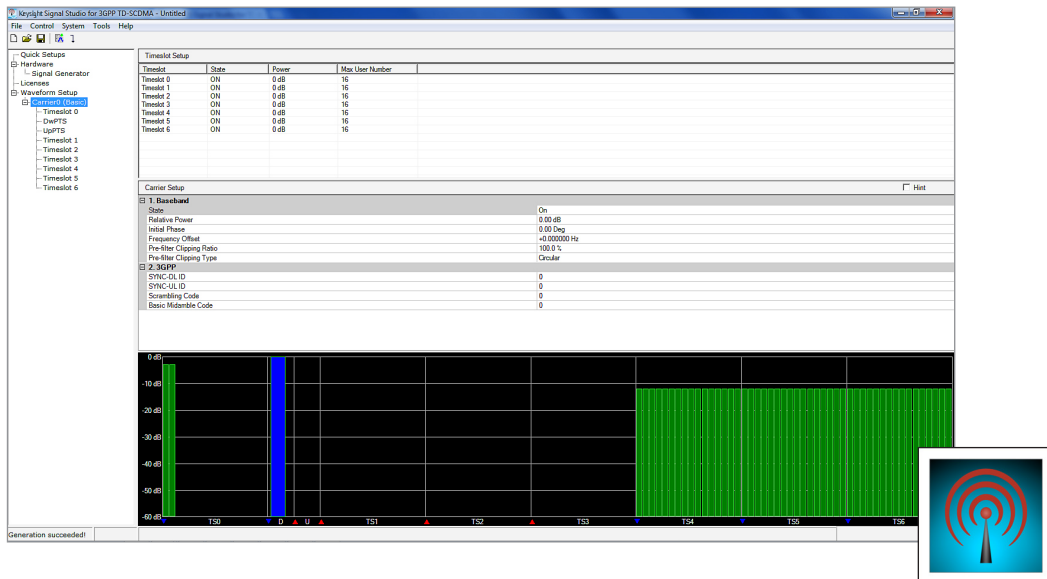


# Keysight Technologies

## Signal Studio for TD-SCDMA/HSPA N7612B

### Technical Overview



- Create Keysight Technologies, Inc. validated and performance optimized reference signals compliant to the 3GPP 1.28 Mcps TDD and TD-SCDMA/HSPA
- All 3GPP physical and transport channels for TD-SCDMA/HSPA and HARQ, CQI and ACK/NACK functionality in HSPA mode
- Use predefined reference measurement channels (RMC) and fixed reference channels (FRC) to perform UE and BTS receiver conformance testing
- Licensing that fits your specific use case, timeframe and budget
- Easy-to-use, application-specific graphical interface for configuring signals
- Accelerate the signal creation process with a user interface based on parameterized and graphical signal configuration and tree-style navigation

## Simplify TD-SCDMA/HSPA Signal Creation

Keysight Signal Studio software is a flexible suite of signal-creation tools that will reduce the time you spend on signal simulation. For TD-SCDMA/HSPA, Signal Studio's performance-optimized reference signals—validated by Keysight—enhance the characterization and verification of your devices. Through its application-specific user-interface you'll create standards-based and custom test signals for component, transmitter, and receiver test.

### Component and transmitter test

Signal Studio's basic capabilities use waveform playback mode to create and customize waveform files needed to test components and transmitters. Its user friendly interface lets you configure signal parameters, calculate the resulting waveforms and download files for playback. The applications for these partially coded, statistically correct signals include:

- Parametric test of components, such as amplifiers and filters
- Performance characterization and verification of RF sub-systems

### Receiver test

Signal Studio's advanced capabilities enable you to create fully channel-coded signals for receiver bit-error-rate (BER), or block-error-rate (BLER) analysis.

Applications include:

- Performance verification and functional test of receivers, during RF/baseband integration and system verification
- Coding verification of baseband subsystems, including FPGAs, ASICs, and DSPs

### Apply your signals in real-world testing

Once you have setup your signals in Signal Studio, you can download them to a variety of Keysight instruments. Signal Studio software complements these platforms by providing a cost-effective way to tailor them to your test needs in design, development and production test.

