PathWave Vector Signal Analysis (89600 VSA)

KEYSIGHT TECHNOLOGIES

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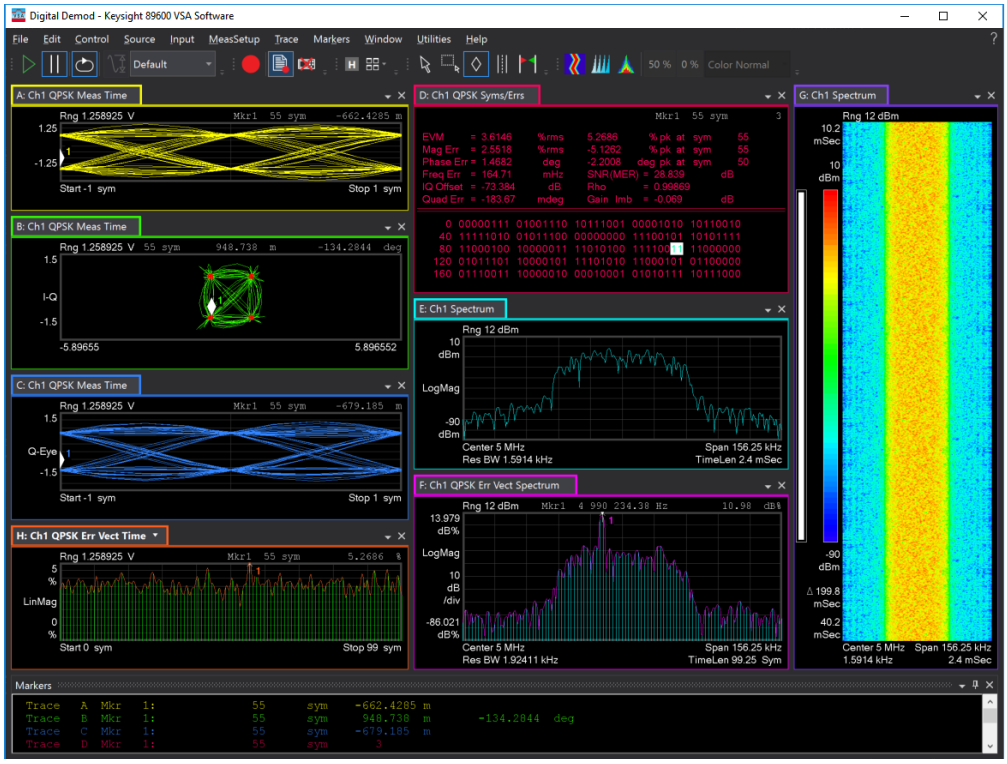
See through the complexity

- Gain greater insight with high-resolution FFT-based spectrum, time and modulation domain analysis
- Measure your signal: PathWave Vector Signal Analysis (VSA) software supports more than 75 signal standards and modulation types
- Analyze and troubleshoot signals in cellular, wireless-connectivity, aerospace, defense and general-purpose applications
- Apply vector signal analysis at virtually any point in your design, from simulation to production, baseband to RF



Free 30-day trial

Download PathWave Vector Signal Analysis (VSA) software and use it free for 30 days to make measurements with your analysis hardware, or use our recorded demo signals which are available by selecting File> Recall > Recall Demo > signal type on the software toolbar. Request your free trial license today:

www.keysight.com/find/89600_trial

Tools to Demodulate and Analyze Your Most Complex Signals

Development becomes more complex when faster data rates intersect with today's crowded spectral environment. Finding a signal problem is essential, but achieving the clarity to pinpoint the answer is the crucial challenge. PathWave Vector Signal Analysis (VSA) software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize your most advanced designs. As you assess the tradeoffs, the PathWave Vector Signal Analysis (VSA) helps you see through the complexity.

