PRODUCT BROCHURE

PathWave Signal Generation

Accelerate Your Test and Design Workflows

KEYSIGHT

PATHWAVE

Table of Contents

Simplify Signal Generation

Keysight's signal generation portfolio delivers a comprehensive suite of signal creation tools that enable engineers to simulate real-world scenarios with precision and flexibility. The signal generation family includes three powerful software to different workflows and deployment environments:

- Signal Studio, PC-based software
- PathWave Signal Generation (PWSG) Desktop, next-generation PC-based software
- PathWave Signal Generation (PWSG) Embedded, integrated with instrument firmware

Figure 1. Signal Studio (left), PWSG Desktop (middle), and PWSG Embedded (right)

Together, these offerings provide a seamless transition from legacy tools to modern, scalable platforms, while maintaining continuity in signal creation capabilities.

PathWave Signal Generation and Signal Studio Product Family

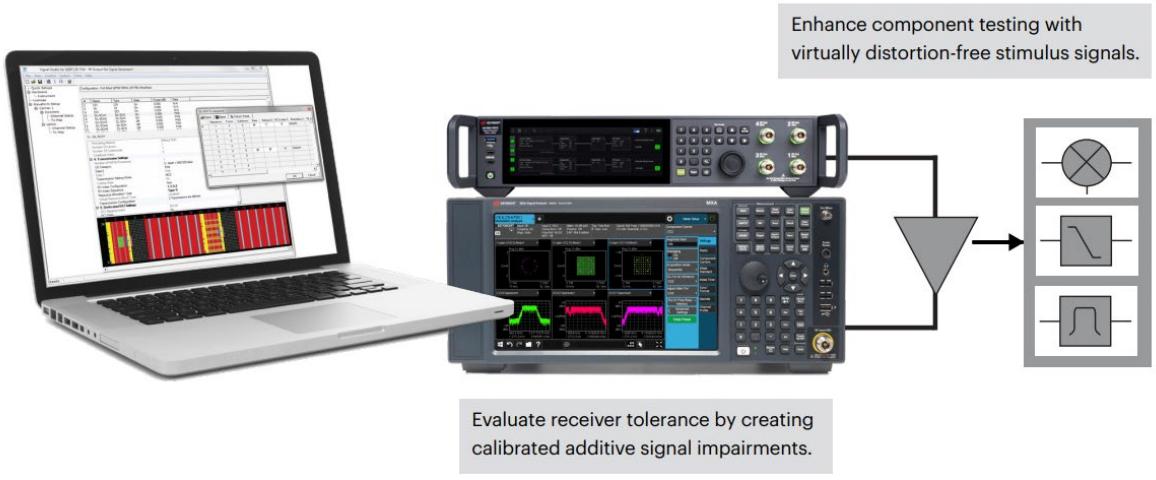
	Application	Signal Studio	PWSG Desktop	PWSG Embedded
Aerospace Defense	Pulse Building	✓ N7620B	-	✓ N7620APPC
	Enhanced Multi-Tone and NPR	✓ N7621C	-	✓ N/E7621APPC
	Multi-Emitter Scenario Generation	✓ N7660C	-	-
	Multi-Source Corrections	✓ N7665C	-	-
	Land Mobile Radio	✓ N7640C	-	-
	Avionics (VOR/ILS)	-	-	✓ N/E7641APPC
	IA-based AM/FM/PM	-	-	✓ N/E7642APPC
	De-embedding	-	-	✓ N/E7653APPC
General Purpose	Custom Modulation	✓ N7608C	-	✓ N/E7608APPC
	GNSS	✓ N7609C	-	✓ N7609APPC
	Custom Fading	-	-	✓ N7605APPC
	3GPP MIMO Fading	-	-	✓ N7605AP0C
	SISO Fading	✓ N7605C	-	-
	Power Amplifier Test	✓ N7614C	-	-
	Advanced Waveform Utility	-	✓ N7618APPC	-
Cellular Communications	5G NR/5G-Advanced	-	✓ N7631APPC	✓ N/E7631APPC
	LTE-A FDD	✓ N7624C	-	✓ N7624APPC (UL/PRACH)
	NB-IoT/eMTC	✓ N7624C	-	-
	LTE-A TDD	✓ N7625C	-	✓ N7625APPC (UL/PRACH)
	GSM/EDGE Modulation	✓ N7602C	-	✓ N7602AP1C
	GSM / EDGE /Evo	✓ N7602C	-	-
	TD-SCDMA/HSPA	✓ N7612C	-	-
Wireless & IoT Connectivity	WLAN	✓ N7617C (802.11a/g/g/n/ac/ ax/be/bn)	-	✓ N7617APPC (802.11ax/be/bn)
	DFS and DAA Profiles	✓ N7607C	-	-
	Bluetooth	✓ N7606C	-	-
	IoT	✓ N7610C	-	-
	mmWave WLAN (802.11ad/ay)	✓ N7637C	-	-
	Mobile WiMax	✓ N7615C	-	-
Automotive & Broadcasting	NR-V2X	-	✓ N7632APPC	✓ N7632APPC
	LTE-V2X	✓ N7626C	-	-
	WLAN 802.11p	✓ N7617C	-	-
	Digital Video	✓ N7623C	-	-
	Broadcast Radio (FM/DAB)	✓ N7611C	-	-

