



# Agilent N7625B Signal Studio for 3GPP LTE TDD

## Technical Overview

### Create 3GPP TDD Test Waveforms with Ease

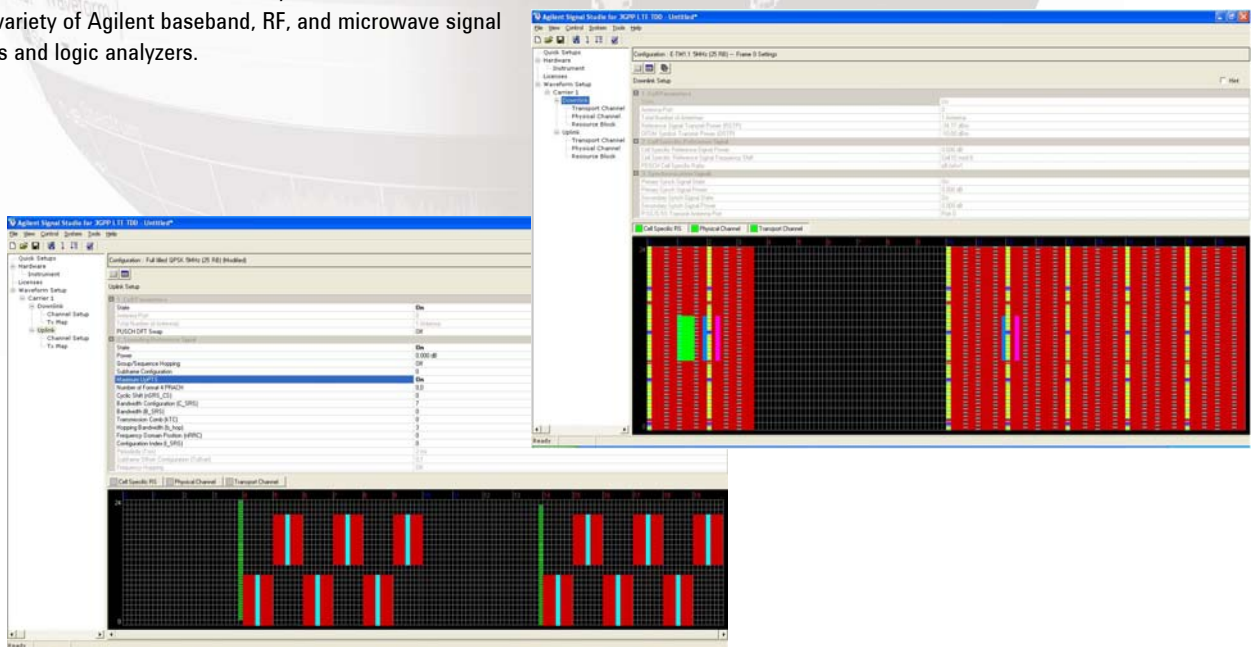
The N7625B Signal Studio for 3GPP LTE TDD software simplifies creation of standards compliant LTE waveforms by providing quick access to parameters in its easily mastered tree-style navigation of the signal structure. The waveform playback mode of the software creates physical layer and transport channel coded arbitrary waveform files. These waveforms are used for measuring EVM, ACLR, and CCDF for power amplifier testing and for measuring HARQ functionality and block error rate (BLER) for receiver testing.

Signal Studio for 3GPP LTE TDD provides a cost effective, scalable test solution that enables thorough characterization and validation of your LTE TDD devices at an excellent price/performance ratio. For multi-format devices, or as your test needs evolve, you get more out of your test equipment by using high performance general purpose signal generator platforms that support a wide range of applications, including cellular and wireless formats.

Use the N7625B software to download your LTE TDD waveform files to a variety of Agilent baseband, RF, and microwave signal generators and logic analyzers.

