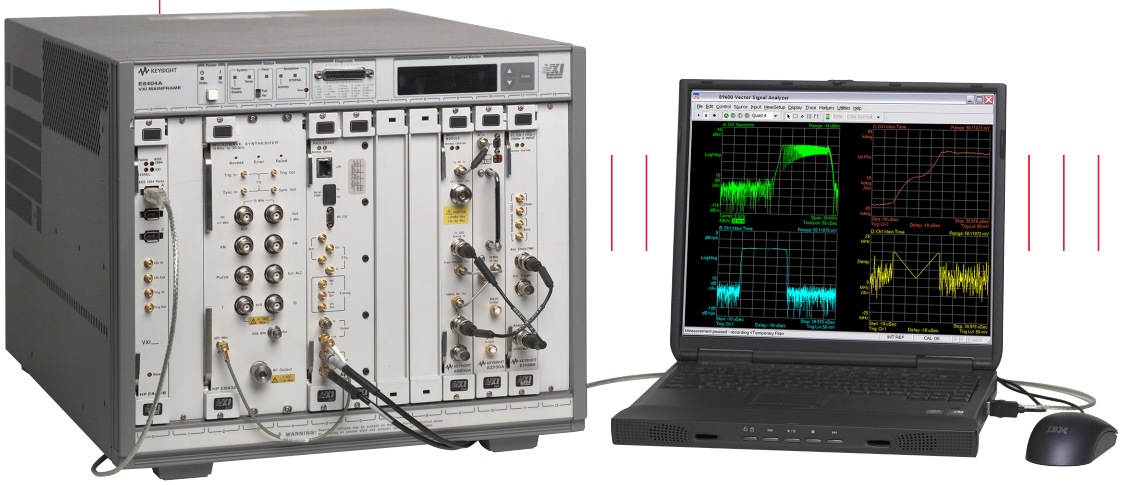
Keysight Technologies
N7501A
Signal Simulation and Processing System

Technical Overview



KEYSIGHT TECHNOLOGIES

Introduction

A faster path to generating and analyzing challenging signals

The Keysight Technologies, Inc.N7500 Series custom signal simulation and processing systems offer the flexibility and performance you need for today's complex signal environments. For applications such as radar systems, satellite communications and terrestrial microwave radio for broadband wireless access, N7500 Series systems provide a path to success.

N7500 Series systems require less custom engineering because they incorporate standard commercial test equipment, which means you can generate and analyze challenging signals more quickly and with a smaller budget. Key system building blocks include Keysight VXI synthesizers and baseband processors (see pages 5 and 6 for details).

N7500 Series custom systems are available in various configurations tailored to your unique requirements, and they typically include engineering and support services in addition to the system hardware and software. Keysight engineering professionals ensure your system is successfully implemented, from initial design through customer acceptance. The system team is supported by Keysight's signal-generation and measurement experts, who ensure your system takes full advantage of Keysight's in-depth measurement knowledge and real-world signals experience.

The Keysight N7501A is an example system that demonstrates some of the advantages of using Keysight custom signal simulation and processing systems. The N7501A covers the 10 MHz to 20 GHz frequency range with 80 MHz signal bandwidth. Systems in different frequency ranges and different bandwidths are also available.

N7501 System Benefits

Fast throughput

The system can switch frequency and power in less that 350 µs, typically less than 150 µs.

System architecture

System architecture is optimized for fast response to computer commands. You can put new complex communication signals online in less than 100 ms. Loop-back capability built into the baseband processor enables the system to perform a calibration in less than 30 seconds.

Modulation flexibility

In addition to AM/FM/pulse, the system offers I/Q modulation like a vector signal generator, as well as IF modulation that gets upconverted onto the microwave signal. You can combine all modulation modes for utmost flexibility.

Scaleability

Sources and receivers feature a modular VXI form factor, so multiple-channel configurations are straight-forward.

Adaptability to changing needs

As your needs change, the N7501A system is designed to adapt to meet them. You can add new equipment, new signals and new capabilities with minimal disruption to work flow.

N7501A System Overview

The N7501A is a combination of high-performance instruments, system-engineered for optimum capability in complex signal applications.

Signal modulation types

Signal modulation types supported by the N7501A system include AM, FM, ϕM, Pulse, QAM, PSK, MSK, FSK, and custom I/Q.

System software

Keysight's tool kit of preconfigured software routines helps our software experts quickly create the custom software you need for your application. Keysight programmers can work in most of the commonly used software environments to meet your needs.