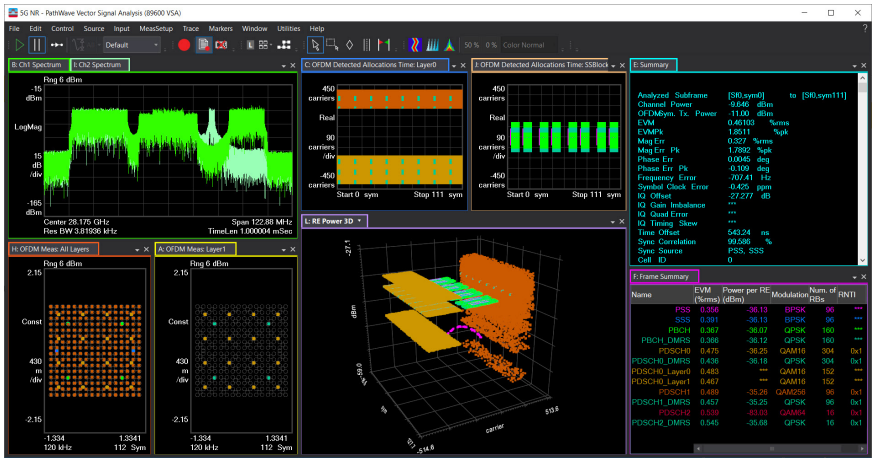


Figure 1. Characterize the complex modulation of evolving cellular commumications standards like 5G NR (New Radio).

Choosing between 89600 VSA and X-Series measurement applications

PathWave Vector Signal Analysis (VSA) software is ideal for evaluating and troubleshooting wireless signals in R&D. PC-based, supporting numerous hardware measurement platforms, the PathWave Vector Signal Analysis (VSA) software provides the flexibility and sophisticated measurement tools essential to find and fix signal problems.

The X-Series measurement applications provide embedded format-specific, one-button measurements for the X-Series analyzers. With fast measurements, pass/fail testing and simplicity of operation, these applications are ideally suited for automated design verification and manufacturing test.

www.keysight.com/find/X-Series_apps

Test today's signals and be ready for tomorrow's standards and modulations

With PathWave Vector Signal Analysis (VSA) software, you can measure more than 75 signal standards and modulation types for cellular communications including evolving 5G New Radio, wireless connectivity, WLAN 802.11ax/11be, 802.15.4/4z HRP UWB, MILCOM, satellite communications and more. PathWave Vector Signal Analysis (VSA) software also lets you leverage Keysight's consistent track record of being first to market with support for emerging standards, even before they are fully ratified.

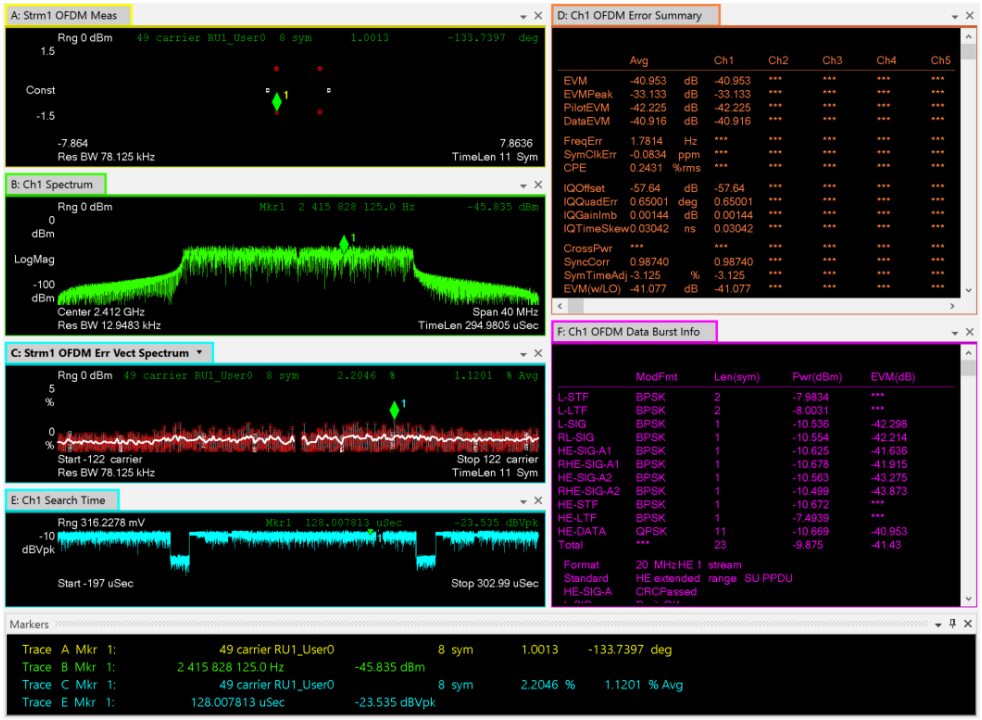


Figure 2. Verify the WLAN 802.11ax signal quality in multiple domains.

