Agilent PSA Series
Spectrum Analyzers

50 GHz
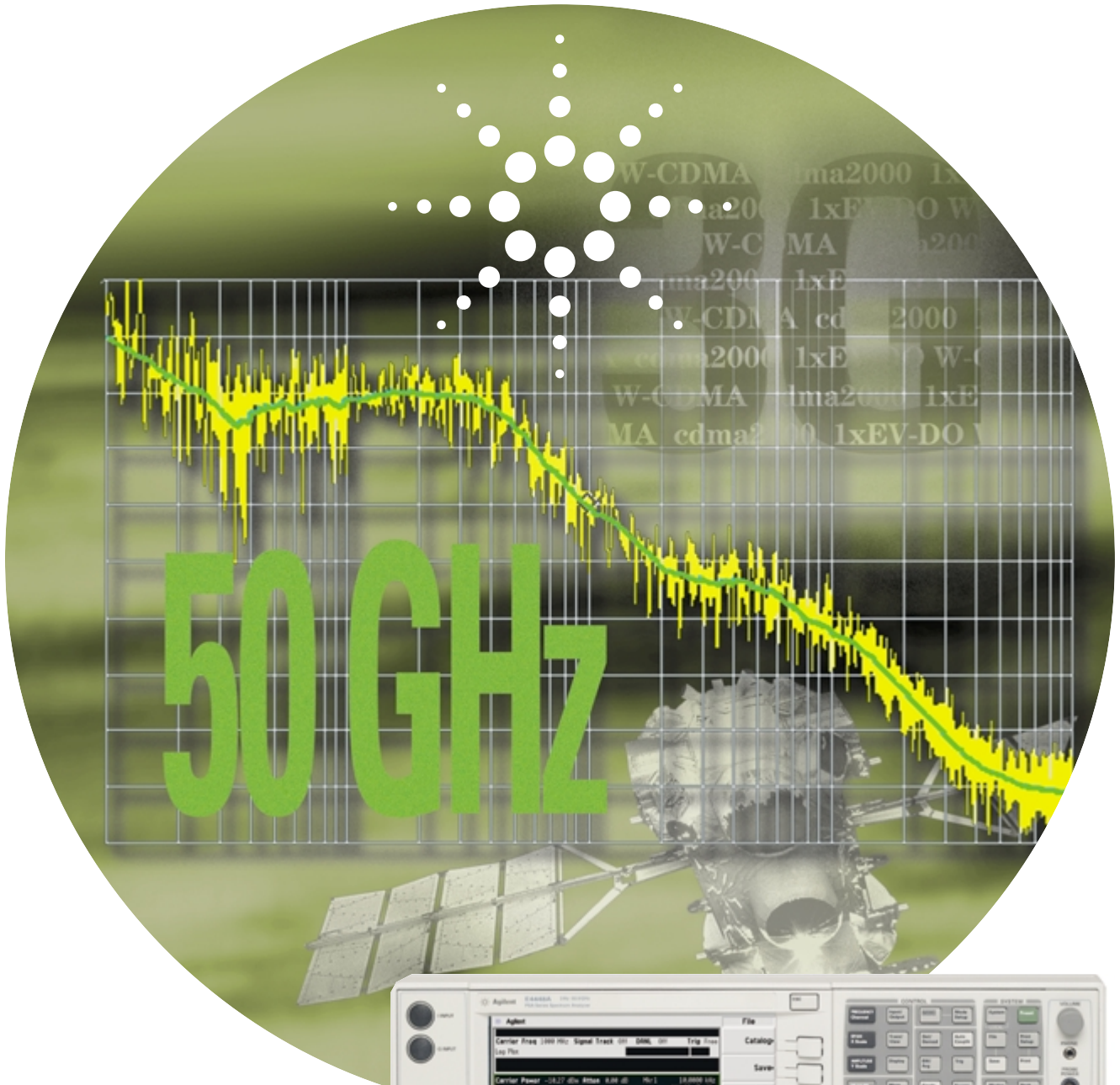
Agilent Technologies

Performance exceeding expectations...

The brainpower and the will are already yours; the next step is selecting precisely the right tools to reach the market first.

In 1964, Hewlett-Packard Company introduced its first spectrum analyzer at the birth of the technology revolution. Since that time, HP and now Agilent Technologies have continued to be industry leaders in spectrum analysis tools. Today, Agilent offers an entirely new platform for high-performance spectrum analysis.

The Agilent PSA series offers high-performance spectrum analysis up to 50 GHz with powerful one-button measurements, a versatile feature set, and a leading-edge combination of flexibility, speed, accuracy, and dynamic range. From millimeter wave and phase noise measurements to spur searches and modulation analysis, the PSA series offers unique and comprehensive high-performance solutions to R&D and manufacturing engineers in cellular and emerging wireless communications, aerospace, and defense.

Dynamic range
Fine-tune measurements with industry's most usable dynamic range.

Accuracy
Design with confidence in guaranteed accuracy.

Flexibility
Take control of measurement setups through advanced flexibility.

Speed
Increase throughput and design efficiently with fast measurements.

PSA series frequency range summary

Model	Start	End
E4443A	3 Hz	6.7 GHz
E4445A	3 Hz	13.2 GHz
E4440A	3 Hz	26.5 GHz
E4446A	3 Hz	43.5 GHz
E4448A	3 Hz	50 GHz

Capability beyond limitation

The PSA series offers a wide variety of features for making more than just traditional spectrum analyzer measurements.

PowerSuite

Make an assortment of challenging power measurements easily with this standard toolset. It offers the most complete one-button advanced power measurements with wireless format-based setups.
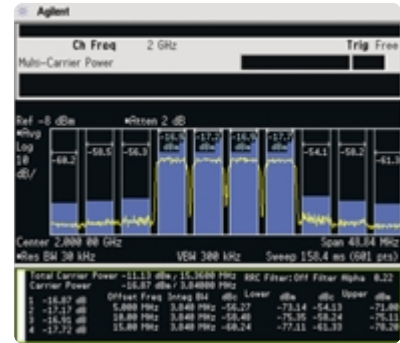
W-CDMA multi-carrier power measurement

Digital modulation analysis

Decades ago, the term "wireless" was used to describe AM radio. Today it is used to describe the industry that is encircling the globe with voice and data communications devices in a variety of different modulation formats. The PSA series offers powerful, format-based digital modulation analysis with one-button measurement setups in a growing variety of optional measurement personalities. The following list of personalities will evolve as wireless technologies grow:

- W-CDMA
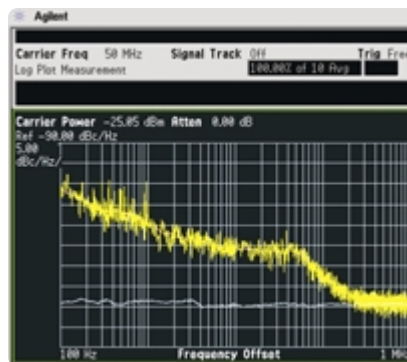- GSM with EDGE
- cdma2000
- 1xEV-DO
- cdmaOne
- NADC, PDC

EDGE power versus time

W-CDMA code domain analysis

Phase noise measurement personality

Visualize the behavior of phase noise with this optional measurement personality. Phase noise measurements are made quickly and easily with uncompromising accuracy, sensitivity, reliability and repeatability.


Phase noise log plot measurement

High-performance spectrum analysis

The PSA series has great specifications to provide wide dynamic range.