### Key Features

- Compliant to December 2009 3GPP LTE specification
- Basic mode with physical layer coded signals for eNB- or UE-component modulation and power testing
- Advanced mode with transport-channel coded signals for eNB or UE Rx testing
- Predefined setups for E-UTRA test models (E-TM) and fixed reference channels (FRC)



## Summary of Features

- **Compliant to December 2009 3GPP LTE specification**
- **Basic mode with physical layer coded signals for eNB- or UE-component modulation and power testing**
- **Advanced mode with transport-channel coded signals for eNB or UE Rx testing**
- **Predefined setups for E-UTRA test models (E-TM) and fixed reference channels (FRC)**
- All uplink / downlink and special subframe configurations
- Supports all bandwidths, modulation types, signals, and channels, including UE-specific RS
- Add AWGN to evaluate performance in real-world conditions

### Downlink Features

- Automatic downlink control information (DCI) coding based on PDSCH allocation, UE scheduling and random access, and UL power control
- Up to 4x4 MIMO (spatial multiplexing or TX diversity) with embedded fading, or real-time MIMO channel emulation with the PXB baseband generator and channel emulator
- Unique configuration for each code word, including data type, payload size, modulation type, and RV index
- HARQ testing with up to 15 simulated retransmissions
- UE-specific reference signal support
- PBCH encoded with master information block (MIB)

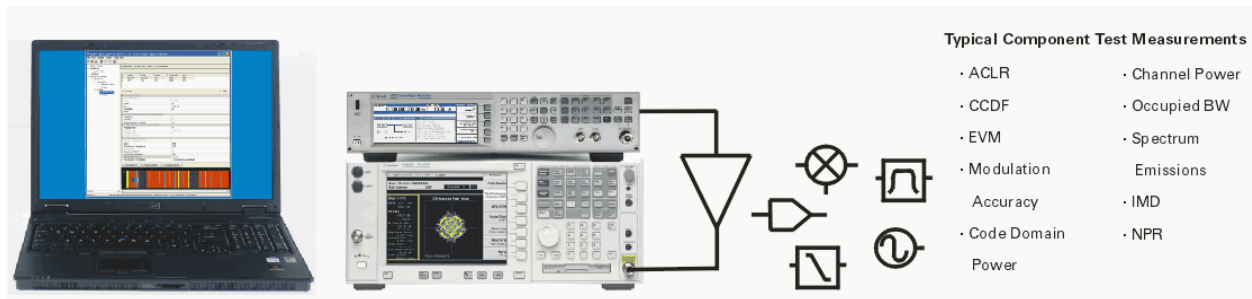
### Uplink Features

- Predefined configurations for all uplink Fixed Reference Channels (FRC), including multi-user PUCCH and PRACH
- Demodulation reference signal (DMRS) with group and sequence hopping
- Sounding Reference Signal (SRS) with frequency hopping, PUCCH with all formats, and multiple PRACH preambles
- PUSCH frequency hopping and UL control information multiplexing with PUSCH

### Uplink Features (continued)

- User-defined RV index sequence for HARQ retransmission
- PRACH preamble configuration wizard

## Basic Capabilities for Component and Transmitter Test



The basic options for N7625B Signal Studio for 3GPP LTE TDD enables component and transmitter design and validation engineers to characterize modulation and power behavior and performance through metrics such as EVM, ACLR, and PAPR/CCDF under a wide variety of test conditions. Also, Signal Studio for 3GPP LTE TDD can be used for physical layer verification tests in RF receivers.

The easy-to-use Signal Studio graphical user interface provides quick access to LTE waveform parameters, including transmission bandwidth, cyclic prefix, and modulation type, enabling you to efficiently configure complex waveforms for testing LTE components.

For investigation of power and modulation characteristics under multiple test conditions, Signal Studio enables:

- Creation of spectrally correct signals for ACLR, channel power, spectral mask, and spurious testing
- Settable parameters such as channel power and data channel modulation type (BPSK, QPSK, 16QAM, 64QAM), for modulation verification and analysis such as EVM testing, including E-TMs.
- Multi-carrier signal generation, each with modulation type and bandwidth, oversampling ratio, frequency offsets, timing offsets, power, symbol roll-off length, baseband filter, and cell ID.
- CCDF graphs to investigate the effect of power ramps, modulation formats, power changes, clipping, etc on device performance. Refer to Figure 1 on page 4.