Over 75 signal standards and modulation types, including

- Cellular communications: 5G New Radio(NR), Verizon 5GTF, WiMax™ LTE- Advanced, LTE, W-CDMA/HSPA+, GSM/EDGE Evolution, cdma2000®, TD-SCDMA
- Wireless connectivity: WLAN 802.11be, 802.11ax, 802.11n/ac, 802.11a/b/g/j/p, WiMax™, Bluetooth®, Zigbee, RFID, 802.15.4 HRP UWB
- Aerospace, defense and satellite: AM, FM, PM, BPSK, QPSK, QAM, APSK, FSK, VSB, SOQPSK, APCO 25, DVB-S/S2/S2X
- Radar pulse: pulse, frequency hopping, FMCW
- Cable TV such as DOCSIS 3.0 and 3.1
- Custom modulation: Evaluate your non-standard or proprietary OFDM and APSK signals
- Also supports up to 8 channels for MIMO and multi-channel test

Figure 3. Analyze modulation types ranging from AM/FM/PM to QPSK (shown), 4096QAM and 18APSK.

Multi-measurements: Analyze and display multiple signals at once

The industry's first multi-measurement capability can configure, execute and display multiple measurements simultaneously. For example, a systems engineer can analyze the coexistence of 5G and LTE signals leveraging Dynamic Spectrum Sharing. A collection of measurements can be created and stored in memory, available to run instantly. Connect to multiple analyzers at the same time, or use a single multi-channel instrument, to acquire signals from different test points or frequency bands in parallel. Powerful display tools enable comparison and correlation of results from different measurements.

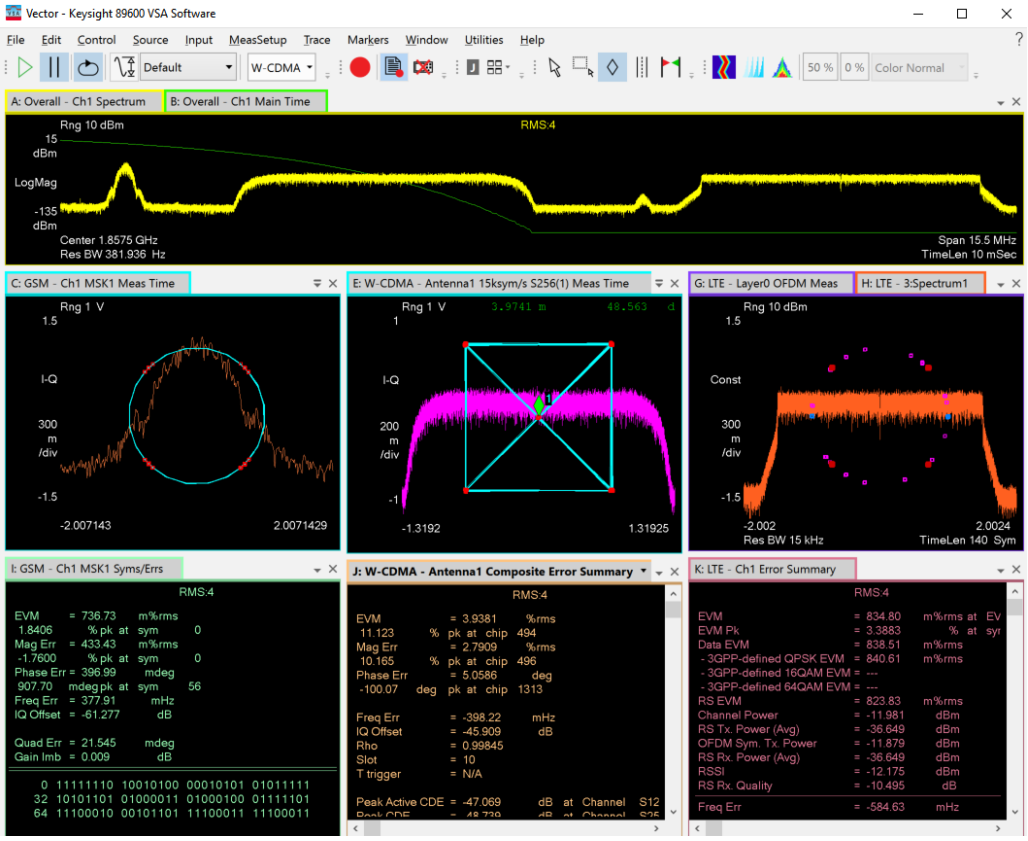


Figure 4. Multi-measurements enable capture, analysis and display of multiple signals at once. Four measurements are shown here: Vector measurement for overall spectrum and CCDF, GSM, W-CDMA and LTE demodulations.