- displayed average noise level (DANL) of -154 dBm (-169 dBm with optional preamplifier)
- third order intercept (TOI) of +17 dBm (+19 dBm typical)
- maximum third order dynamic range of 114 dB
- > 110 dB of calibrated log display range
- 1 dB compression point at +3 dBm (+7 dBm nominal)
- 4.1:1 RBW selectivity (nominal)
- excellent phase noise
  - -114 dBc/Hz at 10 kHz offset
  - -144 dBc/Hz at 1 MHz offset
  - -151 dBc/Hz at 10 MHz offset

The new PSA millimeter wave spectrum analyzers (E4446A and E4448A) provide the highest available dynamic range from 26.5 GHz to 50 GHz for emerging communications and aerospace and defense industries.

- widest distortion free 3rd order dynamic range: 95 dB at 44 GHz
- lowest sensitivity: -131 dBm at 44 GHz
- best wide offset phase noise: -130 dBc/Hz (1 MHz offset) at 40 GHz
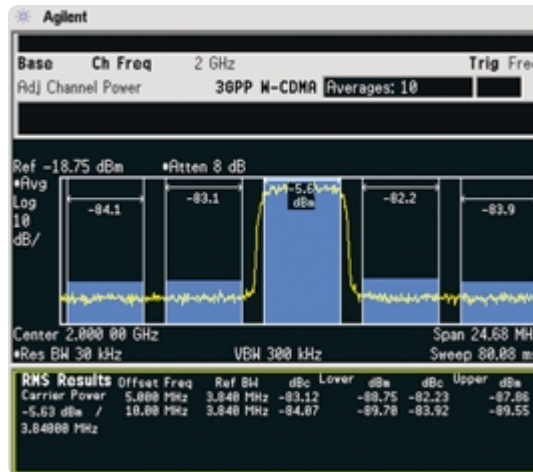
Great specifications are just the starting point for great measurements. The PSA series has the technology to offer unprecedented control over dynamic range, resolution, and speed.

- standard 2 dB step attenuator up to 50 GHz
- 10% resolution bandwidth (RBW) steps (160 RBW settings) from 1 Hz to 8 MHz
- digital IF and ADC with feed forward and autorange capability
  - move marker off the screen and still get accurate results
  - wide log range with accurate measurements anywhere on the display
  - negligible quantization error
  - optional preamplifier with flatness and gain calibrated into measurements

Dynamic range

The above example shows the popular benchmark W-CDMA adjacent channel power (ACP) measurement. Achieve -81 dB (typical) dynamic range with the PSA series using Agilent's unique noise correction algorithm.

Refer to the PSA series product note entitled *Optimizing Dynamic Range for Distortion Measurements,* literature number 5980-3079EN, for more information on dynamic range in the PSA series.

The PSA series achieves unsurpassed accuracy. The specifications that make this possible are:

- absolute amplitude accuracy of ±0.62 dB up to 3 GHz (±0.24 dB, 95% confidence)
- most accurate amplitude measurements above 26.5 GHz: ±3.24 dB at 44 GHz
- frequency response of ±0.38 dB up to 3 GHz (±0.1 dB, typical)
- log amplification linearity of ±0.07 dB
- 0 dB reference level uncertainty

How are these exceptional specifications achieved?

- all-digital IF section that reduces or eliminates errors in RBW uncertainty, log amplifier fidelity, RBW filter sweep effects, RBW switching uncertainty, and IF gain uncertainty
- highly accurate, built-in 50 MHz reference signal
- auto alignment algorithm guarantees accuracy with temperature changes
- fully-calibrated attenuators across frequency and amplitude

With superior linearity, the PSA series of spectrum analyzers makes very precise relative power measurements and provides the resolution necessary to take full advantage of this capability.

For more information on measurement accuracy of the PSA series, see the product note entitled *PSA Series Amplitude Accuracy,* literature number 5980-3080EN.
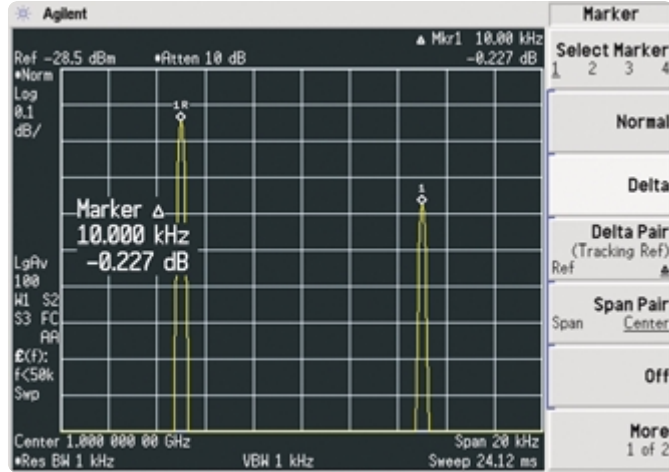
This figure illustrates 0.1 dB/division display resolution, 0.01 dB reference level resolution, and 0.001 marker resolution with averaging.

Amplitude correction
Let the PSA help improve the accuracy of the rest of your test system adding up to four sets of amplitude correction curves versus frequency. Amplitude correction can be used to compensate for gains and losses in cables, antennas, amplifiers, etc.

Accuracy

High-performance spectrum analysis

Take control of measurement setups with the substantial flexibility of the PSA series. Besides the standard 2 dB step attenuator and 160 RBW settings, there are additional features that can improve speed, dynamic range, and data representation.

Swept mode or FFT mode
There are two ways in which the PSA series can perform swept spectrum analysis. The more traditional swept mode measures the power level at each frequency as it is passed through the resolution bandwidth filter. Another method performs a fast Fourier transform (FFT) algorithm on digitized time data to make the measurements. The FFT mode can often reduce the sweep time for measurements with narrow spans and narrow resolution bandwidths. Having both of these methods in one analyzer assures the best possible speed.

Phase noise optimization
The PSA series' local oscillator (LO) phase lock loop configuration can be set to optimize phase noise close to a carrier (below 50 kHz offset), far from a carrier (above 50 kHz offset), or for speed. Optimizing close-in or far-out phase noise performance improves dynamic range.

An array of detectors
The complex signals of today's broadband technology consist of any combination of continuous wave, noise, and modulated signals. Detector modes become important for accurately measuring these different types of signals. The PSA series offers this complete suite of detectors to assure correct measurement results:

- normal
- average (log, rms, voltage)
- peak
- sample
- negative peak

Auto couple
From the novice to the most knowledgeable expert, the PSA makes it easy for anyone to obtain accurate, reliable results from their measurements. Each measurement setting can be automatically determined by the PSA for optimization of speed and dynamic range. For more operator control, flexibility features are easily accessed from a single menu.