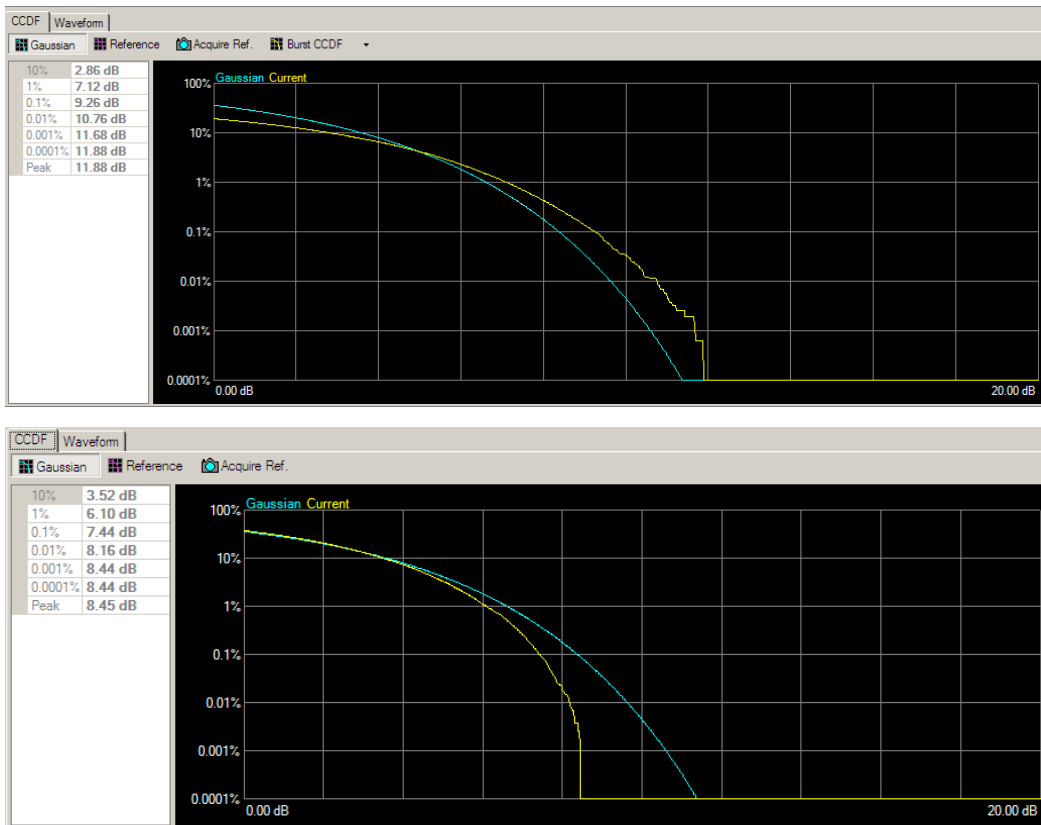
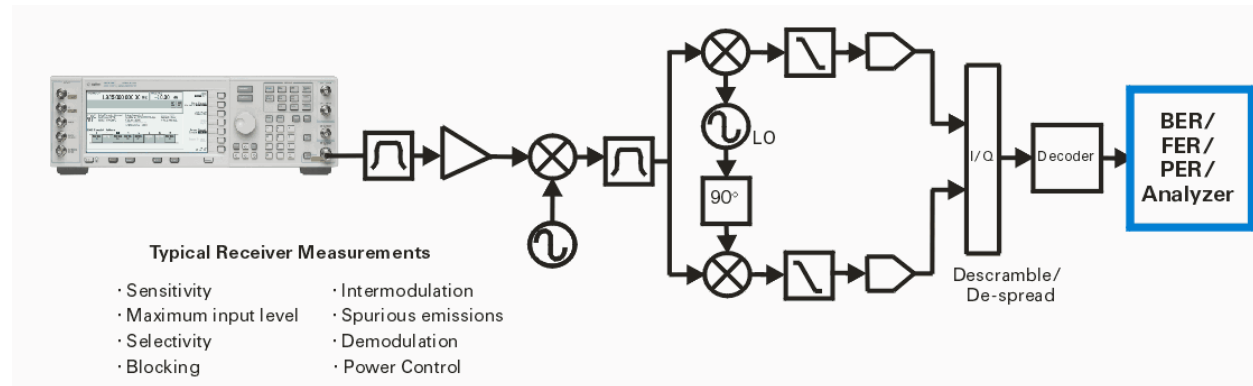