Thoroughly characterize power amplifier distortion and envelope tracking designs

Complex stimulus-response measurements provide the ability to measure and compare two signals, for measurements such as:

- AM/AM
- AM/PM
- Gain compression
- Differential EVM
- Time delay

Automatic time alignment, amplitude and phase compensation simplify setup and analysis. The unique capability of PathWave Vector Signal Analysis (VSA) software to compare baseband and RF signals makes it ideal for optimizing and validating envelope tracking power amplifier and power supply designs.

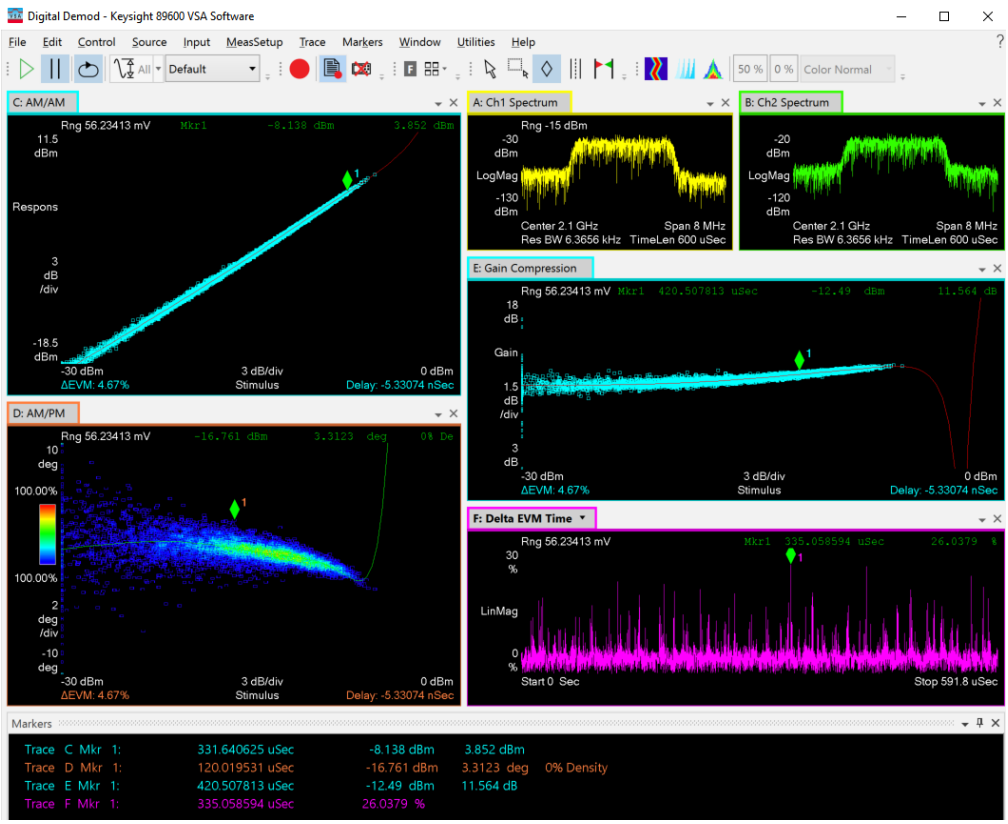


Figure 5. Apply all of the software's advanced displays and troubleshooting tools to your stimulus-response measurements.

Pinpoint the Solution with Advanced Troubleshooting Tools

You can reach deeper into signals to find the root cause of problems with measurements in the time, frequency and modulation domains. Quantify spectral performance with high-resolution, FFT-based measurements and a rich set of markers. Analyze time-domain signal quality using features like time gating, CCDF, and auto-correlation. Characterize complex modulation schemes with constellation, EVM, decoded bits, and more.