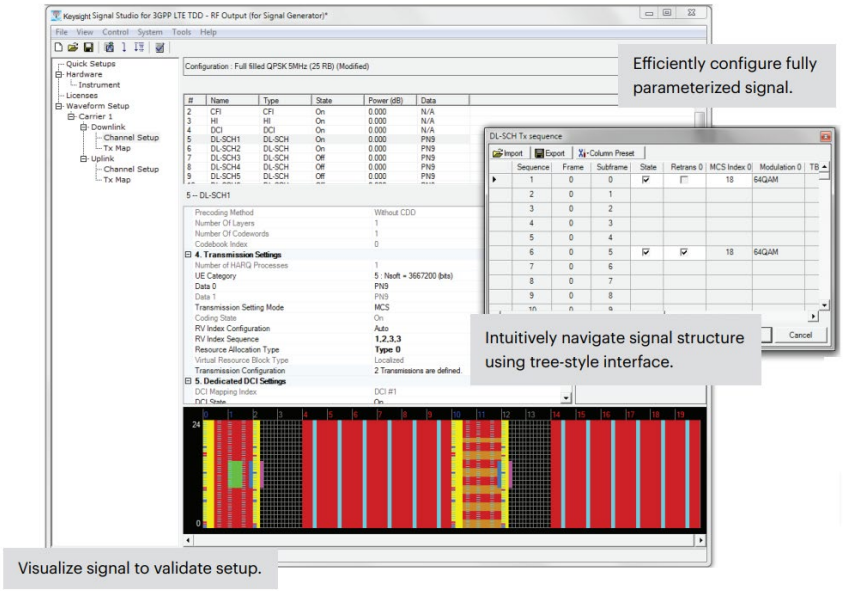
Reduce the Time You Spend on Signal Simulation

Signal Studio comes with performance-optimized signals validated by Keysight. You can easily modify these signals to meet your needs. Or you may quickly create custom reference signals for testing devices. Its fast and simple user interface features tree-style navigation and graphical, parameterized signal configuration.

What is Signal Studio?

Signal Studio is signal creation software that runs on a PC. It enables the creation of application specific test signals at baseband, RF and microwave frequencies.





Typical Measurements

- Test components and transmitters:
  - CCDF
  - EVM
  - Channel power
  - Occupied bandwidth
  - Spectrum
- Test receivers:
  - Component test along receiver chain
  - Receiver sensitivity
  - BER

Easily Create Signals for Your Bench or Production Line

Whether you need test stimuli in R&D or manufacturing, Signal Studio simplifies creation of the signals you need for characterization, verification, and pass / fail testing of components, devices, receivers, and more.

Key Features and Attributes	
Signal generation	• Custom, standards-based, and presets for common test signals • Arbitrary IQ waveform and real-time IQ generation
Additive impairments	• I/Q impairments • AWGN • Real-time fading
Graphs	• I(t), Q(t), I(t) + Q(t), P(t) • Spectrum, CCDF, CDP • Frame structure • Power envelope

Simplify Signal Creation on the Bench

Create your own signal-creation workstation in R&D by connecting Signal Studio to a Keysight instrument through the LAN or GPIB port of a PC. A built-in configuration tool makes it fast and simple, and the Signal Studio user interface includes a window that enables direct control of a connected instrument.

For advanced automation and control, the available application programming interface (API) exposes the signal creation and generation parameters of the software. This capability also enables creation of a custom user interface for signal creation.

See Signal Studio Compatible Instruments for more information.

Accelerate Testing on the Production Line

To save time during automated testing, waveforms created in Signal Studio can be downloaded to an instrument and stored in memory. Recall and playback can be initiated programmatically with SCPI commands or through the front panel.

When you need to use custom signals with multiple test systems, flexible right-to-use licenses can meet your specific needs, schedules and budget requirements. For example, waveform licensing is ideal for cost-effective deployment of Signal Studio test signals in a manufacturing environment. Each of these licenses is fixed to a single instrument but is available in packs of 5 or 50 waveform licenses that can be used for different signal formats. Please see the licensing section for more information about other licensing options.

Configure a Suite That Meets Your Needs

Signal Studio software is scalable to meet a wide range of component and receiver testing requirements. It starts with a choice of two operating modes: waveform playback mode and real-time mode. Waveform playback mode supports two levels of functionality: basic and advanced. Real-time mode provides advanced capabilities such as closed-loop control during signal generation.

Enhance Component and Receiver Testing with Waveform Playback

Signal Studio's basic waveform playback capabilities enable you to create and customize waveform files to test components and transmitters. Its user-friendly interface lets you manipulate various signal parameters, calculate the resulting waveforms, and download files for playback with a Keysight instrument.

- Create spectrally correct signals for channel power, spectral mask, and spurious testing.
- View CCDF, spectrum, time domain, and power envelope graphs to investigate the effects of power ramps, modulation formats, power changes, clipping, and other effects on device performance.
- Adjust peak-to-average ratio with the crest factor reduction technology.
- Save Keysight PathWave Vector Signal Analysis (89600 VSA) or X-Series measurement application setup files using selected Signal Studio software products for further analysis. See the appropriate technical overview for product specific information.

Figure 2. A typical component test configuration using Signal Studio with Keysight signal generator and analyzer

Receiver Test with Advanced and Real-Time Capabilities

Signal Studio can generate standards-compliant or custom signals for early testing of receiver system and component hardware with channel coding and multi-antenna port. Evaluate receiver performance at various stages of the receiver chain (RF, IF, and IQ) on signal analyzers and oscilloscopes together with PathWave 89600 VSA software or X Series measurement applications.

Use selected Signal Studio software to support the following:

- Standards-compliant signals for receiver testing with channel coding.
- Enabling or disabling channel coding, scrambling, and interleaving.
- Uplink and downlink configurations.
- Multi-antenna port transmitters, including spatial multiplexing and transmit diversity.
- Multiuser channel generation.
- Single carrier and multiple carriers.
- Customized data: PN9, PN15, custom bit pattern, or user-defined file with coded bits for bit error ratio (BER) testing.
- Addition of real-time additive white Gaussian noise (AWGN) to signal generators to set the carrier-to-noise ratio, carrier bandwidth, and noise bandwidth.

