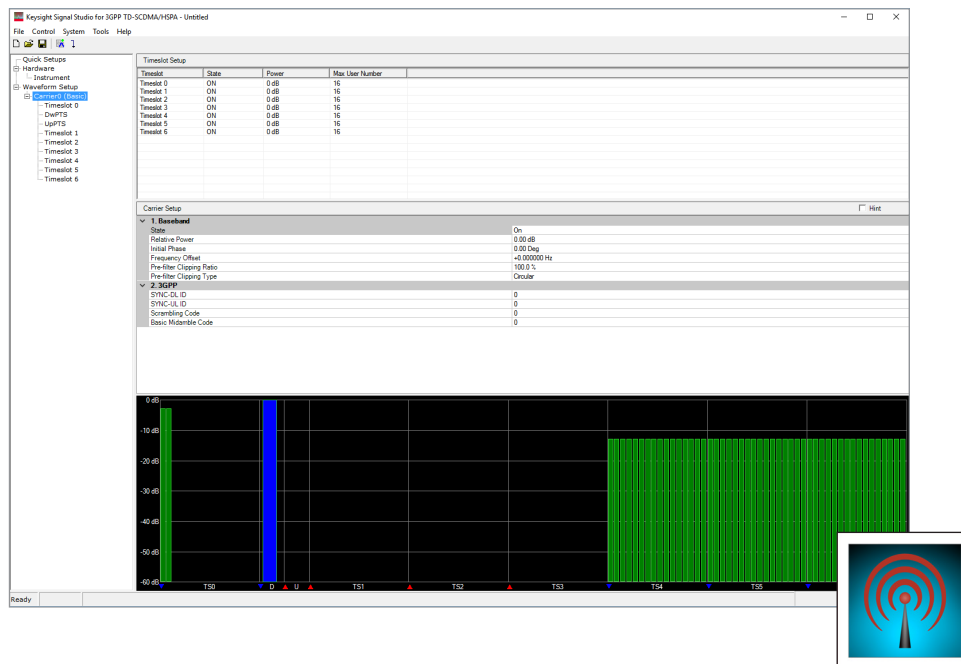


Keysight Technologies

Signal Studio for TD-SCDMA/HSPA

N7612C

Technical Overview



- Create Keysight validated and performance optimized reference signals compliant with 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
- Easy-to-use, application-specific graphical user 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

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
- E6640A EXM wireless test set
- M8190/95A arbitrary waveform generator
- M9420/21A PXIe VXT vector transceiver

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

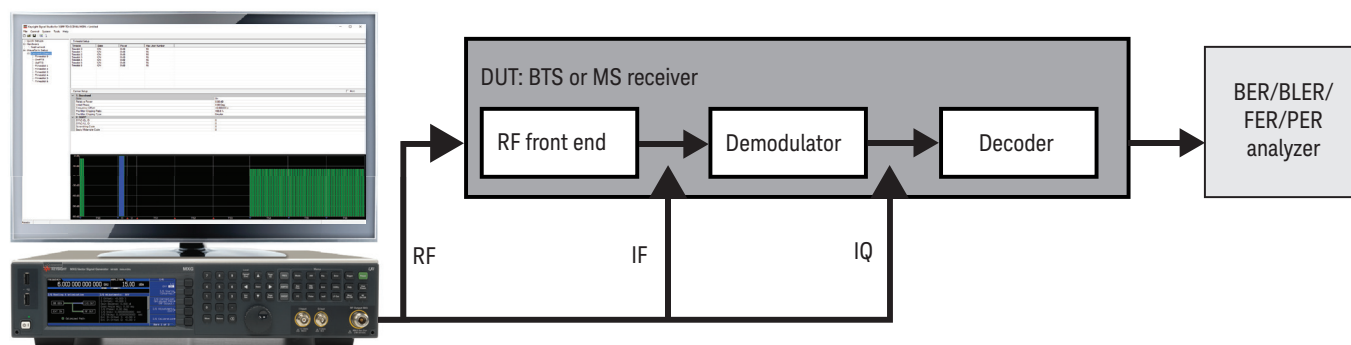


Figure 2. Generate fully channel-coded signals to evaluate the BER, BLER, PER, or FER of your receiver with Keysight X-Series signal generators and Signal Studio's advanced capabilities

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

TD-SCDMA/HSPA	Component & transmitter testing	Receiver testing
Signal Studio	Basic waveform playback mode	Advanced waveform playback mode
TD-SCDMA	✱	✱
TD-HSDPA	✱	✱
Calibrated AWGN	✱	✱
Code domain and CCDF graphs	✱	✱
Multi-carrier timing and clipping	✱	✱
Short length waveform	✱	✱
Downlink		
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		✱
Uplink		
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	Component & transmitter testing	Receiver testing
Signal Studio	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:

- **Node-locked:** Allows you to use the license on one specified instrument/computer.
- **Transportable:** Allows you to use the license on one instrument/computer at a time. This license may be transferred to another instrument/computer using Keysight's online tool.
- **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.
- **Time-based:** License is time limited to a defined period, such as 12-months.

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

N7612C Signal Studio for 3GPP TD-SCDMA/HSPA

Waveform playback licenses (N7612EMBC)

Software	Support Contract	Description
N7612EMBC-1FP	R-Y5B-001-A ²	Node-locked perpetual license
N7612EMBC-1FL	R-Y4B-001-L ¹	Node-locked 12-month license
N7612EMBC-1TP	R-Y5B-004-D ²	Transportable perpetual license
N7612EMBC-1TL	R-Y4B-004-L ¹	Transportable 12-month license

Software support subscription for perpetual licenses ³

Support Contract	Description
R-Y6B-001-L	12-months of support for node-locked licenses
R-Y6B-004-L	12-months of support for transportable licenses
R-Y6B-501	1-month of support for node-locked licenses (extension after 1 st year)
R-Y6B-504	1-month of support for transportable licenses (extension after 1 st year)

Hardware configurations

To learn more about compatible hardware and required configurations, please visit: www.keysight.com/find/SignalStudio_platforms

PC requirements

A PC is required to run Signal Studio. www.keysight.com/find/SignalStudio_pc

Model numbers & options

To learn more about Signal Studio licensing, model numbers and options, please visit: www.keysight.com/find/signalstudio_model

1. All time-based software licenses include a 12-month support contract.
2. Support contracts must be purchased for all perpetual licenses in the first year. All software upgrades and KeysightCare support are provided for software licenses with valid support contracts.
3. After the first year, support contracts for all perpetual licenses may be extended with annual and monthly support extensions.

Websites

www.keysight.com/find/SignalStudio

www.keysight.com/find/N7612C

Comprehensive Online Documentation

www.keysight.com/find/signalstudio_support

Signal Studio and Signal Creation Software

www.keysight.com/find/signalstudio_software

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

www.keysight.com/find/td-scdma

www.keysight.com/find/HSPA

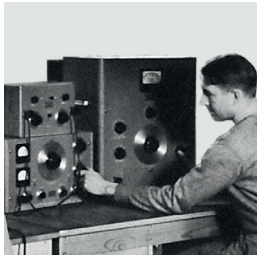
Literature

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

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