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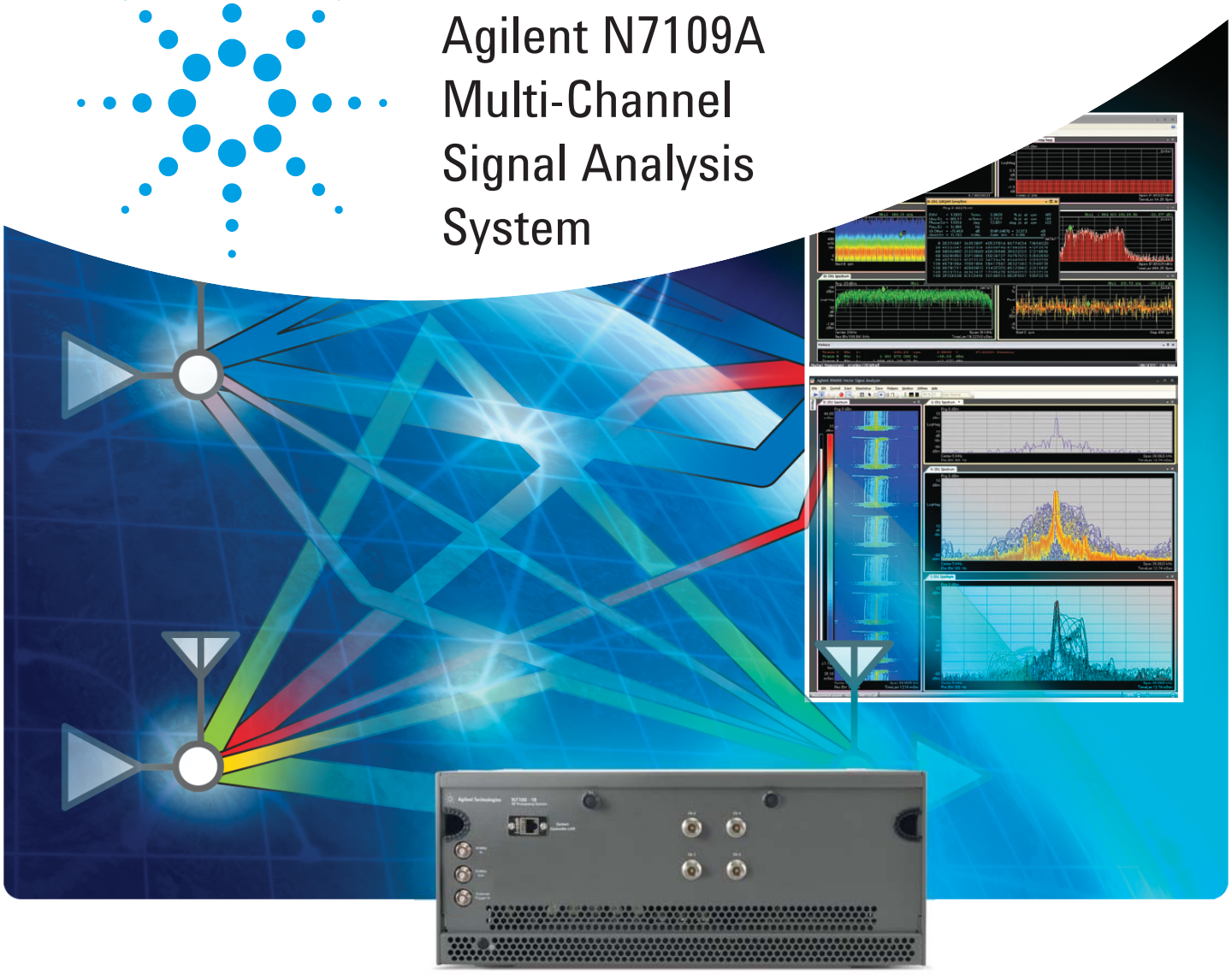
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Agilent N7109A Multi-Channel Signal Analysis System



Adapt as MIMO testing evolves

In the development of next-generation wireless technologies, MIMO measurements are becoming an essential part of every R&D engineer's toolkit. From 802.11n to LTE-Advanced and beyond, the Agilent N7109A multi-channel signal analysis system provides excellent MIMO RF performance at attractive price points for two- and four-channel systems.

