analysis*, product note, literature number 5988-0735EN

*Self-Guided Demonstration for Phase Noise Measurements*, product note, literature number 5988-3704EN

*Self-Guided Demonstration for W-CDMA Measurements*, product note, literature number 5988-3699EN

*Self-Guided Demonstration for GSM and EDGE Measurements*, product note, literature number 5988-3700EN

*Self-Guided Demonstration for cdma2000 Measurements*, product note, literature number 5988-3701EN

*Self-Guided Demonstration for 1xEV-DO Measurements*, product note, literature number 988-6208EN

*Self-Guided Demonstration for cdmaOne Measurements*, product note, literature number 5988-3702EN

*Self-Guided Demonstration for NADC and PDC Measurements*, product note, literature number 5988-3703EN

*PSA Series Demonstration CD*, literature number 5988-2390EN

*Optimizing Dynamic Range for Distortion Measurements*, product note, literature number 5980-3079EN

*PSA Series Amplitude Accuracy*, product note, literature number 5980-3080EN

*PSA Series Swept and FFT Analysis*, product note, literature number 5980-3081EN

*PSA Series Measurement Innovations and Benefits*, product note, literature number 5980-3082EN

*PSA Series Spectrum Analyzer Performance Guide Using 89601A Vector Signal Analysis Software*, product note, literature number 5988-5015EN

*Selecting the Right Signal Analyzer for Your Needs*, selection guide, literature number 5968-3413E

*8 Hints for Millimeter Wave Spectrum Measurements*, application note, literature number 5988-5680EN

*PSA Series Spectrum Analyzer Performance Guide Using 89601A Vector Signal Analysis Software*, product note, literature number 5988-5015EN

*89600 series + PSA, 802.11A and HiperLAN2 ODFM Measurements*, product note, literature number 5988-4094EN

*N4256A Amplifier Distortion Test Set*, product overview, literature number 5988-2925EN

*BenchLink Web Remote Control Software*, product overview, literature number 5988-2610EN

*HP 8566B/68B Programming Code Compatibility for PSA and ESA-E Series Spectrum Analyzers*, product overview, literature number 5988-5808EN

*IntuiLink Software, Data Sheet*, Literature Number 5980-3115EN

*Agilent Technologies Wireless/GSM Solutions*, application note, literature number 5968-2320E

*Measuring EDGE Signals - New and Modified Techniques and Measurement Requirements*, application note, literature number 5980-2508EN

*Selecting the Right Signal Analyzer for Your Needs*, selection guide, literature number 5968-3413E

*8 Hints for Millimeter Wave Spectrum Measurements*, application note, literature number 5988-5680

For more information on the PSA series, please visit:

[www.agilent.com/find/psa](http://www.agilent.com/find/psa)



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Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

**Your Advantage**

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