Figure 1. CCDF curves for an example custom-configured signals

## Advanced Capabilities for Receiver Test



For receiver design and verification, Signal Studio for 3GPP LTE TDD delivers signals to address applications in the design process, such as during Rx chipset design and verification or module integration and verification.

The advanced option QFP enables engineers working on evolved universal terrestrial radio access network base stations (eNBs), to validate uplink receiver characteristics and performance based on the 3GPP TS 36.141 conformance test document. Signal Studio accelerates and simplifies receiver conformance testing by generating uplink signals, including transport-channel coding. Pre-defined configurations include:

- FRC configurations for receiver requirement testing
- FRC configurations for performance requirement testing

The advanced carrier in Signal Studio uses a process- and incremental redundancy-based approach to payload data and its associated HARQ. Transport channel data is assigned to one or more processes, each with an initial redundancy variable (RV) index. For each ACK response sent to the eNB for a given process, RV index "0" is associated to that process. If a NACK response is sent to the eNB, the RV index is incremented based on a user-definable sequence.

The simulated ACK/NACK sequence and associated process retransmissions can be predefined in Signal Studio. When used in conjunction with the Agilent PXB, HARQ feedback (such as from an eNB) can be input from external CMOS 3.3V into the PXB.

Testing of UE receivers is simplified through Signal Studio, from SISO to MIMO. Downlink signals, including test models and FRC configurations are available as pre-defined configurations. Multiple signal generators are easily connected to Signal Studio, generating spatial multiplexing MIMO signals through a single user interface and configuration window. Signal Studio takes care of applying the correct parameters to each Tx antenna signal, eliminating the pain and uncertainty of trying to duplicate and setup each Tx antenna manually. Rx performance under different MIMO precoding matrix indices is easily configured, and static channel fading conditions can be generated within the arbitrary waveform. For dynamic signal manipulation and channel emulation, Signal Studio connects to the Agilent PXB for real-time MIMO fading.