Applications

The N7501A can be used in a wide variety of advanced signal simulation and signal processing applications, including the following:

- Stimulus/response testing with digitally modulated signals, including spectral regrowth and error vector magnitude (EVM)
- Vector signal analysis, power-level measuring, and frequency counting
- Broadband receiver testing, eg. bit error rate (BER)
- Radar simulation, including Barker-codes and chirps
- Signal calibration
- Wireless signal frequency monitoring/impairment, including GSM, CDMA, TDMA, PDC, WCDMA, cordless phones, DECT/N-PCS, D900SS, PHS/DCS/PCS

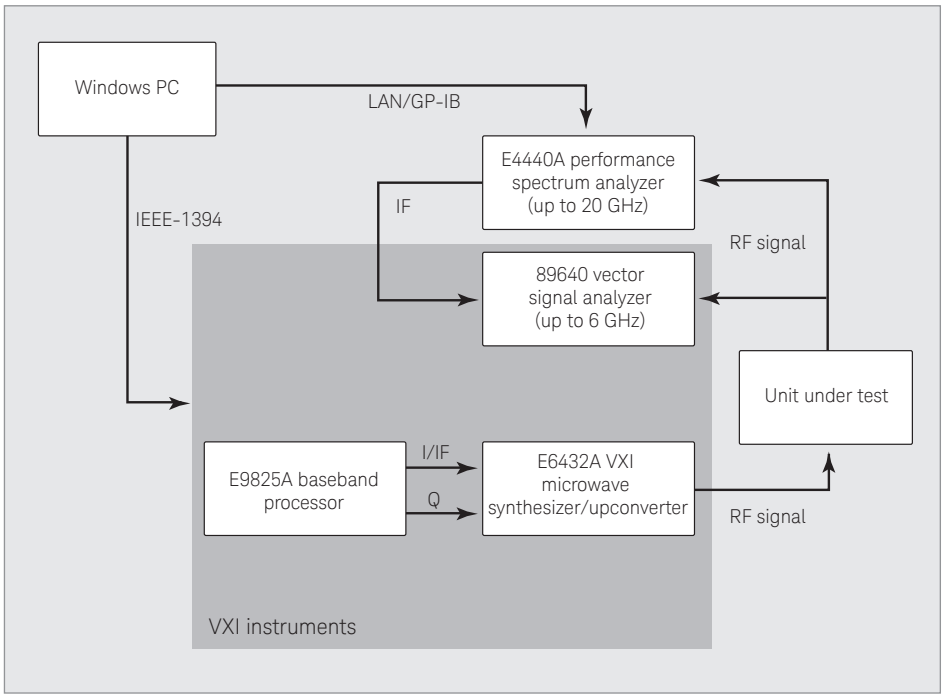
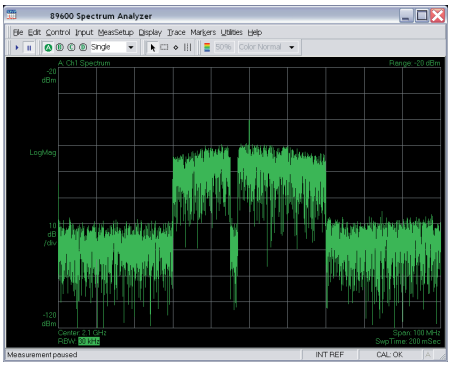


Figure 1. N7501A block diagram

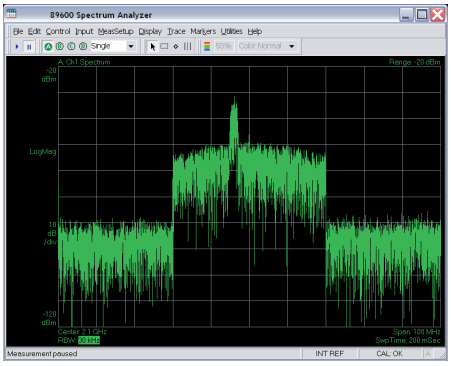
Sample Applications

Some example applications of the N7501A are shown in the following screenshots.

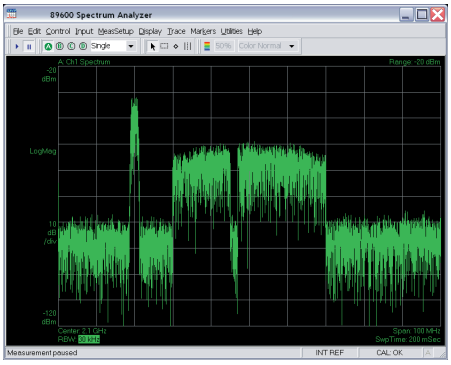
NPR waveform plus comms signal



You can generate a noise power ratio signal with a notch using an arbitrary waveform generator and the I-Q modulation of the E6432A VXI microwave synthesizer.



A comms signal is added into the notch using the E9825A VXI digital baseband processor and the IF modulation of the E6432A. Signals are combined without any calculations.