- Vector signal generators
  - MXG X-Series
  - EXG X-Series
  - PSG
  - ESG
  - M9381A PXIe VSG
- Wireless test sets
- PXB baseband generator and channel emulator
- M8190A arbitrary waveform generator
- M9420A PXIe vector transceiver
- Waveform Creator software
- SystemVue simulation software

### Typical Measurements

Test components with basic capabilities:

- IMD / NPR
- ACLR
- CCDF
- EVM
- Modulation accuracy
- Code domain power
- Channel power
- Occupied bandwidth

Verify receivers with advanced capabilities:

- Sensitivity
- Maximum input level
- Selectivity
- Blocking
- Intermodulation
- Power control

## Component and Transmitter Test



Figure 1. Typical component test configuration using Signal Studio's basic capabilities with a Keysight X-Series signal generator and an X-Series signal analyzer

Signal Studio's basic capabilities enable you to create and customize TD-SCDMA/HSPA signals to characterize the power and modulation performance of your components and transmitters on BTS and UE. Easy manipulation of a variety of signal parameters, including switching point, code domain power, and modulation type, simplifies signal creation.

- Create spectrally-correct signals for ACLR, channel power, spectral mask, and spurious testing
- Set parameters such as channel power and data channel modulation type (QPSK, 16QAM, 64QAM) for modulation verification and analysis, such as EVM tests
- Configure multi-carrier waveforms, each with modulation type, frequency offsets, timing offsets, power, baseband filter, and cell ID
- View CCDF, spectrum and time domain graphs to investigate the effects of power ramps, modulation formats, power changes, clipping, and other effects on device performance
- Simultaneously turn off all uplink and downlink timeslots to meet the requirements of power amplifier tests
- Generate slot-length based waveforms to help make fast PA tests with a waveform sequence.
- Use pre-defined Fixed Reference Channel(FRC) for UE component and transmitter tests

## Receiver Test

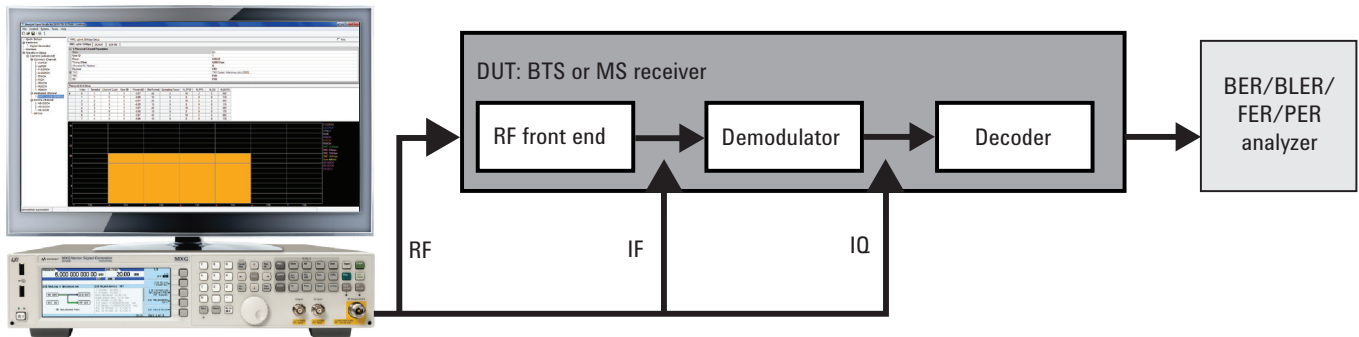


Figure 2. Generate fully channel-coded signals to evaluate the BER, BLER, PER, or FER of your receiver with Keysight X-Series signal generators and Signal Studio's advanced capabilities

Signal Studio's advanced capabilities address applications in TD-SCDMA/HSPA receiver test, including the verification of baseband designs and the integration of the baseband and RF modules. Using waveform playback mode enables transport-channel coding to validate BTS and UE receiver characteristics and performance.

### BTS receiver testing

- Choose from a variety of pre-defined reference measurement channel (RMC) and FRC configurations for BTS receiver conformance testing
- Turn on the DPCH0 state to simulate multiple UE co-existence
- Customize rate matching attributes in the RMC configurations
- Configure uplink signals and HARQ feedback in HSDPA mode
- Set TFCI value based on BTS receiver configurations
- Advanced functional testing with HSUPA channels including E-PUCH, E-AGCH and E-HICH with transport layer coding
- Pre-defined uplink multi-code per standard requirement

### UE receiver testing

- Choose a pre-defined reference measurement channel (RMC) configuration for early baseband verification
- Create HS-DSCH, HS-SCCH and HS-PICH in HSDPA mode
- Customize rate matching attributes in the RMC configurations
- Set TFCI values based on BTS receiver configurations
- Select downlink transmission CRC size, channel coding type and TTI value

### TD-SCDMA BTS testing

The 3GPP TS25.142 specification defines how to test TD-SCDMA base station transmitters and receivers.