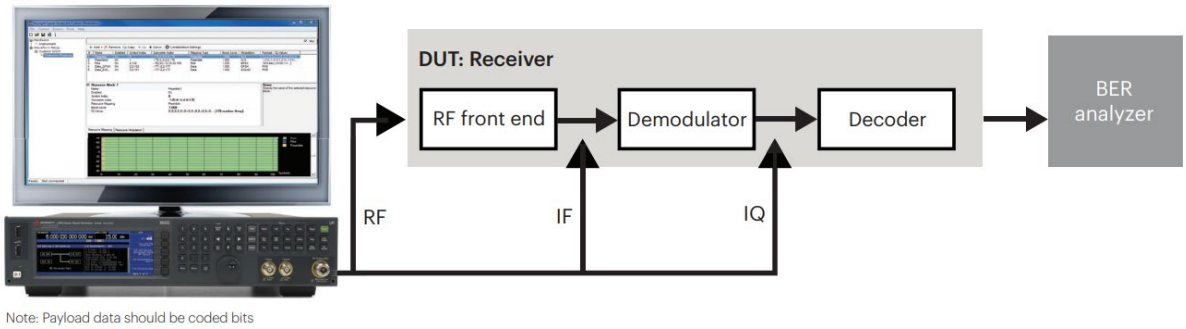


Figure 3. Generate receiver test signals for early testing of your receiver with Keysight X-Series signal generators and Signal Studio

Real-time capabilities available with selected Signal Studio software provide additional features to help you create signals for testing receiver designs in all stages of development. Advanced options enable you to create fully channel-coded signals for analysis of receiver BER, FER, BLER, and PER so you can verify baseband subsystem coding in ASICs, DSPs, and more. You can also check receiver performance and functionality during RF / baseband integration, system-level test, and beyond.

Signal Studio's Real-Time Capabilities Include:

- GSM / EDGE signal creation
- WCDMA / HSPA+ signal creation
- LTE and LTE-Advanced FDD signal creation
- GNSS signal creation for GPS, BeiDou, Galileo, GLONASS, SBAS and QZSS
- Digital video signal creation for DVB-T / H / T2 / C / S / S2 and ISDB-T
- Broadcast audio signal creation for XM
- Fading signal creation
- 5G NR PUSCH signal creation and phase compensation

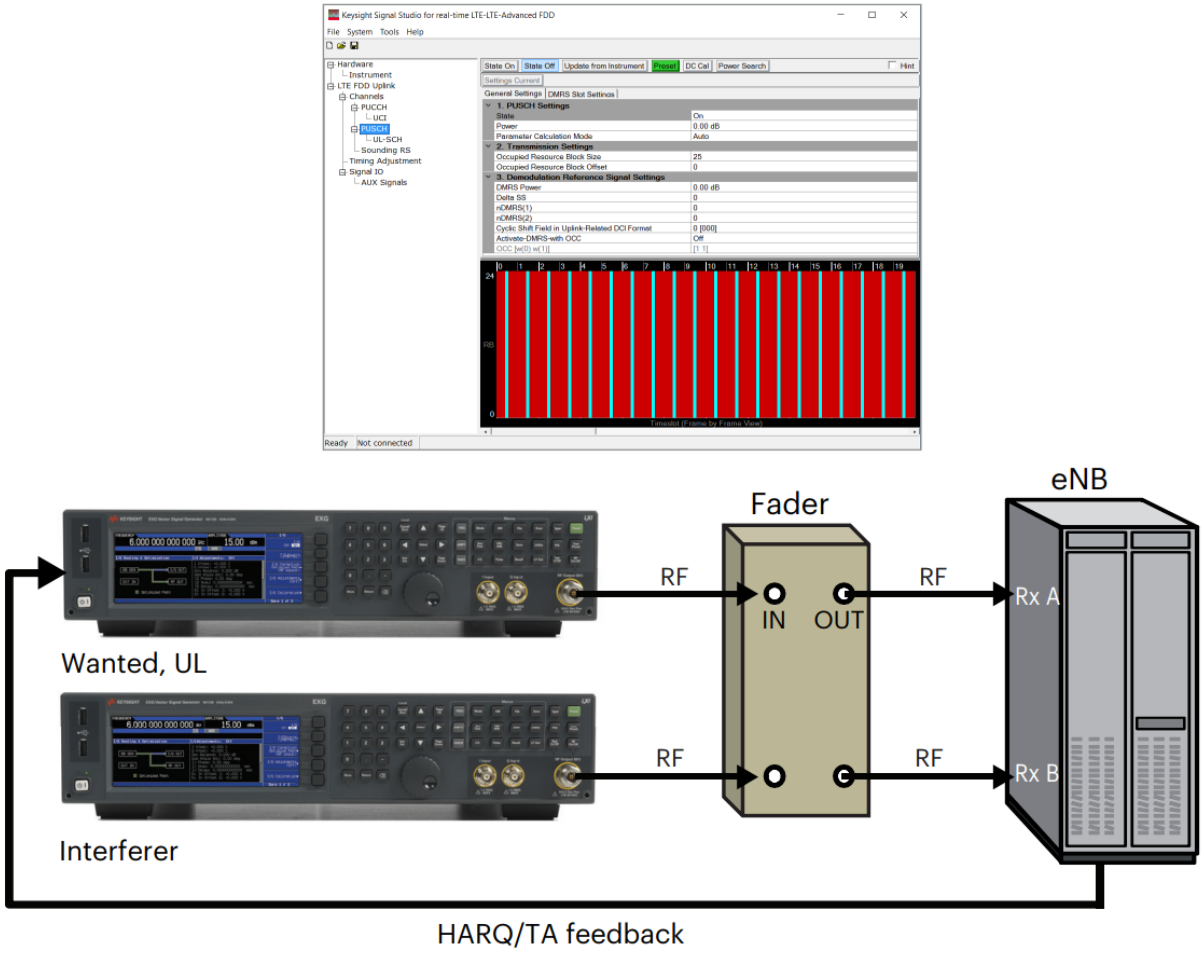


Figure 4. LTE receiver performance test with real-time signal generation

Apply Your Signals in Real-World Testing

When you have defined your signals in Signal Studio, you can download them to a wide range of Keysight instruments. This flexibility allows you to generate signals at various carrier frequencies with different bandwidths for multiple applications. Signal Studio complements these instruments by providing a cost-effective way to tailor them to your design, development, and production test needs. With Keysight's proven support for emerging standards, Signal Studio helps you stay at the forefront as wireless systems evolve.