Flexibility
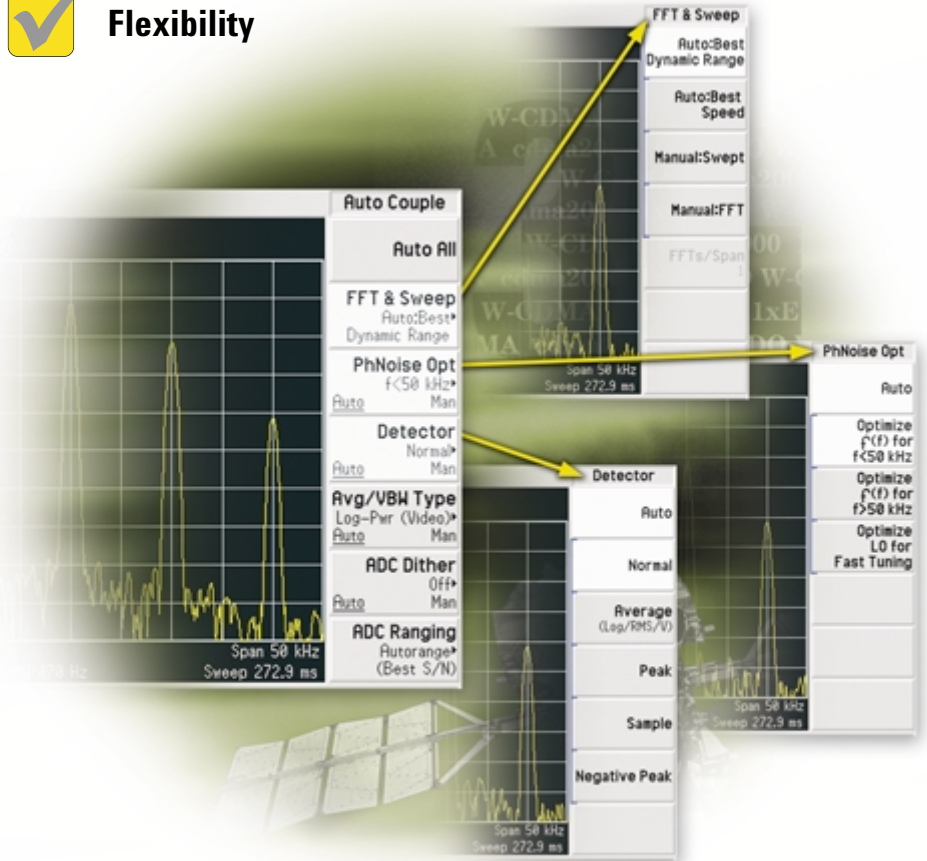
In addition to shorter measurement times in narrow spans with the FFT mode, swept measurements also have remarkable speeds. Because of the all digital IF and excellent sensitivity, the PSA series is able to achieve:

- 1-ms frequency sweep times in swept mode
- 1-µs sweep times in zero span
- local update rate of > 50 measurements per second
- remote operation update rate of > 22 measurements per second
- incredibly fast low-level spur searches
- increased frequency resolution without increased sweep times, 101 to 8192 sweep points
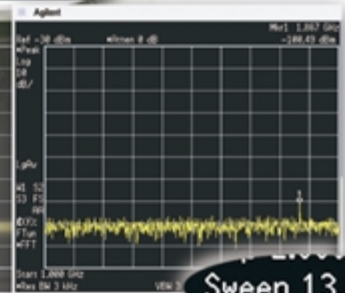
Speed

Traditional swept measurement
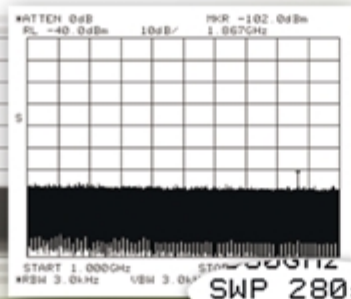
Compared to older generations of spectrum analyzers, the PSA series makes this low-level spur search measurement over twice as fast in swept mode and over 20 times faster in FFT mode.

SWP 280sec

PSA series swept measurement

Sweep 134 s

Sweep 13.4 s

PSA series FFT algorithm measurement

PowerSuite:
The power to realize

Making broadband signal measurements simple and intuitive requires unique spectrum analyzer measurement capability. The PSA series offers a comprehensive suite of flexible, one-button RF and microwave power measurements with wireless format-based setups. PowerSuite is a standard tool set included in every PSA series spectrum analyzer.

PowerSuite measurements:

- channel power
- occupied bandwidth
- adjacent channel power (with multiple offsets)
- multi-carrier power/12-carrier ACP
- power statistics (CCDF)
- harmonic distortion
- burst power
- third order intercept (TOI)
- spurious emissions
- spectrum emission mask

Standards-based formats:

- cdmaOne (IS-95)
- cdmaOne (J-STD-008)
- NADC
- GSM/EDGE
- 3GPP W-CDMA
- cdma2000 SR1
- cdma2000 SR3-MC
- cdma2000 SR3-DS
- PDC
- Bluetooth™
- TETRA
- 802.11a
- 802.11b
- HiperLAN/2
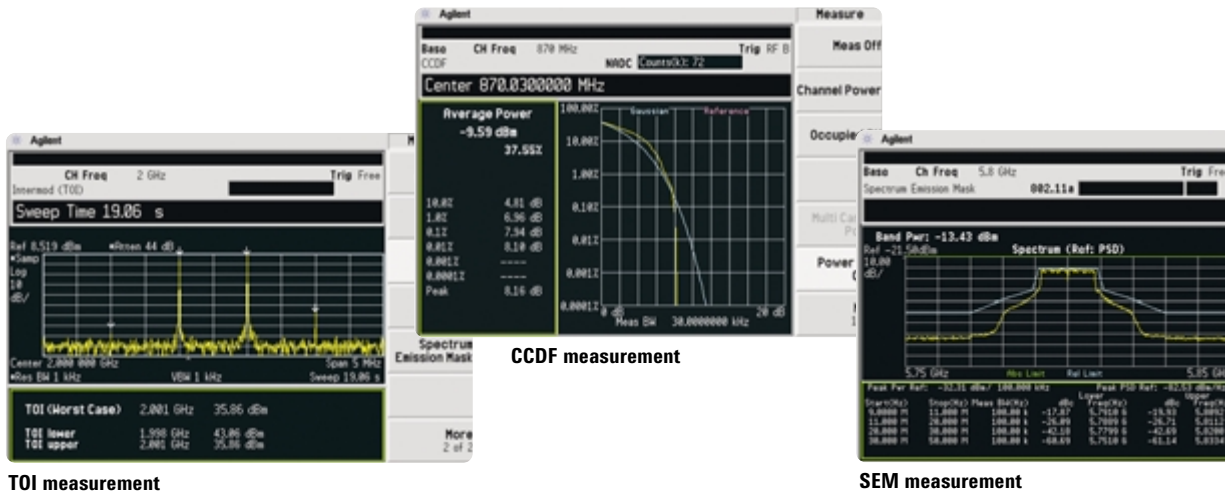
TOI measurement

CCDF measurement

SEM measurement

Phase noise measurement personality (Option 226)