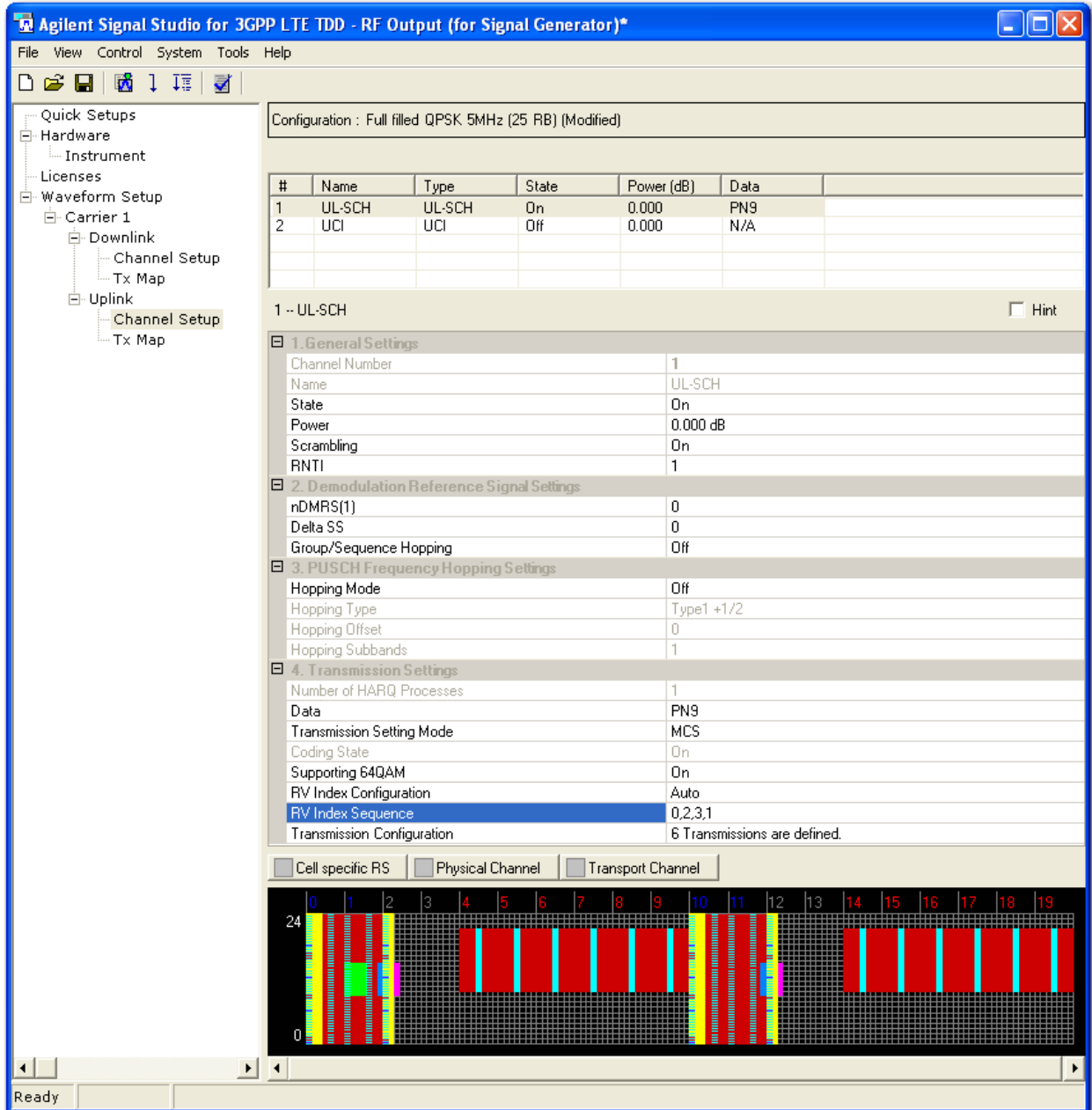


Figure 2. UL signal configuration shows user-defined RV index sequence

## 3GPP LTE eNB Conformance Tests

### Receiver Characteristics

Receiver Characteristics	Wanted Signal	Interfering Signal	Dynamic Range (between wanted & interferer)	Solution
7.2 Reference Sensitivity Level	FRC A1-1, 1-2, 1-3 QPSK Mod	None required for this test		Signal Studio
7.3 Dynamic Range	FRC A2-1, 2-2, 2-3 16QAM Mod	AWGN	Up to 12.7 dB	Signal Studio
7.4 In-Channel Selectivity	FRC 1-2, 1-3, 1-4, 1-5 QPSK Mod	E-UTRA with all BW	Up to 20.1 dB	Signal Studio
7.5 Adjacent Channel Selectivity	FRC A1-1, 1-2, 1-3 QPSK Mod	E-UTRA offsets up to 2.5 MHz <sup>1</sup>	48.1 dB	Signal Studio
7.5 Narrowband Blocking	FRC A1-1, 1-2, 1-3 QPSK Mod	E-UTRA Offsets up to 4.66 MHz <sup>1</sup>	51.1 dB	Signal Studio
7.6 Blocking (in-band)	FRC A1-1, 1-2, 1-3 QPSK Mod	Offsets up to 7.5 MHz <sup>1</sup>	57.1 dB	Signal Studio
7.6 Blocking (out-of-band)	FRC A1-1, 1-2, 1-3 QPSK Mod	CW Offsets up to 12.75 GHz	85.1 dB	Signal Studio with additional CW source
7.7 Receiver Spurious Emissions	NA	NA	NA	Spectrum Analyzer
7.8 Receiver Intermodulation	FRC A1-1, 1-2, 1-3 QPSK Mod	CW offset up to 7.5 MHz <sup>1</sup> & E-UTRA offset up to 18.2 MHz <sup>1</sup>	48.1 dB	Signal Studio (with PXB)
7.8 Receiver Intermodulation (Narrow Band Intermodulation)	FRC A1-1, 1-2, 1-3 QPSK Mod	CW offset up to 415 kHz <sup>1</sup> & E-UTRA offset up to 1780 kHz <sup>1</sup>	48.1 dB	Signal Studio (with PXB)