VXG microwave vector signal generator

The **M9484C VXG** is the industry's first dual-channel microwave vector signal generator with up to 54 GHz frequency range and 2.5 GHz of modulation bandwidth in a single instrument, or up to 110 GHz with the V3080A frequency extender and 5 GHz with channel bonding, to enable your next breakthrough for 5G, 6G, and advanced aerospace/defense applications.

Benchtop vector signal generators

Next Generation N5186A MXG provides up to 8.5 GHz frequency coverage with 960 MHz modulation bandwidth per channel and supports four channels in a compact form factor for multi-channel signal generation in cellular base stations, wireless connectivity, and digital video testing.
N5182B MXG, **N5172B EXG X-Series** covers up to 6 GHz with 160 MHz bandwidth, delivering cost-effective performance.
N5166B CXG X-Series is an affordable option for general-purpose, IoT, and educational applications.

AP504xA Compact Signal Generator

The **AP504xA G3** series vector signal generators offer ultra-agile performance up to 40 GHz with 400 MHz bandwidth. The **AP5041A** supports single channel with front-panel GUI and the **AP5042A** supports up to 4 channels for multi-channel signal generation.

PXIe vector transceiver

The **M9410A / M9411A / M9415A/ M9416A PXIe VXT** provide 1.2 GHz signal generation and analysis bandwidth up to 13.35 GHz, expandable to 26.5 GHz with the **M9471A**. Perfect for modular, high-throughput test systems.

Arbitrary waveform generator (AWG)

AXIe M8190A, M8195A, or M8199A deliver unmatched fidelity, high resolution and wide bandwidth simultaneously for creating complex signal scenarios for radar, high-speed communications, and advanced research. **PXIe M5300A** is two-slot module with four high-speed AWG outputs, clock I/O, and eight triggers, which supports direct RF synthesis up to 16 GHz with 2 GHz instantaneous bandwidth, real-time sequencing, and FPGA programmability.

Wireless test set

The **E6640A / E6680A / E6681A EXM** wireless test sets are scalable for production environments and optimized for the latest cellular and WLAN chipsets. They deliver the speed, accuracy, and port density needed for high-volume manufacturing.

Signal Studio Compatible Instruments

Below is a list of Signal Studio software products and supported instruments. Click the hyperlinked product number in the left column for product-specific information.

Cellular Communications

			Benchtop					PXIe		AXIe
Current Model	Communications Standard	Real-time Capability[1]	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	E8267D PSG	AP5041A AP5042A	M9410A M9411A M9415A M9416A VXT	M5300A AWG	M8190A AWG
N7600C	W-CDMA / HSPA+	✓	✓[2]	✓[2]	✓[3]	✓	✓[2]	✓[2]	✓[2]	
N7601C	cdma2000® / 1xEV-DO	✓	✓[2]	✓[2]	✓[3]	✓	✓[2]	✓[2]	✓[2]	
N7602C	GSM / EDGE / Evo	✓	✓[2]	✓[2]	✓[3]	✓	✓[2]	✓[2]	✓[2]	
N7612C	TD-SCDMA / HSPA		✓[2]	✓[2]	✓[3]	✓	✓[2]	✓[2]	✓[2]	
N7624C	LTE / LTE-A FDD	✓	✓	✓	✓	✓[4]	✓[2]	✓[2]	✓[2]	✓
N7625C	LTE / LTE-A TDD	✓	✓	✓	✓	✓[4]	✓[2]	✓[2]	✓[2]	✓
N7626C	LTE V2X		✓	✓	✓	✓[4]	✓[2]	✓[2]	✓[2]	✓

1. Supports selected standards on N5172B and N5182B. Please refer to specific product technical overviews for more information.
2. Supports only “file export” based waveform playback.
3. N5166 CXG supports only “file export” based waveform playback.
4. The amplitude accuracy is not guaranteed with ALN turning off which needs manual power search.
5. For more information regarding Signal Studio products and their supported hardware, please visit www.keysight.com/find/signalstudio_platforms.
6. For information regarding legacy Signal Studio (N76xxB) and legacy supported hardware, please visit Compatible Instruments for Signal Studio Products: Legacy.

Wireless Connectivity

		Benchtop					PXIe		AXIe
Current Model	Communications Standard	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	E8267D PSG	AP5041A AP5042A	M9410A M9411A M9415A M9416A VXT	M5300A AWG	M8190A M8195A AWG
N7606C	*Bluetooth*® (BR, EDR, 4.0 / 4.2, BT5, BT5.1 (AoA and AoD), BT5.3, BT6	✓[2]	✓	✓	✓	✓[2]	✓[2]	✓[2]	
N7607C	DFS and DAA radar profile	✓	✓	✓	✓[3]				
N7610C	IoT (Internet of Things) (Wi-SUN, ZigBee®, Z-Wave, LoRa, and HRP UWB)	✓	✓	✓	✓	✓[2]	✓[2]		✓[5]
N7615C	Mobile WiMAX™	✓[2]	✓[2]	✓[4]			✓[2]		
N7617C	WLAN 802.11 a / b / g / j / p / n / ac / ah / af / ax / be / bn	✓	✓[2]	✓	✓	✓[2]	✓		✓[5]
N7637C	mmWave WLAN 802.11ad / ay								✓

1. Real-time capability is not included in this table.
2. Supports only “file export” based waveform playback.
3. E8267D-UNW is needed on PSG E8267D to support this application.
4. N5166B CXG does not support this application.
5. M8195A AWG does not support this application.
6. For more information regarding Signal Studio products and their supported hardware, please visit www.keysight.com/find/signalstudio_platforms.
7. For information regarding legacy Signal Studio (N76xxB) and their supported hardware, please visit Compatible Instruments for Signal Studio Products: Legacy.