An optional, built-in measurement personality consolidates advanced spectrum analysis capability and phase noise measurements into a single oscillator test. This flexible tool can quickly and easily generate plots of phase noise in dBc/Hz versus log offset frequency or measure jitter or make continuous spot frequency phase noise measurements.
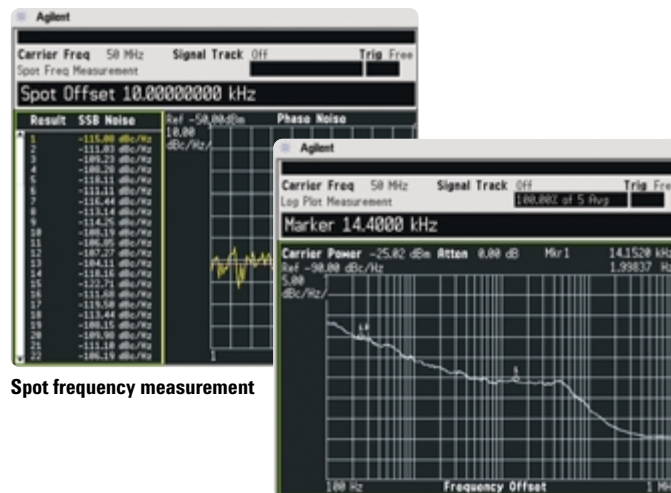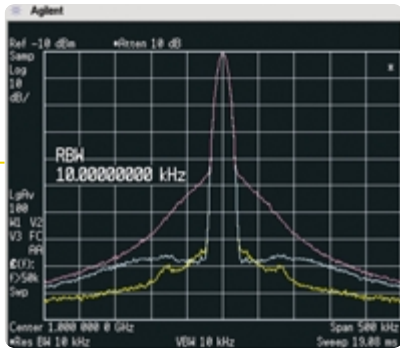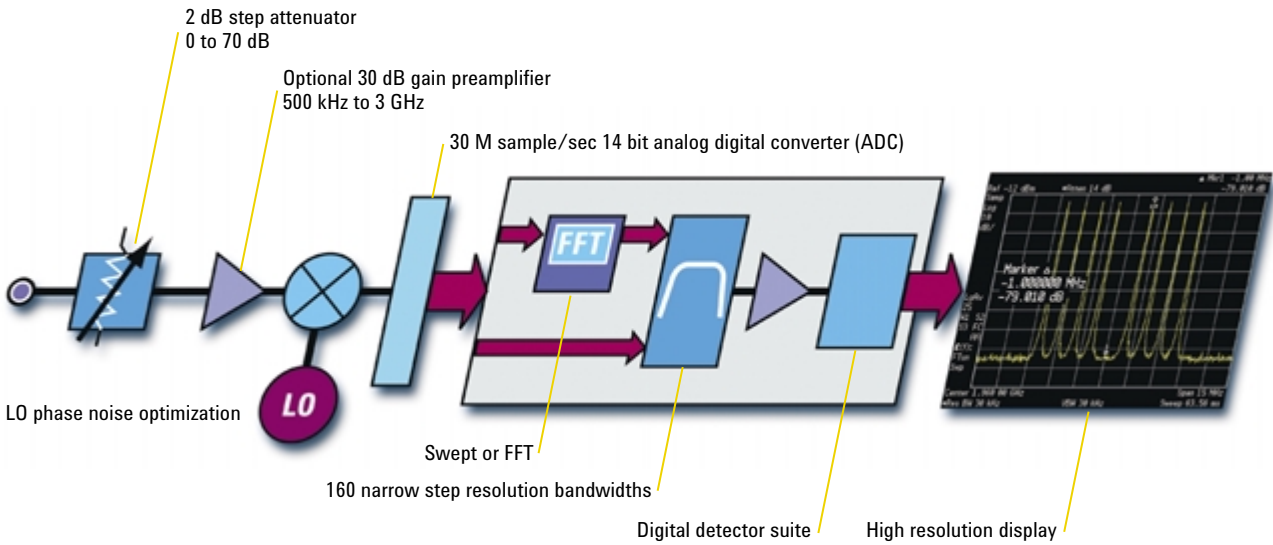

Spot frequency measurement
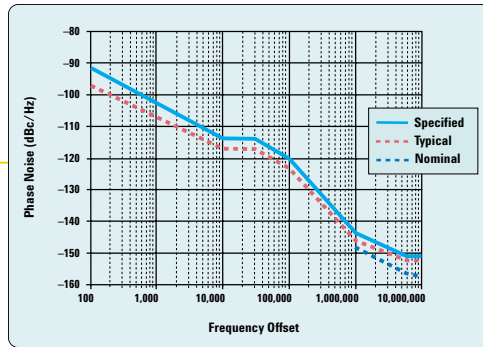

Phase noise versus offset frequency

A spectrum analyzer with a digital brain

Agilent PSA series block diagram

2 dB step attenuator
0 to 70 dB

Optional 30 dB gain preamplifier
500 kHz to 3 GHz

30 M sample/sec 14 bit analog digital converter (ADC)

LO phase noise optimization

Swept or FFT

160 narrow step resolution bandwidths

Digital detector suite

High resolution display

Comparison of phase noise optimization for fast tuning, for > 50 MHz, and for < 50 MHz
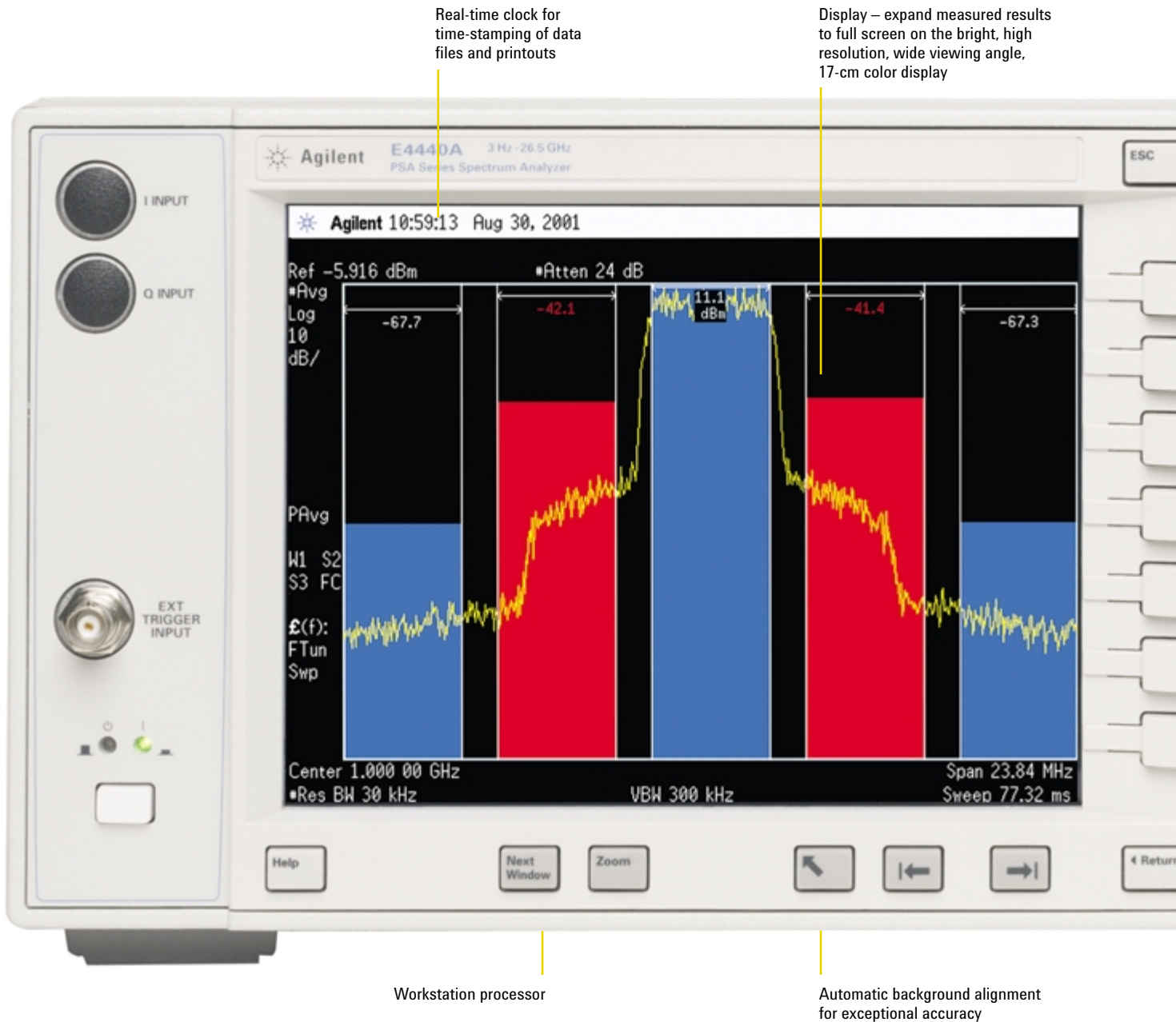