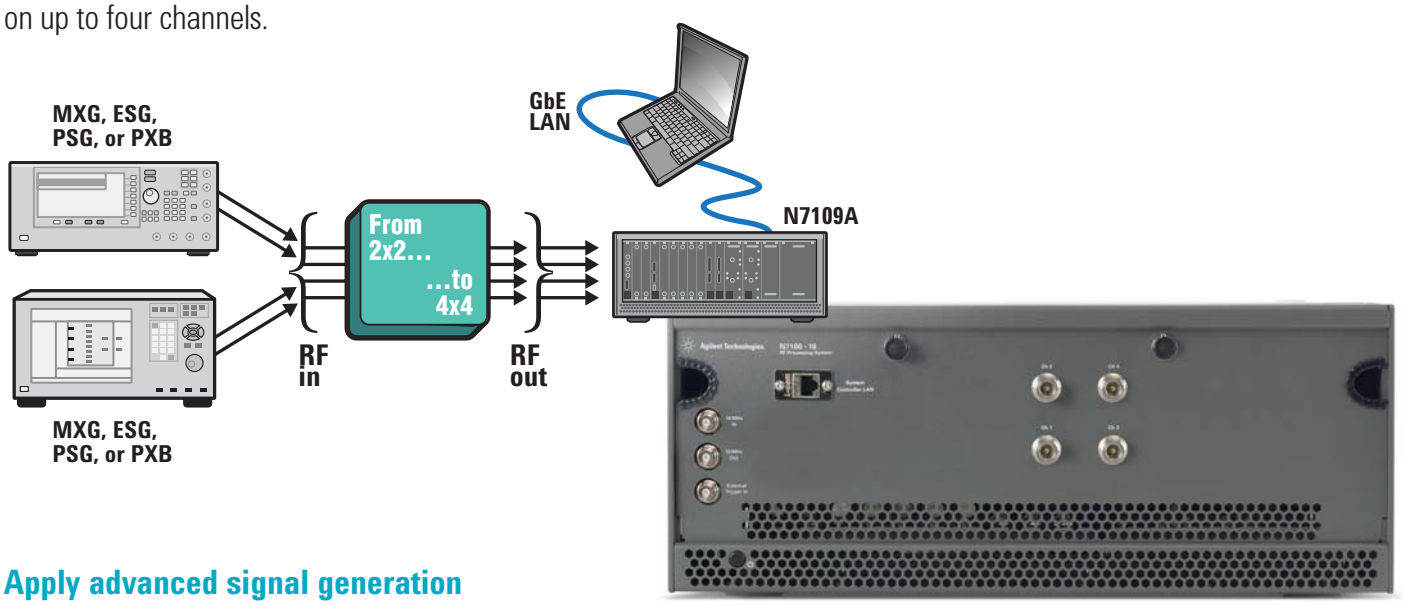
The N7109A combines modular N7100 Series measurement hardware with the MIMO capabilities of the industry-leading Agilent 89600B vector signal analysis (VSA) software. The system enables fast, informative measurements of devices that range from 2x2 to 4x4—and leaves room for future evolution beyond four channels.

Agilent Technologies

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Make MIMO measurements from 2x2 to 4x4

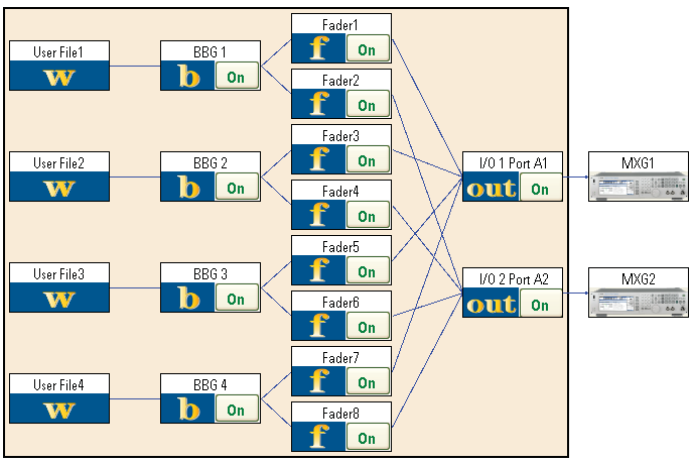
The basic measurement configuration is shown in the diagram below. One or two vector signal generators provide inputs to the MIMO device-under-test (DUT) and an N7109A with two or four channels measures the outputs. The 89600B VSA software runs on the host PC, providing simultaneous signal acquisition and analysis on up to four channels.



Apply advanced signal generation

Our range of vector signal generators provides outstanding signal quality at baseband, RF and microwave frequencies, plus arbitrary waveform playback and sophisticated real-time signal generation. Examples include the N5182A MXG, E4438C ESG and E8267D PSG vector signal generators as well as the N5106A PXB baseband generator and channel emulator.

Agilent Signal Studio software is a useful addition for the creation of Agilent-validated and performance-optimized reference signals. This PC-based software enables generation of numerous application-specific test signals at baseband, RF and microwave frequencies. Flexible and easy to use, it cuts the time you'll spend on signal simulation.



Get fast, flexible measurements

The modular, compact N7100 Series measurement platform is implemented in the PXI® Express format. You can configure a system with one or two N7130A two-channel receiver modules that provide 40 MHz analysis bandwidth from 20 MHz to 6 GHz. Each channel includes a built-in preamp and multiple fixed pre-selectors, which enable and optimize off-the-air measurements.