In addition to standard tools like constellations, IQ parameters and overall EVM, PathWave Vector Signal Analysis (VSA) software provides:

- Compound, color-coded constellations for signals with multiple modulations, zone, or control channel signals
- Pilot EVM, resource signal EVM, preamble EVM, EVM by symbol time or carrier, all color-coded to highlight carrier or modulation types, or control channel signals
- Tables showing the contents of the frame control header, training fields, and similar information
- MIMO condition number by carrier, I/Q parameters by stream, and more

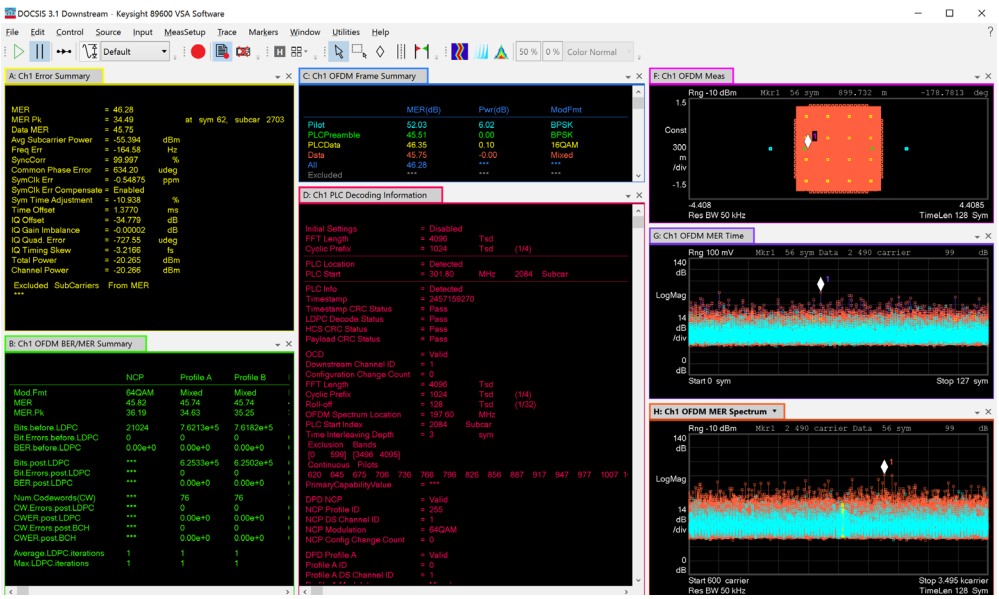


Figure 6. Reach deeper into signals with advanced troubleshooting tools even in decoding information of DOCSIS 3.1.

Signal capture and playback

Capture and playback signals for detailed gap-free analysis. The full function playback facilitates analysis with loop-on-signal tools, user-defined file segment storage, and graphical/numeric displays showing the progression of the signal file. The flexible overlap processing built into PathWave Vector Signal Analysis (VSA) slows down the playback for detailed analysis of the captured file.

View multiple facets of complex signals—simultaneously

PathWave Vector Signal Analysis (VSA) software graphical user interface (GUI) helps you see more and with greater clarity. It enables you to pinpoint problems with arbitrary arrangement and flexible sizing of unlimited traces at once, each with unlimited markers. Build the test view you need to optimize your signal evaluation and troubleshooting.

Perform detailed analysis of dynamic signal behaviors with advanced display types and triggering. Use spectrogram, digital persistence and cumulative history displays to help view dynamic frequency and amplitude behavior over time.

Catch elusive signals with flexible magnitude and external triggers, as well as frequency mask trigger, with real-time enabled UXA, PXA and MXA signal analyzers. Together, these provide unprecedented analysis detail of short-lived signal events in time, spectrum and modulation domains.

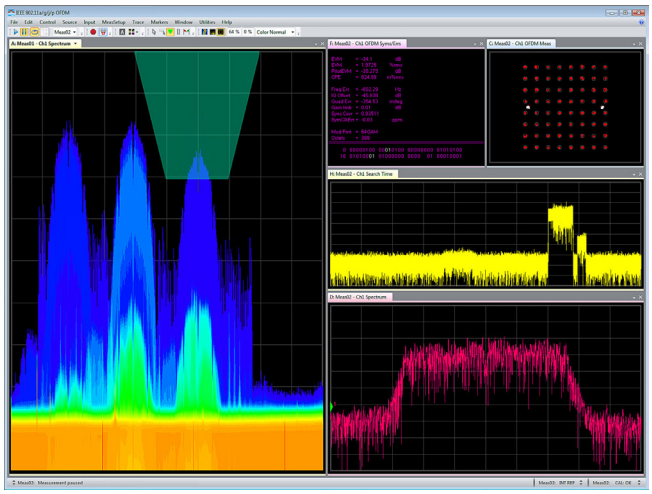


Figure 7. Create and execute a spectrally-selective frequency mask trigger from PathWave Vector Signal Analysis (VSA) software when connected to real-time enabled UXA, PXA, and MXA signal analyzers.