<sup>1</sup> From channel edge of wanted signal.

- Either ARB or real-time Signal Studio can be used
- Tests do not require channel emulation
- Test are performed open loop, i.e. no HARQ feedback required

## Performance Requirements

Performance Requirements	Wanted Signal	Notes	Feedback	Solution
8.2.1 PUSCH in Multipath Fading Propagation Conditions	FRC A3, A4, A5 QPSK, 16QAM, 64QAM	Multiple propagation profiles, interfering signal is AWGN	HARQ	Signal Studio with PXB
8.2.2. UL Timing Adjustment	FRC A7, A8 QPSK & 16QAM	Requires simulation of stationary UE and moving UE with moving propagation with ETU200 profile	HARQ & timing adjustment	Signal Studio with PXB
8.2.3 HARQ-ACK Multiplexed on PUSCH	FRC A3-1, A4-3 to A4-8 QPSK, 16QAM	Requires ETU70 profile	HARQ	Signal Studio with PXB
8.2.4 High Speed Train Conditions	FRC A3-2 to A3-7 QPSK	Requires high speed train channel emulation	HARQ	Signal studio with PXB
8.3.1 ACK Missed Detection for Single User PUCCH Format 1a	PUCCH ACK	Multiple propagation profiles; interfering signal is AWGN		Signal studio with PXB
8.3.2 CQI Missed Detection for PUCCH Format 2	PUCCH CQI	Interfering signal is AWGN		Signal studio with PXB
8.3.3 ACK Missed Detection for Multi User PUCCH Format 1a	PUCCH ACK	Requires 3 Interferers		Signal studio with PXB
8.4.1 PRACH False Alarm Probability and Missed Detection	PRACH Preamble	Requires 1x4 RX Diversity		Signal studio with PXB

- All tests require channel emulation and AWGN
- All tests require 1x2 RX diversity
- Real-time LTE Signal Studio is required for 8.2 tests
- ARB-based Signal Studio or Real-time LTE Signal Studio is required for 8.3 and 8.4 tests



## Supported Standards

N7625B Signal Studio for 3GPP LTE TDD supports the following 3GPP standard revisions:

<b>3GPP Functional Freeze Date</b>	<b>3GPP Technical Specification</b>	<b>Version</b>
December 2009	36.141	8.5.0
	36.211	8.9.0
	36.212	8.8.0
	36.521-1	8.4.0
March 2009	36.211	8.6.0
	36.212	8.6.0

## Basic and Advanced Capabilities Summary

Feature/Parameter	Basic	Advanced
LTE TDD support	●	●
PRACH with transport channel coding for BLER testing		●
Calibrated AWGN (requires instrument option)	●	●
Real-time modulation filter (ESG/MXG only)		●
Code domain and CCDF graphs	●	●
Multi-carrier timing, and clipping	●	●
<b>Downlink</b>		
Downlink MIMO configurations (up to 4x4)	●	●
Automatic DCI generation		●
ETM Setting Wizard for E-UTRA to match transmission tests	●	●
Preconfigured support for FRC signals		●
HARQ processing for DL-SCH		●
PDSCH selectable modulation: QPSK, 16QAM, 64QAM	●	
DL-SCH selectable MCS		●
<b>Uplink</b>		
Preconfigured support for FRC signals with transport channel coding		●
HARQ processing for UL-SCH (bundling of ACK/NACK)		●
PRACH signal generation, all formats	●	
User-definable HARQ and RV index transmission pattern		●