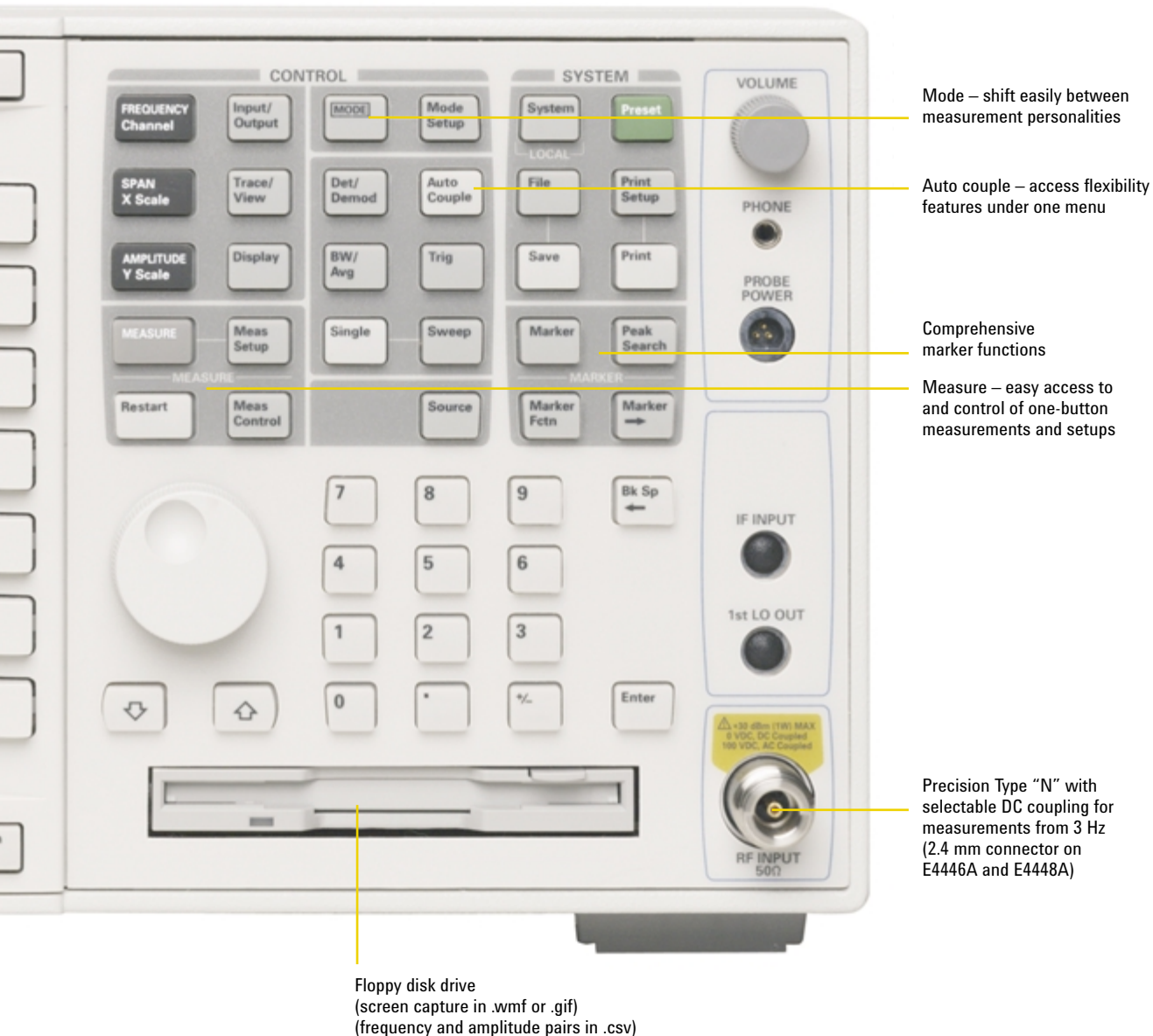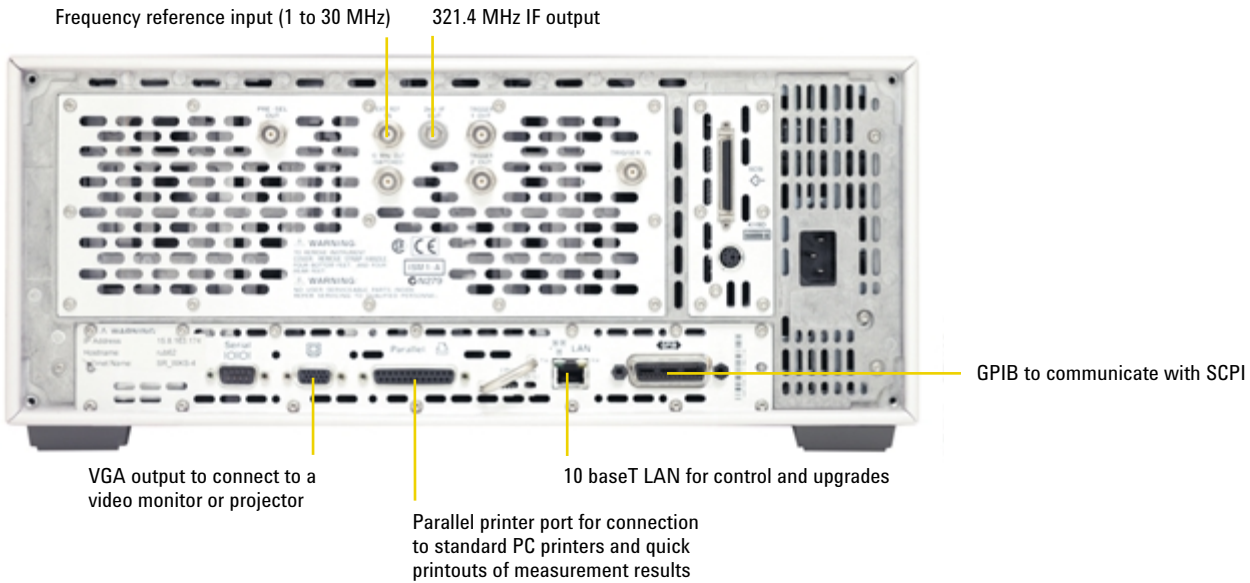**PSA series phase noise performance plot (1 GHz center frequency)**

The Agilent PSA series features an all-digital implementation of a swept spectrum analyzer IF section. This innovation is responsible for faster sweep speeds, narrow steps in resolution bandwidth, high linearity in log amplification, versatile detector modes, and high display resolution. Digital signal processing (DSP) also enables the analyzer's FFT and digital demodulation capabilities.

To learn more about DSP and other technology innovations of the Agilent PSA series, refer to our product note entitled *PSA Series Measurement Innovations and Benefits*, literature number 5980-3082EN.

Truly user friendly

The PSA series has a simple and intuitive user interface. The display is large and bright with effective use of colors. Front panel hard keys perform frequently used functions and provide access to menus. Soft keys on the display are organized for quick and easy navigation. One-button set-ups are provided for many measurements.

Real-time clock for time-stamping of data files and printouts

Display — expand measured results to full screen on the bright, high resolution, wide viewing angle, 17-cm color display

Workstation processor

Automatic background alignment for exceptional accuracy

Frequency reference input (1 to 30 MHz)   321.4 MHz IF output

GPIB to communicate with SCPI

VGA output to connect to a
video monitor or projector

10 baseT LAN for control and upgrades

Parallel printer port for connection
to standard PC printers and quick
printouts of measurement results

Mode – shift easily between
measurement personalities

Auto couple – access flexibility
features under one menu

Comprehensive
marker functions

Measure – easy access to
and control of one-button
measurements and setups

Precision Type "N" with
selectable DC coupling for
measurements from 3 Hz
(2.4 mm connector on
E4446A and E4448A)

Floppy disk drive
(screen capture in .wmf or .gif)
(frequency and amplitude pairs in .csv)

Modulation analysis

The wireless communications industry has stringent requirements on standards compliance. Agilent provides measurement personalities that simplify standards testing with one-button format-based measurements. Since this is the fourth generation of cellular communications personalities in our instruments, it has given us the opportunity to incorporate customer feedback to include feature, performance, and usability enhancements.