Audio / Video Broadcasting

			Benchtop					PXIe		AXIe
Current Model	Communications Standard	Real-time Capability[1]	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	E8267D PSG	AP5041A AP5042A	M9410A M9411A M9415A M9416A VXT	M5300A AWG	M8190A AWG
N7611C	Broadcast Radio		✓[2]	✓[2]	✓[3]		✓[2]	✓[2]		
N7623C	Digital Video	✓	✓	✓	✓[3]	✓	✓[2]	✓[2]		✓
N7640C	Land Mobile Radio (LMR)		✓[2]	✓[2]	✓[3]		✓[2]			

1. Supports selected standards on N5172B and N5182B. Please refer to specific product technical overviews for more information.
2. Supports only "file export" based waveform playback.
3. N5166B CXG supports only "file export" based waveform playback.
4. For more information regarding Signal Studio products and their supported hardware, please visit www.keysight.com/find/signalstudio_platforms.
5. For information regarding legacy Signal Studio (N76xxB) and their supported hardware, please visit Compatible Instruments for Signal Studio Products: Legacy.

Detection, Positioning, Tracking, and Navigation

			Benchtop					PXIe		AXIe
Current Model[3]	Communications Standard	Real-time Capability[1]	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	E8267D PSG	AP5041A AP5042A	M9410A M9411A M9415A M9416A VXT	M5300A AWG	M8190A AWG
N7609C	Global Navigation Satellite Systems (GNSS)	✓	✓[2]	✓[2]	✓[3]	✓		✓[2]		
N7620B	Pulse Building			✓	✓[4]					

1. Supports selected standards on N5172B and N5182B. Please refer to specific product technical overviews for more information.
2. Supports only "file export" based waveform playback.
3. N5166B CXG supports only "file export" based waveform playback.
4. N5166B CXG does not support this application.
5. For more information regarding Signal Studio products and their supported hardware, please visit www.keysight.com/find/signalstudio_platforms.
6. For information regarding legacy Signal Studio (N76xxB) and their supported hardware, please visit Compatible Instruments for Signal Studio Products: Legacy.

General Purpose

			Benchtop					PXIe		AXIe
Current Model [3]	Communications Standard	Real-time Capability[1]	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	E8267D PSG	AP5041A AP5042A	M9410A M9411A M9415A M9416A VXT	M5300A AWG	M8190A M8195AAWG
N7605C	Real-Time Fading	✓			✓[3]					
N7608C	Custom Modulation		✓	✓	✓	✓	✓[2]	✓[2]		✓
N7614C	Power Amplifier Test	✓			✓[3]	✓[4]		✓		✓

1. Supports selected standards on N5172B and N5182B. Please refer to specific product technical overviews for more information.
2. Supports only "file export" based waveform playback.
3. N5166B CXG does not support this application.
4. For Power Amplifier test, E8267D only supports the DPD and CFR. It can also be used as up-converter with M8190A for wideband DPD solution.
5. For more information regarding Signal Studio products and their supported hardware, please visit www.keysight.com/find/signalstudio_platforms.
6. For information regarding legacy Signal Studio (N76xxB) and their supported hardware, please visit Compatible Instruments for Signal Studio Products: Legacy.

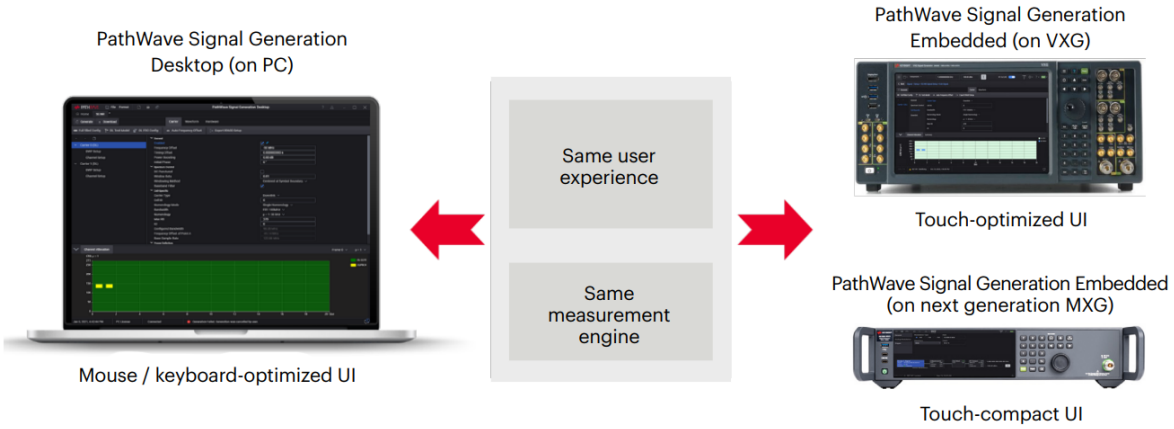
Next-Generation Signal Creation

What is PathWave Signal Generation?

Keysight PathWave Signal Generation is Keysight's next-generation signal-generation software. It offers two types of applications: Desktop and Embedded. It unifies various signal-generation applications by providing a consistent and optimized user experience from R&D through manufacturing to enable smoother collaboration.

PathWave Signal Generation Desktop (PWSG Desktop) runs on a PC, similar to Signal Studio, for creating and downloading generated waveforms to various signal generators.

PathWave Signal Generation Embedded (PWSG Embedded) is fully integrated with the firmware of Keysight's next generation signal generators, including the M9484C VXG and N5186A MXG, eliminating the need for external PCs and simplifying test setups.