To address the challenges of testing TD-SCDMA components and receivers, Signal Studio for TD-SCDMA/HSPA enables you to generate multiple carriers and standard compliant reference measurement channels. The user interface allows you to adjust the carrier spacing, power offset, number of carriers, channel coding type, CRC size, and TFCI value to meet your test needs.

## Features Summary

<b>TD-SCDMA/HSPA</b>	<b>Component &amp; transmitter testing</b>	<b>Receiver testing</b>
<b>Signal Studio</b>	<b>Basic waveform playback mode</b>	<b>Advanced waveform playback mode</b>
TD-SCDMA	●	●
TD-HSDPA	●	●
Calibrated AWGN	●	●
Code domain and CCDF graphs	●	●
Multi-carrier timing and clipping	●	●
Short length waveform	●	●
<b>Downlink</b>		
Up to 12 carriers	●	●
Preconfigured RMC signals		●
PDSCH selectable modulations: QPSK, 8PSK, 16QAM, 64QAM	●	●
DL-SCH selectable CRC size, TTI, channel coding type, TFCI		●
S1/S2 phase pattern selection	●	●
HS-DSCH, HS-DCCH, and HS-SICH generation		●
<b>Uplink</b>		
Up to 12 carriers	●	●
Preconfigured RMC/FRC signals with transport channel coding		●
PRACH signal generation		●
Selectable UL-SCH coding rate, CRC size, data payload		●
HSUPA channels (E-PUCH, E-AGCH, and E-HICH)		●

## Supported Standards

3GPP technical specification	Version
TS25.142	V11.4.0
TS25.221	V11.0.0
TS25.222	V11.0.0
TS25.321	V11.5.0
TS34.122	V11.6.0

### Base station conformance tests (3GPP TS25.142)

TD-SCDMA/HSPA Signal Studio	Component & transmitter testing	Receiver testing
	Basic waveform playback mode	Advanced waveform playback mode
Maximum output power	●	
Frequency stability	●	
Output power dynamics	●	
Transmit ON/OFF power	●	
Output RF spectrum emissions	●	
Transmit intermodulation	●	
Transmit modulation	●	
Reference sensitivity level Dynamic range		●
Adjacent Channel Selectivity (ACS)		●
Blocking characteristics		●
Intermodulation characteristics		●
Spurious emissions		●

## Performance Characteristics

### Definitions

#### Specification (spec):

Represents warranted performance of a calibrated instrument that has been stored for a minimum of 2 hours within the operating temperature range of 0 to 55 °C, unless otherwise stated, and after a 45 minute warm-up period. The specifications include measurement uncertainty. Data represented in this document are specifications unless otherwise noted.

#### Typical (typ):

Represents characteristic performance, which 80% of the instruments manufactured will meet. This data is not warranted, does not include measurement uncertainty, and is valid only at room temperature (approximately 25 °C).

#### Measured (meas):

An attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is not warranted and is measured at room temperature (approximately 25 °C).

The following performance characteristics apply to the instruments indicated in the respective tables. For performance characteristics of other instruments, refer to the respective product data sheet.

### ACLR performance

		N5172B and N5182B MXG				M9381A VSG	
		Standard		Option UNV		Standard	
Configuration	Offset	Specification (dBc)	Typical (dBc)	Specification (dBc)	Typical (dBc)	Measured (dBc)	Typical (dBc)
1 carrier	Adjacent (1.6 MHz)	-74.7	-75.6	-74.7	-75.2	-67.7	-67.2
	Alternate (3.2 MHz)	-76.2	-78.7	-76.2	-79.4	-75.0	-75.1
3 carrier	Adjacent (1.6 MHz)	-68	-71.5	-69.3	-71.6	-70.3	-69.0
	Alternate (3.2 MHz)	-69.7	-73.2	-71.3	-75	-74.5	-73.3
6 carrier	Adjacent (1.6 MHz)	-66.5	-69.7	-67.8	-71.1	-71.3	-70.2
	Alternate (3.2 MHz)	-66.4	-70.1	-68.6	-72.8	-74.4	-73.3