- offers the most complete standards-based modulation analysis available in a spectrum analyzer today
- supports both base station and mobile device testing
- complex algorithms executed with a single button press
- provides easy to read pass/fail indicators with operator independent results

Digital demodulation hardware (Option B7J)

This option is required for all the cellular communications measurement personalities. It supplies a 1 dB electronic step attenuator for automatic optimization of speed and dynamic range and the basic measurement personality that provides spectrum and waveform analysis and I/Q pairs (10 MHz, 3 dB bandwidth) over GPIB or LAN.

Flexible modulation analysis with Agilent 89601A vector signal analysis software

Embrace the power of flexible modulation analysis by linking the PSA to the 89601A vector signal analysis software. For frequencies up to 3 GHz, the PSA can serve as a front-end receiver for use with the 89601A. This software provides flexible tools for demodulating and analyzing even the most advanced digital formats whether or not they are defined by an established standard. Features include variable block size signal acquisition with user-selectable pulse search and synch words and a user-controllable adaptive equalizer.
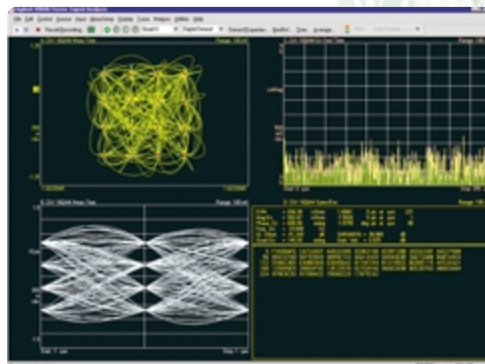

Agilent 89601A vector signal analysis software

Cellular communications measurement personalities

NADC and PDC (Option BAE)

Both the North American Digital Cellular (NADC) and Personal Digital Cellular (PDC) measurement personalities are included in this option. The NADC measurements are structured according to the IS-136 TDMA standard. Measurements included in this option are:

- adjacent channel power (ACP)
- error vector magnitude (EVM)
- occupied bandwidth (for PDC)
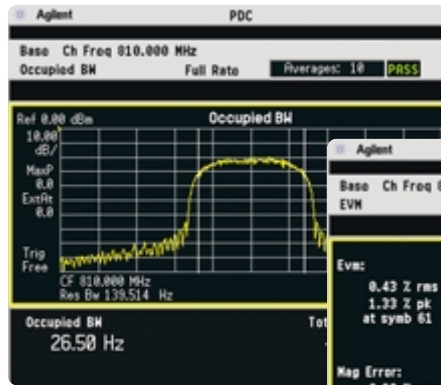
PDC occupied bandwidth
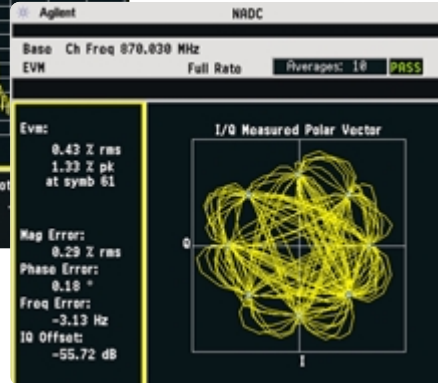
NADC EVM

cdmaOne (Option BAC)

Built on Agilent's pioneering efforts in CDMA measurement techniques, this personality provides quick and easy measurement set-ups for the TIA/EIA/IS-95 standards.

- modulation accuracy (rho)
- code domain analysis
- channel power
- adjacent channel power ratio (ACPR)
- close-in spurious

This personality features PN (pseudo-noise sequence) search, time offset, and carrier feed-through analysis.
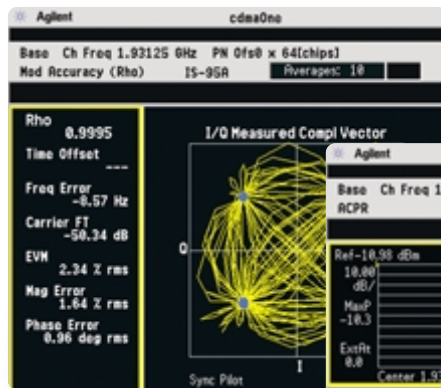
**cdmaOne modulation accuracy**
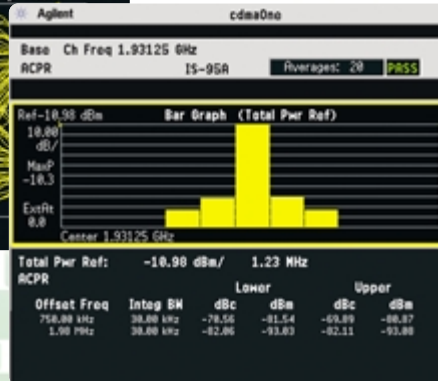
cdmaOne ACPR

GSM with EDGE (Option 202)

This option includes both Global
System for Mobile Communications
(GSM) and Enhanced Data Rates
for GSM Evolution (EDGE)
measurements. The following
are quick, easy to make, and
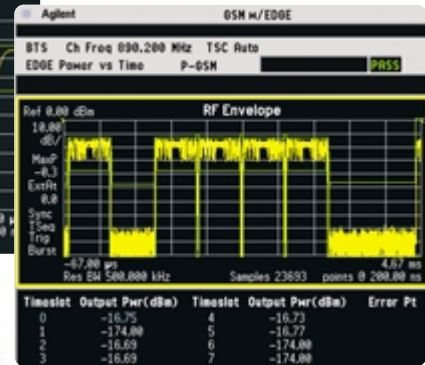standards compliant:

Measurements:

- transmit power
- power versus time (PvT)
- phase and frequency error
- EDGE EVM
- output RF spectrum (ORFS)
- transmitter band spurious

The GSM personality features
multi-slot PvT and flexible
representation of rise and fall times.
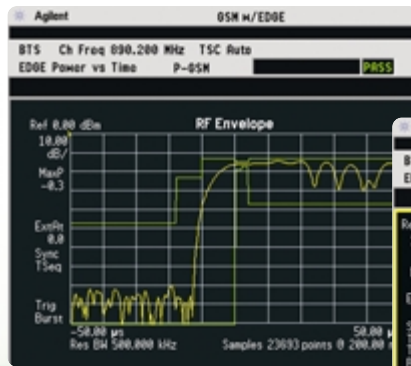

EDGE power versus time

EDGE multi-slot power versus time

W-CDMA (Option BAF)

The complexity of W-CDMA
demands the flexibility and depth of
demodulation capability provided by
this personality. Perform the
following measurements on the
HPSK uplink or downlink QPSK
signals:

- code domain analysis
- QPSK EVM
- modulation accuracy (composite
  rho and EVM)
- channel power
- adjacent channel power leakage
  ratio (ACLR)
- intermodulation distortion
- multi-carrier power
- spectrum emission mask
- occupied bandwidth
- CCDF