- Supports multiple radio formats in a single application software.
- Provides the same user experience and measurement engines across Desktop and Embedded versions.
- Generates encrypted waveforms (*.wfm) for downloading or playback.
- Includes a hardware driver that performs waveform download and setup for playback.
- Provides a high-DPI display with scaling support.

PathWave Signal Generation Desktop

PWSG Desktop runs on a PC like Signal Studio and can create and download generated waveforms into various signal generators. It is integrated software, which supports multiple radio formats in a single application and generates encrypted waveforms (*.wfm) for downloading or playback. It also includes a hardware driver that performs waveform download and setup for playback.

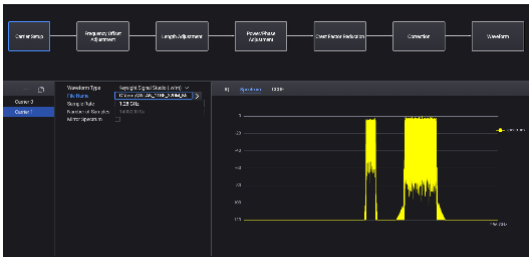
	Benchtop			PXIe	AXIe	
Description	M9484C VXG	N5186A MXG	N5172B EXG N5182B MXG N5166B CXG	M9410A M9411A M9415A M9416A VXT	M8190A AWG	M8195A AWG
5G NR	✓	✓	✓	✓	✓	
Advanced Waveform Utility (AWU)	✓	✓	✓	✓	✓	✓
NR V2X	✓	✓	✓	✓	✓	

1. PathWave Signal Generation Desktop doesn't require a license if you only need creating and exporting the waveforms. You will need N76xxEMBC license installed inside signal generators to save and offline playback the saved waveforms.

PathWave Signal Generation Advanced Waveform Utility (AWU)

Essential Features (Free to Use)

- Import Keysight encrypted waveforms (*.wfm) or user defined waveforms (*.bin, *.txt/.csv/.dat, *mat, *wv)
- Users can make resampling or specify time scale factor
- Support SCPI command
- Download waveforms with correction to specified signal generator (X-series SG, PXU VXT, VXG)
- View waveform graph (Spectrum, Time Domain, CCDF)
- Export waveform files (*.wfm)



Premium Features (Required License N7618APPC)

- Support three kinds of guided calibration methods (Channel Equalization, IQ Calibration, Multi-tone Calibration)
- Traditional channel equalization using the modulated reference signal (requires 89601200C/89601AYAC)
- IQ calibration using reference sequence mainly for external IQ modulator (requires 89601200C)
- Multi-tone calibration using multi-tone signals which won't be limited by signal generator and signal analyzer's bandwidth (requires 89601200C)
- Users can directly import 89600 VSA's EQ frequency response trace as correction file (csv file)
- Support waveform segments summing in time domain
- Support multi-carrier summing in frequency domain
- Support crest factor reduction (CFR)
- Export bin file when all imported waveforms are unencrypted

PathWave Signal Generation Embedded

PathWave Signal Generation Embedded (PWSG Embedded) is the integrated signal-generation application available on Keysight's next-generation signal generators, including the M9484C VXG and the N5186A MXG. Designed for streamlined workflows and reduced system complexity, PWSG Embedded enables direct signal creation from within the instrument firmware — eliminating the need for external PCs and simplifying test setups.

The M9484C VXG is dual-channel microwave vector signal generator supporting frequencies up to 110 GHz and signal bandwidths up to 2.5 GHz. The N5186A MXG offers a compact, four-channel architecture with frequency coverage up to 8.5 GHz and 960 MHz modulation bandwidth per channel.

The following table lists the currently available PWSG Embedded applications. This portfolio will continue to expand, providing broader support for emerging standards and evolving test requirements.

PWSG Embedded	Description	Key Features
N7602AP1C (for VXG only)	GSM/EDGE Modulation	Provides real-time GSM/EDGE modulation configuration
N7605AP0C (for VXG only)	3GPP MIMO fading	Provides fading profiles for 3GPP 5G NR FR1, FR2, and LTE.
N7605APPC (for VXG only)	Custom fading	Customizes the fading profile using the *.tdlx files exported from the Keysight Channel Studio tapped delay line (TDL) modeling tool to configure parameters and applies real-time custom fading on signals for receiver testing
N7608APPC (for VXG and MXG) E7608APPC (for MXG only)	Custom modulation (Custom IQ only)	Provides custom modulation settings.
N7609APPC (for VXG only)	GNSS	Simulates global navigation satellite systems (GNSS) and test scenarios
N7617APPC (for VXG and MXG)	WLAN	Provides standard-based signals for WLAN 802.11ax/be/bn
N7620APPC (for VXG only)	Pulse Building	Simulates radar signals for single emitter
N7621APPC (for VXG and MXG) E7621APPC (for MXG only)	Multitone and NPR	Provides multitone and NPR functionality.
N7624APPC (for VXG only)	LTE-A FDD	Generates compliant LTE-A FDD uplink and PRACH signals
N7625APPC (for VXG only)	LTE-A TDD	Generates compliant LTE-A TDD uplink and PRACH signals
N7631APPC (for VXG and MXG) E7631APPC (for MXG only)	5G NR/5G-Advanced	Provides the 5G NR/5G-Advanced signal creation
N7632APPC (for VXG only)	NR-V2X	Provides 3GPP standard compliance NR-V2X signals
N7641APPC (for VXG and MXG) E7641APPC (for MXG only)	Avionics	Create and customize four types of avionics signals — VOR, ILS localizer, ILS glide slope, and marker beacon
N7642APPC (for VXG and MXG) E7642APPC (for MXG only)	IQ Based AM, FM, phase modulation	Provides basic analog modulation function for AM / FM / PM with waveform, rate, AM depth and FM / PM deviation settings.
N7653APPC (for VXG and MXG) E7653APPC (for MXG only)	Automatic channel response correction and S-parameter de-embedding	Provides correction that you can add from supported file formats (.s2p, .csv, .uflat) or by direct measurement using one of the supported power sensors (power meter, spectrum analyzer, network analyzer).