Processing power comes from the N7140A CPU module and the N7145A FPGA processing module. These combine to deliver onboard data reduction, fast measurements and, with the Gigabit Ethernet PC link, rapid data transfers.

This all fits into a 19-inch N7125A mainframe that's rack mountable and just 4U high. We also include a front cover that simplifies signal connections and provides additional RF shielding.

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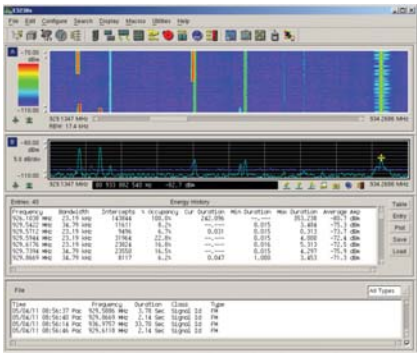
See through the complexity

The 89600B VSA software is a window into what's happening inside complex wireless devices. It's equipped to measure more than 70 signal standards and modulation types, including LTE (FDD/TDD), W-CDMA HSPA+, GSM/EDGE Evolution, 802.16 OFDMA and ultra-wideband (UWB) MB-OFDM.

The 89600B's 20:20 trace/marker capability lets you open new windows into what's happening. Pinpoint problems with arbitrary arrangement and flexible sizing of up to 20 measurement traces at once. Isolate the sources of unexpected signal interactions with up to 20 markers per trace, and activate trace-to-trace coupling of markers. To help you capture and analyze random or transient events, the 89600B also provides multi-domain digital-persistence and cumulative-history displays.

Measure and monitor signal activity

The N6820E signal survey software provides general spectrum analysis, signal monitoring and narrowband signal processing (optional). With either the N6820E or 89600B software, the N7109A provides fast, wide spectral searches with high resolution, helping you detect small signals next to large ones and capture intermittent or short-duration signals.



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Ordering Information



N7125A mainframe, 18 slots

Configuration

- N7109A Multi-Channel Signal Analysis System
  - N7109A-C02 two-channel system: Includes one each N7125A, N7130A, N7140A and N7145A
  - N7109A-C04 four-channel system: Includes one each N7125A, N7140A and N7145A, and two N7130A
- N7125A-1CM rack mount kit
- N7109AF-4CH Factory upgrade from 2-channels to 4-channels (requires system return to Everett, WA)

PC requirements

A Windows®-based system host PC (required) is not included with the N7109A. Your PC must include the following:

- A Gigabit Ethernet LAN interface for connection to the N7125A mainframe.
- Sufficient processing power, memory, disc space, and so on, for the 89600B or N6820E software. Please refer to the respective product configuration guides for detailed requirements.

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N7130A
V/UHF receiver module



N7140A
CPU module



N7145A
FPGA processing module

Related products

The following products can be ordered separately:

- 89601B Vector Signal Analysis Software, **www.agilent.com/find/89600B**
- N6820E Signal Survey Software, **www.agilent.com/find/N6820E**
- N5182A MXG RF Vector Signal Generator, **www.agilent.com/find/MXG**
- E4438C ESG Vector Signal Generator, **www.agilent.com/find/ESG**
- E8267D PSG Vector Signal Generator, **www.agilent.com/find/PSG**
- N5106A PXB Baseband Generator and Channel Emulator, **www.agilent.com/find/PXB**
- Agilent Signal Studio Software, **www.agilent.com/find/SignalStudio**

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Typical Performance Characteristics

(20º-30º C)

Frequency

Frequency Coverage	20 MHz to 6 GHz
Center frequency tuning range	40 MHz to 6 GHz
Vector signal analyzer	1 Hz to 40 MHz (one, two or four chs)
Center frequency resolution	10 mHz
Frequency accuracy	
Initial accuracy	± 0.04 ppm
External frequency reference Input	
Input frequency	10 MHz
Acquisition range	± 5 ppm
Phase noise (1 GHz input)	
> 10 kHz offset	< -100 dBc/Hz
> 100 kHz offset	< -99 dBc/Hz
> 1 MHz offset	< -115 dBc/Hz
Third-order intermodulation (TOI) distortion	+6 dBm (-20 dBm range, pre-amp on); +28 dBm (+5 dBm range)
Third-order dynamic range	<-70 dBc