This personality has the ability to
automatically determine active
channels, to synchronize with any
W-CDMA channel, to display code
domain power in a multi-rate view,
and to demodulate down to the
symbol level. Variable capture
intervals and pre-defined test
models enable the user to perform
fast, accurate measurements for
manufacturing or in-depth analysis
for R&D.
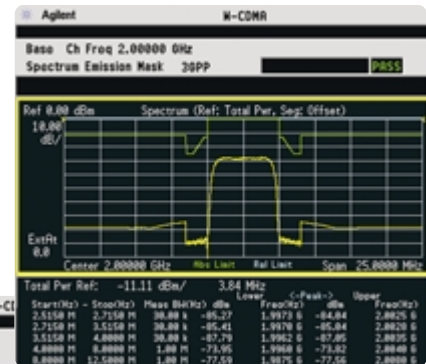
**W-CDMA spectrum
emission mask**
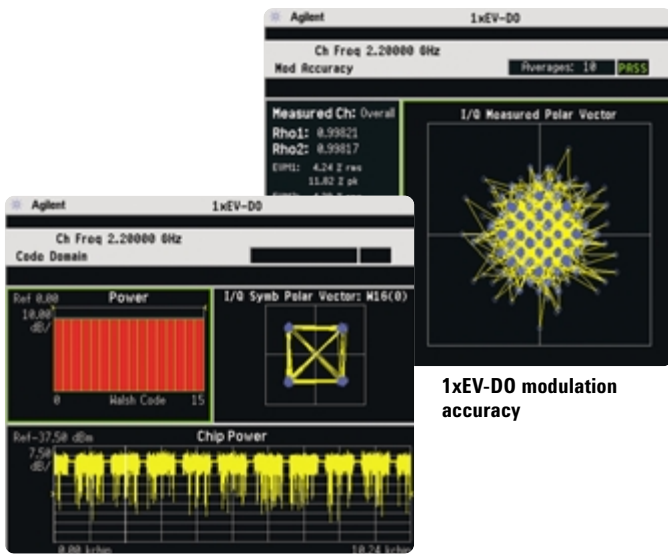
W-CDMA codedomain analysis

1xEV-DO modulation accuracy

1xEV-DO code domain analysis

cdma2000 QPSK EVM

cdma2000 CCDF

1xEV-DO (Option 204)

The evolution to cdma2000 with 1xEV-DO introduces unique measurement capability. The following measurements are based on TIA/EIA/IS-2000.2 standards and are available for the forward link signals:

- code domain power
- modulation accuracy (composite rho)
- QPSK EVM
- PvT
- channel power
- intermodulation distortion
- spurious emissions and ACP
- occupied bandwidth
- CCDF

PvT, spurious emissions and ACP support idle and active slots, with the flexibility for auto burst search without a time gated sweep. In addition, code domain analysis, modulation accuracy, and QPSK EVM can measure pilot, MAC, and data channels in QPSK, 8PSK, and 16QAM.

cdma2000 (Option B78)

The cdma2000 measurement personality offers the logical upgrade path from IS-95 to IS-2000 testing. Measurements support the forward and reverse links.

- code domain analysis
- QPSK EVM
- modulation accuracy (composite rho and EVM)
- channel power
- adjacent channel power ratio
- intermodulation distortion
- spectrum emission mask
- occupied bandwidth
- CCDF

Advanced code domain analysis algorithms display Walsh codes for either Hadamard or OVSF coding schemes in a multi-rate view. Other capability includes code domain power error, symbol EVM, symbol power versus time, active channel identification, variable PN offset, quasi-orthogonal functions and demodulated symbol bit displays after de-spreading.
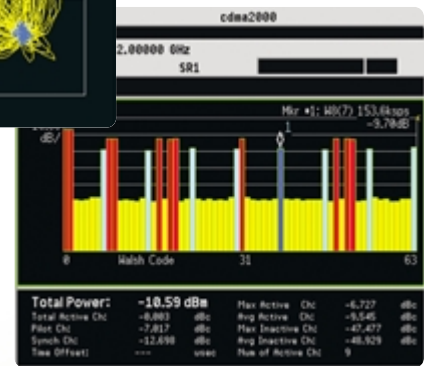
Practical Solutions

Design efficiently and with confidence

To promote productivity in research and development, test and measurement tools must be flexible, thorough, and easy to use. Troubleshooting and design verification can be expedited and simplified with the PSA series spectrum analyzers. With this one tool, it is easy to optimize setups for unique spectrum measurements, to customize advanced power measurements for modulated signals, and to dive down to the bit level using the digital demodulation personalities.

Essential to design verification is having confidence in measurement results. Understanding the importance of this, Agilent makes measurement integrity its highest priority. We provide guaranteed technical specifications to a set performance level on which you can depend.

Increase and maintain manufacturing throughput

From high-volume automated testing of cellular base stations to manually tuning oscillators, the PSA series optimizes manufacturing throughput on many levels.

Increased throughput – Fast sweeps and update rates reduce automated test times. Manual tests are accelerated by one-button setups and fewer required button presses per measurement. The PSA series shifts easily between measurement personalities, minimizing changeover time and accelerating troubleshooting.

Improved yields – Excellent specifications reduce measurement uncertainty to allow for narrower test margins and improved yields. Sophisticated algorithms constantly monitor analyzer conditions and determine when internal background alignment is required.

One analyzer, many solutions – Using only 177mm (seven inches) of rack space, the PSA series is packed with features. Superior accuracy and linearity may eliminate the need for a power meter. Cellular communications measurement personalities give it digital demodulation capability. The phase noise personality transforms it to a phase noise tester. The feature list is long and will continue to grow.

Performance verification and adjustment software for instrument calibration

This software allows fast and accurate testing of PSA spectrum analyzers and provides ANSI Z540 compliant test reports. It runs on a PC platform running Windows® 95/98 or NT 4.0 and uses a standard calibration platform to help minimize calibration run time and operator involvement.

The PSA series simplifies multi-carrier power amplifier (MCPA) testing with in-channel, adjacent channel, and out-of-band measurements in one analyzer.
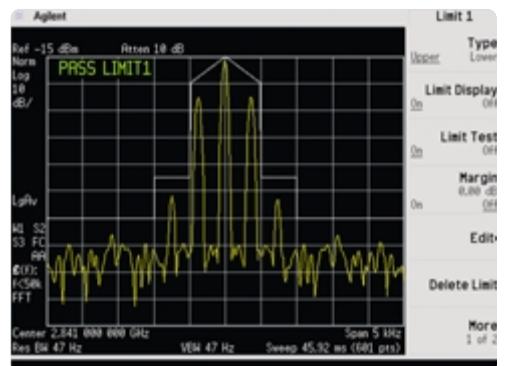
Customize limit lines for pass/fail testing.

Connect

The PSA series has built-in capability to network with PCs, printers, and software programs. Standard connectivity features include:

- VXI*plug&play* drivers for Agilent VEE, National Instrument's LabView, and LabWindows to develop measurement routines, create new measurements, and collect results
- IntuiLink software for easy transfer of measurement results into Microsoft® Excel and Word

- floppy drive to store display screens in Windows® Metafile (.wmf) or bitmap (.gif) formats or to save trace data as a comma separated variable (.csv) file to export to spread sheets or Agilent Advanced Design System (ADS) design software
- GPIB and 10 baseT LAN for automated control and remote operation
- SCPI programmable
- code compatibility with the HP 8566B/8568B spectrum analyzers (Option 266)
- parallel port for printing

BenchLink Web Remote, Agilent's web-based remote control software (Option 230), used to control analyzer functions, record and evaluate data, and view signals in real time, remotely anywhere in the world over the Web. Connecting the PSA lets you use the power of a PC to acquire measurement data and analyze it further. Agilent's Connectivity Suites and products will enable you to make fast, easy instrument connections and create test programs based on the power of Microsoft Visual Studio.NET.