Flexible Licensing Terms

Keysight offers licensing models designed to fit your workflow and budget. Each license type is available as either a perpetual license or a subscription license, as shown in the table below.

Subscription licenses include a valid support contract, ensuring access to technical assistance and software updates throughout the subscription period.

Perpetual licenses provide long-term ownership; a separate support contract is required to maintain access to 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. You may transfer this license 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 a certified USB dongle, which you can purchase 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, you may purchase multiple licenses.	140% of node-locked (floating single site) 200% of node-locked (floating single region) 250% of node-locked (floating worldwide)
Perpetual	Software license for use in perpetuity.	
Subscription	Software license is limited to a defined period, such as 12 months.	38% of perpetual for a 12-month license
Support contract for perpetual licenses	Allows license holder access to Keysight technical support and all software upgrades.	15% of perpetual for 12 months of support
Waveform pack	License and play back individual waveforms created using the Keysight	

License Term	License Type	Software License	KeysightCare Support Subscription
Perpetual	Node-locked	SW1000-LIC-0x[1]	SW1000-SUP-0x[1] included
	Transportable		
	USB portable		
	Floating perpetual (single site)		
	Floating perpetual (single region)		
	Floating perpetual (worldwide)		
Subscription	Node-locked	SW1000-SUP-0x[2]	SW1000-SUP-0x[2]
	Transportable		
	USB portable		
	Floating perpetual (single site)		
	Floating perpetual (single region)		
	Floating perpetual (worldwide)		

1. Durations available 12 / 24 / 36 / 48 / 60 months.
2. Durations available 3 / 6 / 12 / 24 / 36 months.

PathWave Signal Generation Ordering Information

Flexible licensing options are provided to support a wide range of signal-generation workflows using PathWave Signal Generation and Signal Studio software. Whether you need embedded applications, waveform playback, or scalable waveform deployment, the following license types are designed to meet your specific needs.

PWSG Embedded Licenses (N/E76xxAPPC)

This type of license is required to enable PWSG Embedded applications running on the Keysight vector signal generators, M9484C VXG or N5186A MXG.

- N76xxAPPC applies to M9484C VXG and N5186A MXG
- E76xxAPPC applies to N5186A MXG.

PWSG Embedded Application	Required Licenses	Supported Instrument
GSM/EDGE modulation	N7602AP1C	M9484C VXG
3GPP MIMO fading	N7605AP0C	M9484C VXG
Custom fading	N7605APPC	M9484C VXG
Custom modulation (Custom IQ only)	N7608APPC	M9484C VXG, N5186A MXG
	E7608APPC	N5186A MXG
GNSS	N7609APPC	M9484C VXG
WLAN	N7617APPC	M9484C VXG, N5186A MXG
Pulse building	N7620APPC	M9484C VXG
Multitone and NPR	N7621APPC	M9484C VXG, N5186A MXG
	E7621APPC	N5186A MXG
LTE-A FDD	N7624APPC	M9484C VXG
LTE-A TDD	N7625APPC	M9484C VXG
5G NR/5G-Advanced	N7631APPC	M9484C VXG, N5186A MXG
	E7631APPC	N5186A MXG
NR-V2X	N7632APPC	M9484C VXG
Avionics	N7641APPC	M9484C VXG, N5186A MXG
	E7641APPC	N5186A MXG
Based AM, FM, phase modulation	N7642APPC	M9484C VXG, N5186A MXG
	E7642APPC	N5186A MXG
Automatic channel response correction and S-parameter de-embedding	N7653APPC	M9484C VXG, N5186A MXG
	E7653APPC	N5186A MXG

Waveform Playback Licenses (N76xxEMBC)

This type of license enables playback of encrypted waveforms on supported platforms, including signal generators, PXIe VXT modules, AWGs and more. This license is essential for executing waveforms created in PathWave Signal Generation and Signal Studio software.

N76xxEMBC licenses also support Signal Studio real-time mode, ensuring seamless operation for real-time signal generation scenarios.

Signal Studio Model	Communications Standard	Real-Time Capability	Required License
	Cellular Communications		
N7600C	W-CDMA / HSPA+	●	N7600EMBC[1]
N7601C	cdma2000® / 1xEV-DO	●	N7601EMBC[1]
N7602C	GSM / EDGE / Evo	●	N7602EMBC[1]
N7612C	TD-SCDMA / HSPA		N7612EMBC
N7624C	LTE / LTE-A FDD	●	N7624EMBC[1]
N7625C	LTE / LTE-A TDD	●	N7625EMBC[1]
N7626C	LTE V2X		N7626EMBC
N7630C	5GTF (pre-5G)		N7630EMBC
	Wireless Connectivity		
N7606C	Bluetooth® (BR, EDR, 4.0 / 4.2, BT5, BT5.1 (AoA and AoD), BT5.3, BT6		N7606EMBC
N7607C	DFS and DAA radar profile		N7607EMBC
N7610C	IoT (Internet of Things) (Wi-SUN, ZigBee®, Z-Wave, LoRa, and HRP UWB)		N7610EMBC
N7615C	Mobile WiMAX™		N7615EMBC
N7617C	WLAN 802.11 a / b / g / j / p / n / ac / ah / af / ax / be / bn		N7617EMBC
N7637C	mmWave WLAN 802.11ad / ay		N7637EMBC
	Video, Audio, and Radio Test		
N7611C	Broadcast radio (FM Stereo/RDS, DAB, T-DMB)	●	N7611EMBC[1]
N7623C	Digital video (w / DOCSIS3.1)	●	N7623EMBC[1]
N7640C	Land-mobile radio		N7640EMBC
	Detection, Positioning, Tracking, and Navigation		
N7609C	Global navigation satellite systems (GNSS)	●	N7609EMBC[1]
N7620B	Pulse building		N7620EMBC
	General Purpose		
N7605C	Real-time fading	●	N7605EMBC[1]
N7608C	Custom modulation (Custom IQ and OFDM)		N7608EMBC
N7614C	Power amplifier test	●	N7614EMBC[1]
N7621B	Multitone distortion		N7621EMBC

1. N76xxEMBC licenses support both waveform playback mode and real-time mode for Signal Studio.
2. Exported waveform files (*.wfm) require a valid license (N76xxAPPC, N76xxEMBC, or 5-/50-pack) in the instrument to playback.