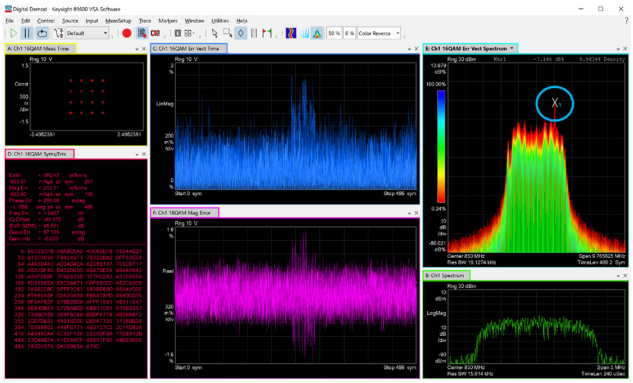


Figure 8. Trace E shows a spur occurring with this 16QAM signal. This low-power, intermittent in-band spur is masked by the signal and cannot be seen using a standard spectrum measurement (Trace B). Demodulating the signal and viewing it using EVM spectrum with the cumulative history display enabled reveals this difficult-to-isolate signal.

Powerful GUI

- View unlimited traces, each with unlimited markers
- Adjust trace shape to extend event observation time or increase viewable data
- Optimize trace arrangement to see signal patterns and study interactions
- Assign any measurement to any trace to analyze sophisticated signals, such as 5G New Radio(NR), LTE, and WLAN 802.11ax/ac/n including MIMO
- Define and run multiple independent measurements, simultaneously
- Create multiple trace windows to organize results

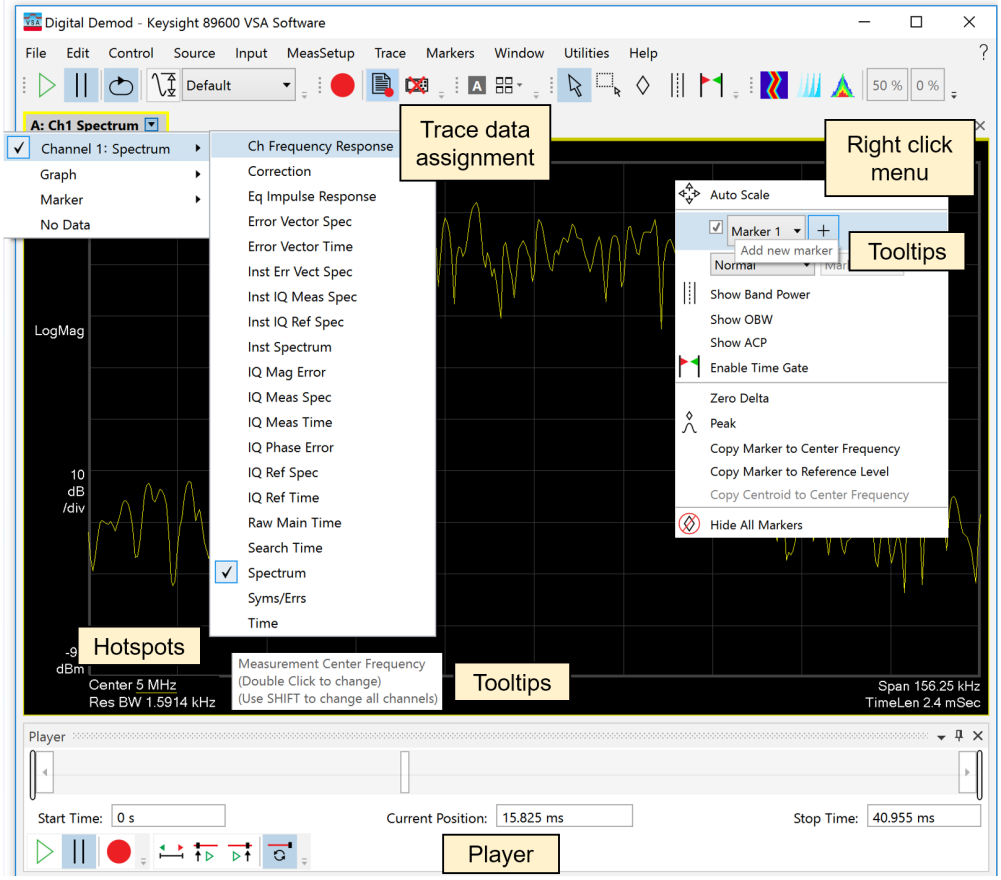


Figure 9. On trace 'hotspots" provide convenient, quick measurement set-up and control.