For more information, please visit

www.agilent.com/find/connectivity
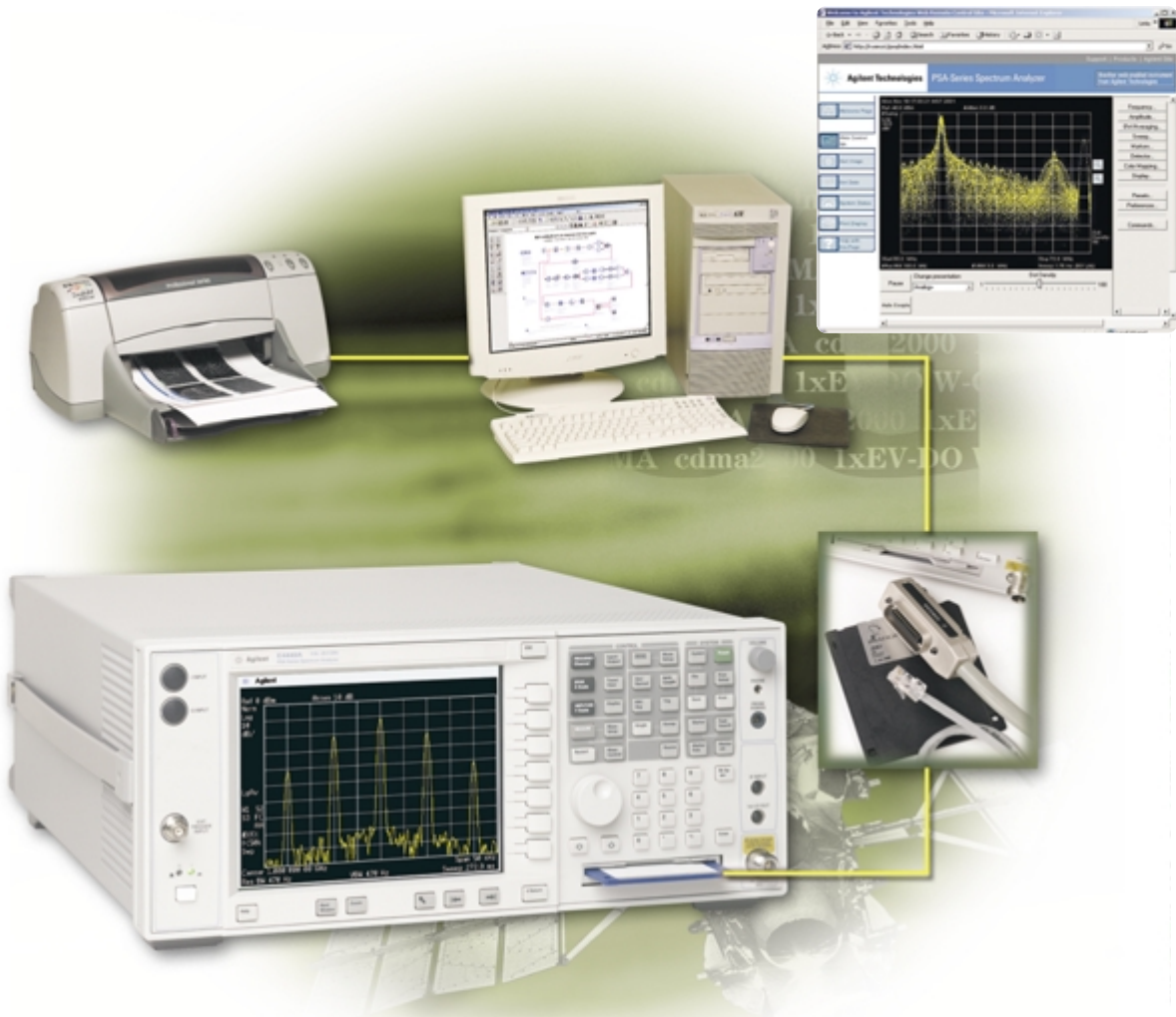
Service and support

The performance and flexibility of the PSA series spectrum analyzer is only a small part of what is available from Agilent Technologies. In a constantly changing environment, Agilent's ability to understand your business needs and quickly provide the latest end-to-end service and support solutions gives the certainty and confidence necessary to accelerate the development and deployment of winning technologies.

Support solutions

Use Agilent's support solutions to get more from the PSA, as well as other test equipment, by increasing productivity and maximizing uptime. Our programs are designed with flexibility and can be tailored to meet your needs, including costs and response times.

Repair services ensure that the instrument is up and running as quickly as possible. The PSA comes with a 3-year return-to-Agilent warranty. Additional repair options are available at the time of purchase.

Calibration services guarantee measurement confidence in PSA. Choose return-to-Agilent or on-site service and order the service as needed or on a regularly scheduled basis.

Volume On-site Calibration (VOSCAL) service minimizes instrument downtime and associated costs by delivering quality calibration on-site without interfering with output schedules. VOSCAL is a fully operational, high-quality mobile calibration laboratory complete with high-specification systems and automation.

System uptime services provide Agilent's global resources and expertise to help prevent system failures and develop solutions to problems fast. Our system up-time teams are comprised of our best service specialists to keep systems up and running.

Equipment management services assist in managing test and measurement assets. Agilent's global equipment management solution helps maximize the utilization and reduce the ownership cost of test equipment.

For more information on Agilent support solutions visit:

www.agilent.com/find/tm_services

Knowledge services

Our goal at Agilent is to provide the key resources that will help you build the comprehensive solutions to stay competitive. Agilent's knowledge services are the best in the business and encompass a wide range of solutions designed with your goals in mind.

Technical consulting provides the required technical expertise to complete and implement specific test strategies.

Process consulting helps to integrate new R&D or manufacturing test processes and technology into your current environment.

Enterprise business consulting provides business-planning services focused on enterprise-wide test issues.

Training and education gives access to our depth of product expertise and helps keep you abreast of emerging technologies. Encompassing technology training, product training, measurement fundamentals and applications training, our classes can be delivered on-site or at an Agilent Training Center.

For more information on Agilent education and training visit:

www.agilent.com/find/education

Key specifications[1]

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

Speed

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

Resolution

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
	-117 dBc/Hz (typical)	-117 dBc/Hz (typical)
1 MHz offset	-144 dBc/Hz	-144 dBc/Hz
	-148 dBc/Hz (nominal)	-148 dBc/Hz (nominal)
10 MHz offset	-151 dBc/Hz	-151 dBc/Hz
	-157 dBc/Hz (nominal)	-157 dBc/Hz (nominal)
Residual FM	$< (1\ Hz \times N^2)$ p-p in 1 s	$< (1\ Hz \times N^2)$ p-p in 1 s

Dynamic range

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)

Accuracy

Absolute amplitude accuracy	±(0.24 dB + frequency response)	±(0.24 dB + frequency response)
	±(0.06 dB + frequency response), (typical)	±(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	$\pm 0.2\% + \dfrac{span}{sweep\ points - 1}$	$\pm 0.2\% + \dfrac{span}{sweep\ points - 1}$
ACPR, W-CDMA accuracy (5 MHz offset)		
Mobile station	±0.12 dB	±0.12 dB
Base station	±0.22 dB	±0.22 dB

Warranty	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.
3. Options not available in all countries.

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)

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

Amplifiers
E444xA-1DS   100 kHz to 3 GHz built-in preamplifier

Inputs and outputs
E4440A-BAB   Replaces type "N" input connector with APC 3.5 connector

Connectivity software
E444xA-230   BenchLink Web Remote Control Software

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

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

Calibration documentation
E444xA-UK6   Commercial calibration certificate with test data

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

Calibration[3]
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-OBW	Service manual and calibration software

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 5988–6208EN

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, 5988-2925EN

BenchLink Web Remote Control Softeware, 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

For more information on the PSA series, please visit:

www.agilent.com/find/psa

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