Waveform Pack Licenses (5-Pack / 50-Pack)

Waveform pack licenses are ideal for cost-effective deployment in a manufacturing environment.

- Each of these licenses is tied to a single instrument and available in packs of 5 waveforms (5-pack) or 50 waveforms (50-pack).
- Multiple packs can be installed on the same instrument using different option numbers (for example, -22x for 5-pack, -25x for 50-pack).
- Supports various signal formats for flexible production testing.

Instrument Model	5-Pack Required License	50-Pack Required License
M9484C VXG	N7650B-22x[1]	N7650B-25x[1]
N5186A MXG	N7650B-22x[1]	N7650B-25x[1]
N5182B MXG	N5182B-22x[1]	N5182B-25x[1]
N5172B EXG	N5172B-22x[1]	N5172B-25x[1]
N5166B CXG	N5166B-22x[1]	N5166B-25x[1]

1. x ranges from 1 to 9. For example, when you need three 5-pack waveforms, you can order -221, -222 and -223, on the same instrument.

PathWave Signal Generation Subscription Bundles

For short-term needs across multiple applications, Keysight offers subscription bundles that include several application licenses. Time-limited bundles are also available for customers with perpetual licenses who need temporary access to additional capabilities.

You can choose from predefined bundles or select the license types and subscription durations to match your project requirements. For more information, refer to Subscription Bundles Promotion.

For maximum flexibility, subscription bundles allow you to select any three or five licenses from waveform playback or application list in the following table. The supported licenses may change as new applications are introduced, or old ones are discontinued.

Bundle Description	Model Number	PathWave Signal Generation Licenses Included
5G and 4G Waveform Playback Bundle	N7689EM1C	• N7624EMBC: LTE / LTE-A / LTE-A Pro FDD • N7625EMBC: LTE / LTE-A TDD • N7631EMBC: 5G NR
Wireless Connectivity Waveform Playback Bundle	N7689EM2C[2]	• N7606EMBC: Bluetooth® • N7607EMBC: DFS radar profiles • N7610EMBC: IoT • N7617EMBC: WLAN 802.11
2G and 3G Waveform Playback Bundle	N7689EM4C	• N7600EMBC: W-CDMA / HSPA+ • N7601EMBC: cdma2000 / 1xEV-DO • N7610EMBC: GSM / EDGE / Evo • N7612EMBC: TD-SCDMA / HSPA
C-V2X Waveform Playback Bundle	N7689EM5C	• N7609EMBC: GNSS • N7626EMBC: LTE/LTE-A/LTE-A Pro FDD • N7632EMBC: NR V2X
5 G and 4G Embedded Application Bundle	N7689AP1C	• N7624APPC: LTE FDD (UL/PRACH) • N7625APPC: LTE TDD (UL/PRACH) • N7631APPC: 5G NR
Pick Any 3 or 5 Waveform Playback Bundle	N7689EAXC	Pick any 3 or 5 from N76xxEMBC waveform playback licenses N7600EMBC, N7601EMBC, N7602EMBC, N7605EMBC N7606EMBC, N7607EMBC, N7608EMBC, N7609EMBC N7610EMBC, N7611EMBC, N7612EMBC, N7614EMBC N7615EMBC, N7617EMBC, N7620EMBC, N7623EMBC, N7624EMBC, N7625EMBC, N7626EMBC, N7630EMBC, N7631EMBC N7632EMBC, N7637EMBC, N7640EMBC
Pick Any 3 or 5 Embedded Application Bundle	N7689PAXC	Pick any 3 or 5 from N76xxAPPC or E76xxAPPC licenses For M9484C VXG N7605APPC, N7605AP0C, N7608APPC, N7609APPC, N7617APPC, N7620APPC, N7621APPC, N7624APPC, N7625APPC, N7631APPC, N7632APPC, N7641APPC, N7642APPC, N7653APPC, N7618APPC For N5186A MXG E7608APPC, E7621APPC, E7631APPC, E7641APPC, E7642APPC, E7653APPC, N7618APPC

1. The subscription bundles support only the node-locked license type.
2. The subscription duration can be 6, 12, 24 or 36 months.

Try Before You Buy!

Free 30-day trials of Signal Studio or PathWave Signal Generation software provide unrestricted use of the features and functions: www.keysight.com/find/SignalStudio_trial

Additional Resources

Hardware Configurations

To learn more about compatible hardware and required configurations, please visit:

www.keysight.com/find/SignalStudio_platforms

PC Requirements

You need a PC to run Signal Studio or PathWave Signal Generation Desktop software.

Model Numbers and Options

To learn more about Signal Studio or PathWave Signal Generation licensing, model numbers, and options, please visit PathWave Signal Generation.

Software Download

www.keysight.com/find/signalstudio_software

PathWave Signal Generation (PWSG) Desktop Software

M9484C VXG Vector Signal Generator Instrument Software

N5186A MXG Signal Generator Instrument Software

Software 30-day Free Trial

To redeem Signal Studio application or PWSG Embedded application 30-day free trial license for your existing signal generators where available, please visit:

www.keysight.com/find/signalstudio_trial