Accelerate development with a consistent set of tools

PathWave Vector Signal Analysis (VSA) runs on a PC or inside PC-based instruments and supports more than 45 Keysight platforms: signal analyzers, oscilloscopes, logic analyzers, modular instrument systems, as well as simulation software. Ensure repeatable, comparable results across teams, from baseband to RF, from simulation to design validation.

www.keysight.com/find/89600_hardware

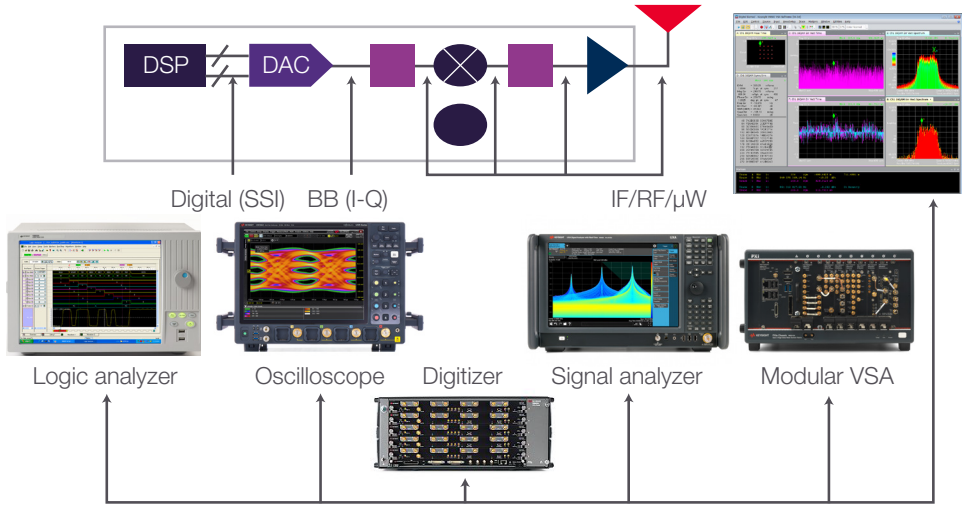


Figure 10. Use the 89600 VSA software with over 45 hardware platforms, including spectrum and signal analyzers, modular instruments and oscilloscopes.

Keep your 89600 VSA up-to-date

With rapidly evolving standards and continuous advancements in signal analysis, the 89601BU/BKU/BNU software update and subscription service offers you the advantage of immediate access to the latest features and enhancements, as available, for PathWave Vector Signal Analysis (VSA).

- Keeps your 89600 VSA software current with new enhancements
- Automatic notification and shipment of software revisions
- Length of subscription: 12 months, renewable

Additional Resources

Literature

Publication title	Publication number
89600 VSA Software - Configuration Guide	5990-6386EN

To learn more about 89600: www.keysight.com/find/89600

To download the latest 89600 software and apply trial license: www.keysight.com/find/89600_trial

To learn more about 89600 supported hardware: www.keysight.com/find/89600_hardware