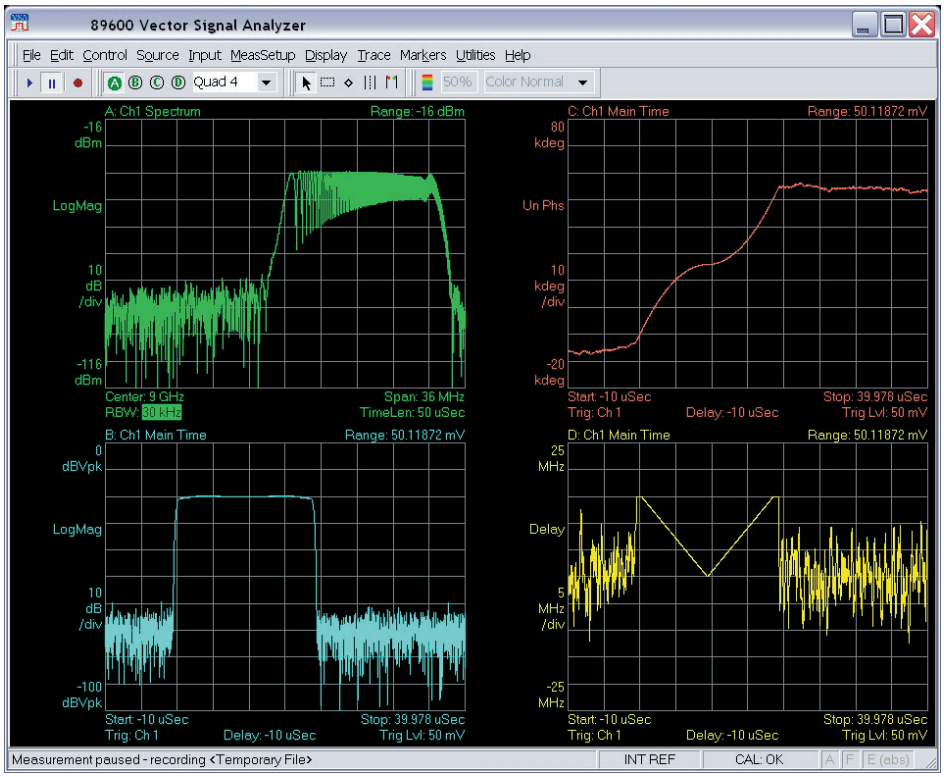
The comms signal is moved outside the noise. Again, no recalculations are required.

Chirp radar signal generation

You can generate a chirp radar signal using the E9825A and the I-Q modulation capability of the E6432A, and then analyze it using the 89640 vector signal analyzer.

Other applications

The N7501A is very flexible and it is possible to use it for many applications, including Barker-coded radar signals, and a wide variety of communications signals.



Key Building Blocks

E6432A VXI microwave synthesizer

The following building blocks can be used as part of an N7501A system. Depending on your requirements, other building blocks can be used to supplement these capabilities. You can obtain many of the key specifications of an N7501A system from the specifications of the key building blocks. A summary of the characteristics for the E6432A described at right.

Characteristics

The E6432A is a robust 3-slot VXI module for demanding microwave applications. It has the following characteristics:

- 10 MHz to 20 GHz frequency range
- Output power -90 to +20 dBm
- 1 Hz frequency resolution
- AM, FM and pulse modulators standard
- I/Q inputs (40 MHz BW) and
- 300 MHz IF input (120 MHz BW)
- Frequency switch and settling <350 µs, typically <150 µs
- Power-only switching in <80 µs (not including attenuator)
- 3-slot VXI module
- VXI register-based programming
- Hardware and software interfaces optimized for systems

Key Building Blocks (Continued)

E9825A VXI digital baseband processor

Characteristics

Generate and analyze challenging baseband signals with the E9825A, a powerful, real-time baseband processor building block for system solutions. This double-slot-width C-size VXI module includes two analog inputs, two analog outputs, and digital hardware capable of continuous signal processing. The module offers the following unique capabilities to make your signal simulation and processing development tasks simpler:

- Two 40-MHz bandwidth channels, one I and the other Q, for a total 80-MHz I/Q bandwidth
- Broadband real-time modulation and demodulation
- Concurrent transmit and receive processing with tight synchronization capability
- Modulation: IQ, 50/300 MHz IF
- Precision calibration with real time corrections
- Arbitrary sample rate and filter shape
- ASIC-based 21-bit, 100 MHz real-time processing
- Full-bandwidth decimation and down conversion (real time)
- Vector signal analysis (VSA) measurement capabilities and source with software configurable signal characteristics (under development)

Note: The E9825A is a building block for custom systems, and cannot be ordered as a standard standalone product. Please contact your Keysight sales representative for more information.

System specifications

Your system specifications will be dependent on system configuration, including the building blocks you chose and your specific requirements.

Ordering information

Contact your Keysight representative

Related literature

Publication	Description	Literature number
Keysight E6432A VXI Microwave Synthesizer	Technical specification	5968-1242E

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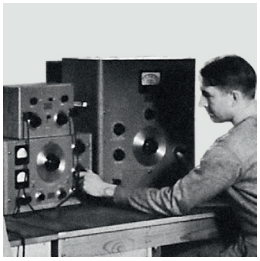

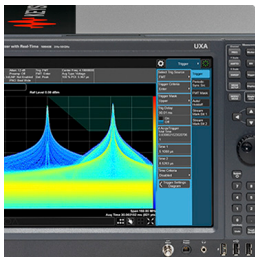

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