### EVM performance

	N5172B and N5182B with Option UNV	M9381A	M9420A
Configuration	Measured EVM	Typical EVM	Nominal EVM
1 carrier	< 0.37%	0.37% rms	< 0.5% rms

## Ordering Information

### Software licensing and configuration

Signal Studio offers flexible licensing options, including:

- **Fixed license:** Allows you to create unlimited I/Q waveforms with a specific Signal Studio product and use them with a single, specific platform.
- **Transportable/floating license:** Allows you to create unlimited I/Q waveforms with a specific Signal Studio product and use them with a single platform (or PC in some cases) at a time. You may transfer the license from one product to another.
- **Waveform license:** Allows you to generate up to 545 user-configured I/Q waveforms with any Signal Studio product and use them with a single, specific platform.

The table below lists fixed, perpetual licenses only; additional license types may be available. For detailed licensing information and configuration assistance, please refer to the Licensing Options web page at [www.keysight.com/find/SignalStudio\\_licensing](http://www.keysight.com/find/SignalStudio_licensing)

## N7612B Signal Studio for 3GPP TD-SCDMA/HSPA

Model-Option	Description
<b>Connectivity</b>	
N7612B-1FP	Connect to E4438C ESG signal generator
N7612B-2FP	Connect to E8267D PSG signal generator
N7612B-3FP	Connect to N5182B/72B MXG/EXG signal generator
N7612B-6FP	Connect to N5106A PXB baseband generator and channel emulator
N7612B-7FP	Connect to Keysight simulation software
N7612B-8FP	Connect to E6607 EXT wireless communications test set
N7612B-9FP	Connect to M9381A
<b>Capability</b>	
N7612B-EFP	Basic TD-SCDMA/HSPA
N7612B-QFP	Advanced TD-SCDMA/HSPA

### Try Before You Buy!

Free 30-day trials of Signal Studio software provide unrestricted use of the features and functions, including signal generation, with your compatible platform. Redeem a trial license online at

[www.keysight.com/find/SignalStudio\\_trial](http://www.keysight.com/find/SignalStudio_trial)

### Hardware configurations

To learn more about compatible hardware and required configurations, please visit: [www.keysight.com/find/SignalStudio\\_platforms](http://www.keysight.com/find/SignalStudio_platforms)

### PC requirements

A PC is required to run Signal Studio. [www.keysight.com/find/SignalStudio\\_pc](http://www.keysight.com/find/SignalStudio_pc)

### Signal Studio Software Updates

To update previously purchased N7612B software to include the latest feature updates, you can purchase the N7612B-MEU minor enhancement update fixed perpetual license.

For more information, visit

[www.keysight.com/find/N7612B-MEU](http://www.keysight.com/find/N7612B-MEU)



## Additional Information

### Websites

[www.keysight.com/find/SignalStudio](http://www.keysight.com/find/SignalStudio)

Access the comprehensive online documentation, which includes the complete software HELP

[www.keysight.com/find/N7612B](http://www.keysight.com/find/N7612B)

[www.keysight.com/find/SignalStudio](http://www.keysight.com/find/SignalStudio)

Keysight's TD-SCDMA and HSPA design and test solutions

[www.keysight.com/find/td-scdma](http://www.keysight.com/find/td-scdma)

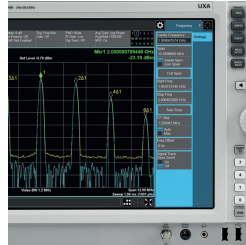
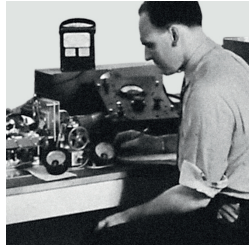
[www.keysight.com/find/HSPA](http://www.keysight.com/find/HSPA)

### Literature

*Signal Studio Software, Brochure*, literature number 5989-6448EN

## From Hewlett-Packard through Agilent to Keysight

For more than 75 years, we've been helping you unlock measurement insights. Our unique combination of hardware, software and people can help you reach your next breakthrough. **Unlocking measurement insights since 1939.**



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 A personalized view into the information most relevant to you.



### Three-Year Warranty

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 Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.



### Keysight Assurance Plans

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 Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

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#### Keysight Infoline

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 Keysight's insight to best in class information management. Free access to your Keysight equipment company reports and e-library.

### Keysight Channel Partners

[www.keysight.com/find/channelpartners](http://www.keysight.com/find/channelpartners)  
 Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

[www.keysight.com/find/N7612B](http://www.keysight.com/find/N7612B)