Choose PathWave Vector Signal Analysis (89600 VSA) License

Description	Model Number	Additional Information
Basic vector signal analysis and hardware connectivity	89601200C (required core option)	• Provides the tools and user interface that make up the 89600 VSA software including time and frequency domain measurement, hardware connectivity, recordings and playback • Channel quality modulation analysis
General purpose		
Digital demodulation analysis	89601AYAC	• Analysis of >40 modulation formats, including custom APSK and presets for communication formats like GSM/EDGE, ZigBee FSK, Bluetooth® BR, APCO25 and SOQPSK • Proprietary and pre-standard, customized IQ constellation signals • TEDS modulation analysis • Channel response measurements such as phase/magnitude response and multi-tone group delay • Flexible frame signal analysis
Custom OFDM modulation analysis	89601BHFC	• Proprietary and pre-standard OFDM formats such as WLAN, DAB, DVB-T/H, DVB-SH, ISDB-T and more
Cellular Communication		
5G NR Modulation Analysis	89601BHNC	• 5G NR modulation analysis • Pre-5G modulation analysis
LTE/LTE-A FDD modulation analysis	89601BHGC	• LTE FDD modulation analysis • LTE-Advanced FDD modulation analysis
LTE/LTE-A TDD modulation analysis	89601BHHC	• LTE TDD modulation analysis • LTE-Advanced TDD modulation analysis
3G modulation analysis bundle	89601B7NC	• W-CDMA/HSPA+ modulation analysis • TD-SCDMA/HSPA modulation analysis • cdma2000 modulation analysis • 1xEV-DO and 1xEV-DV modulation analysis
Wireless Connectivity		
Wireless connectivity modulation analysis	89601B7RC	• WLAN 802.11a/b/g/j/p modulation analysis • WiMax™ modulation analysis
High throughput WLAN modulation analysis	89601BHXC	• WLAN 802.11n/ac modulation analysis • WLAN 802.11ax modulation analysis • WLAN 802.11be modulation analysis (Beta based on early draft spec)
IoT modulation analysis	89601BHTC	• NB-IoT modulation analysis • RFID modulation analysis • HRP UWB (IEEE 802.15.4/4z)

Description	Model Number	Additional Information
Radar analysis		
Pulse analysis	89601BHQC	• Pulsed modulated radar signal analysis • Frequency hopping signal analysis
FMCW analysis	89601BHPC	• For multi-chirp linear FM modulated signals or automotive radar
Other standard formats		
DOCSIS modulation analysis	89601BHMC	• DOCSIS3.1 downstream and upstream modulation analysis
Multi-vendor hardware connectivity	89601301C	• Connect multi-vendor hardware for modulation analysis

Choose Flexible Licensing Types and Terms

Each of the following license types are offered as perpetual or time-based licenses as shown in the table below. A valid support contract is included with time-based licenses. For perpetual license, a separate support contract is required to access Keysight technical support and software updates.

License Type	Description	Pricing Formula
Node-locked	Allows you to use the license on one specified instrument/ computer.	
Transportable	Allows you to use the license on one instrument or computer at a time. This license may be transferred to another instrument or computer using Keysight's online tool.	130% of node-locked
USB Portable	Allows you to move the license from one instrument/ computer to another by end-user only with certified USB dongle, which is purchased separately.	130% of node-locked
Floating	Allows you to access the license on networked instruments/computers from a server, one at a time. For concurrent access, multiple licenses may be purchased.	140% of node-locked (floating, single site) 200% of node-locked (floating, single region) 250% of node-locked floating, worldwide)
Perpetual	Software license can be used in perpetuity	
Time-based	Software license is time limited to a defined period, such as 12 months.	38% of perpetual for a 12-month license
Support contract for perpetual license	Allows license holder access to Keysight technical support and all software upgrades.	15% or 3% of perpetual for 12 months of support contract

PathWave Vector Signal Analysis (89600 VSA) Ordering Information

Software License Type and Term	Software License	Support Subscription
Node-locked perpetual	R-Y5A-001-A	R-Y6A-001-y[1]
Node-locked time-based	R-Y4A-001-z[2]	Included
Transportable perpetual	R-Y5A-004-D	R-Y6A-004-y[1]
Transportable time-based	R-Y4A-004-z[2]	Included
USB Portable perpetual	R-Y5A-005-E	R-Y6A-005-y[1]
USB Portable time-based	R-Y4A-005-z[2]	Included
Floating perpetual (single site)	R-Y5A-002-B	R-Y6A-002-y[1]
Floating time-based (single site)	R-Y4A-002-z[2]	Included
Floating perpetual (single region)	R-Y5A-006-F	R-Y6A-006-y[1]
Floating time-based (single region)	R-Y4A-006-z[2]	Included
Floating perpetual (worldwide)	R-Y5A-010-J	R-Y6A-010-y[1]
Floating time-based (worldwide)	R-Y4A-010-z[2]	Included

1 y means different support subscription duration. L for 12 months (as default), X for 24 months, Y for 36 months, and Z for 60-months. Support subscription must be purchased for all perpetual licenses with 12-months as the default. All software upgrades and KeysightCare support are provided for software licenses with valid support subscription.

2 z means different time-based license duration. F for six months, L for 12 months, X for 24 months, and Y for 36 months. All time-based licenses have included the support subscription same as the time-base duration.