Amplitude

Full scale accuracy	
≤ 1 GHz	± 1 dB
1 GHz – 4 GHz	± 1.5 dB
> 4 GHz	± 2 dB
Flatness, VSA mode	
Over full IF	±1 dB
Dynamic range	
Residual responses:	
20 MHz – 240 MHz	< -77 dBm
240 MHz – 745 MHz	< -90 dBm
745 MHz – 775 MHz	< -84 dBm
> 775 MHz	< -90 dBm
Sidebands (1 kHz to 300 kHz)	< -72 dBc
Sidebands (300 kHz to 1 MHz)	< -58 dBc
Sidebands (> 1 MHz)	< -80 dBc (except ±1.25 MHz ≤-77 dBc)
Input-related spurious responses	< -40 dBc
Crosstalk	72 dB
Input noise density (ranges ≥ -40 dBm)	< -116 dBfs/Hz
Input sensitivity (most sensitive range)	-158 dBm/Hz (-156 dBm/Hz above 5.9 GHz on 2nd tuner channels)
Phase Group delay linearity	±2 ns typical, single-channel variation after calibration (half peak-to-peak)

RF Input

Input channels	One, two or four
Full scale range	+10 dBm to -50 dBm in 1-dB attenuator steps
Maximum safe input level	+20 dBm, 50 Vdc
Nominal impedance	50 Ω
Connector	Type-N on front panel cover. SMA on tuner modules.
Input coupling	AC
VSWR (0.02 - 6.0 GHz, -20 dBm range)	
20 MHz – 1 GHz	2:1
>1 GHz	3:1

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Cross-Channel Tracking

Within same 2-ch tuner, or adjacent tuners, with tuners locked together referenced to channel 1.

Amplitude match	±1.8 dB typical
Group delay match	< 9.0 nSec p-p

Time Capture Memory

Time capture memory & record length

132 MSa (64 MSa in 1 or 2-ch mode, 32 MSa in 4-ch mode)

Recording length:

Span/bandwidth	1 or 2-ch mode	4-ch mode
40 MHz	1.3 sec	0.65 sec
20 MHz	2.6 sec	1.3 sec
10 MHz	5.2 sec	2.6 sec
etc		

MIMO

Typical EVM and measurement update speed performance

Using Agilent 89600B VSA software, HP EliteBook 8540p PC w/2.67 GHz i7 CPU, 8 GB RAM, Windows7, 1 Gb LAN.

802.11n, 2x2, 20 MHz BW @ 2.4 GHz	< -44 dB (0.6%), 0.1 seconds/update
802.16e WiMAX, 2x2, 10 MHz BW @ 2.5 GHz	< -42 dB (0.8%), 0.2 seconds/update
LTE, 2x2, 5 MHz BW @ 1 GHz	< -43 dB (0.7%), 0.4 seconds/update
LTE, 2x2, 5 MHz BW @ 2 GHz	< -44 dB (0.6%), 0.4 seconds/update
LTE, 2x2, 20 MHz BW @ 1 GHz	< -44 dB (0.6%), 1.8 seconds/update
LTE, 2x2, 20 MHz BW @ 2 GHz	< -44 dB (0.6%), 1.8 seconds/update
LTE, 4x4, 5 MHz BW @ 1 GHz	< -42 dB (0.8%), 1.5 seconds/update
LTE, 4x4, 5 MHz BW @ 2 GHz	< -43 dB (0.7%), 1.5 seconds/update
LTE, 4x4, 20 MHz BW @ 1 GHz	< -41 dB (0.9%), 1.5 seconds/update
LTE, 4x4, 20 MHz BW @ 2 GHz	< -41 dB (0.9%), 1.5 seconds/update

System Environmental Characteristics

Operating temperature range	+15° C to +55° C
Storage temperature range	-40° C to +70° C
Humidity	Maximum 95% at +40° C, non-condensing
Maximum altitude	3000 meters. De-rate max temperature by 5° C above 2000 meters.
Line input power requirements	100 VAC to 240 VAC nominal (±10%) 420 W @ 40° C maximum. De-rate linearly above 40° C to maximum 360 W @ 55° C. 50/60/400 Hz nominal (47 Hz to 440 Hz)
Warm-up time	30 minutes
Calibration interval	2 years, return to factory calibration
Safety standards	IEC 61010-1:2001 / EN 61010-1:2001 Canada: CAN/CSA-C22.2 No. 61010-1-04 USA: ANSI/UL 61010-1:2004
EMC standards	Tested for Compliance with European EMC Directive 2004/108/EC. IEC 61326-1:2005 / EN 61326-1:2006 CISPR 11, Group 1, Class A (Meets Class B Radiated Emissions) ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.
Mechanical	
Operating vibration	5 – 500 Hz, 0.21 gRMS random, 0.5 g (0 to peak) swept sine
Non-operating vibration	5 – 500 Hz, 2.10 gRMS random
Transportation shock	30 g, 6.8 m/s, trapezoidal pulse
Overall dimensions	*(H x W x D – with bottom feet and front panel cover)* 7.6 in. x 19 in. x 20 in. 19.3 cm x 48.26 cm x 50.8 cm

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