## Performance Characteristics

### N5162A/N5182A MXG Signal Generator with Option UNV

#### Signal Studio for 3GPP LTE TDD (2009-12) Distortion Performance

Radio Format: 1 carrier Basic LTE TDD Downlink

Frequencies measured: 1880 MHz, 1900 MHz, 1910 MHz, 1920 MHz, 1960 MHz, 2017.5 MHz, 2350 MHz, 2595 MHz

Power: -10 dBm

Bandwidth	E-UTRA Test Model/ Modulation	Offset E-UTRA	E-UTRA (dBc)	Offset UTRA	UTRA (dBc)
5 MHz	E-TM1.1 / QPSK	Adjacent (5 MHz)	-71.5 <sup>a</sup>	Adjacent (5 MHz)	-71.8 <sup>d</sup>
5 MHz	E-TM1.1 / QPSK	Alternate (10 MHz)	-72.7 <sup>a</sup>	Alternate (10 MHz)	-72.4 <sup>d</sup>
5 MHz	E-TM1.2 / QPSK	Adjacent (5 MHz)	-70.9 <sup>a</sup>	Adjacent (5 MHz)	-71.5 <sup>d</sup>
5 MHz	E-TM1.2 / QPSK	Alternate (10 MHz)	-72.8 <sup>a</sup>	Adjacent (10 MHz)	-72.4 <sup>d</sup>
10 MHz	E-TM1.1 / QPSK	Alternate (10 MHz)	-69.3 <sup>b</sup>	Adjacent (7.5 MHz)	-71.9 <sup>d</sup>
10 MHz	E-TM1.1 / QPSK	Alternate (20 MHz)	-70.3 <sup>b</sup>	Adjacent (12.5 MHz)	-71.8 <sup>d</sup>
10 MHz	E-TM1.2 / QPSK	Adjacent (10 MHz)	-69.2 <sup>b</sup>	Adjacent (7.5 MHz)	-71.9 <sup>d</sup>
10 MHz	E-TM1.2 / QPSK	Alternate (20 MHz)	-70.5 <sup>b</sup>	Alternate (12.5 MHz)	-71.7 <sup>d</sup>
20 MHz	E-TM1.1 / QPSK	Adjacent (20 MHz)	-66.5 <sup>c</sup>	Alternate (12.5 MHz)	-71.7 <sup>d</sup>
20 MHz	E-TM1.1 / QPSK	Alternate (40 MHz)	-66.7 <sup>c</sup>	Alternate (17.5 MHz)	-71.9 <sup>d</sup>
20 MHz	E-TM1.2 / QPSK	Adjacent (20 MHz)	-66.5 <sup>c</sup>	Adjacent (12.5 MHz)	-71.4 <sup>d</sup>
20 MHz	E-TM1.2 / QPSK	Alternate (40 MHz)	-66.8 <sup>c</sup>	Alternate (17.5 MHz)	-71.8 <sup>d</sup>

a. 4.515 MHz integration bandwidth used

b. 9.015 MHz integration bandwidth used

c. 18.015 MHz integration bandwidth used

d. 3.84 MHz integration bandwidth used

**N5162A/N5182A MXG Signal Generator with Option UNV (Continued)**

**Signal Studio for 3GPP LTE TDD (2009-12) EVM<sup>a</sup> Performance**

Radio Format: 1 carrier Basic LTE TDD Downlink

Frequencies measured: 1880 MHz, 1900 MHz, 1910 MHz, 1920 MHz, 1960 MHz, 2017.5 MHz, 2350 MHz, 2595 MHz

Power: -10 dBm

Bandwidth	Modulation	E-UTRA Test Model	Measurement	Measured EVM
5 MHz	64QAM - 1RB	E-TM2	64QAM EVM	< 0.7 %
	64QAM - Full RB	E-TM3.1	64QAM EVM	
	16QAM	E-TM3.2	16QAM EVM	
	QPSK	E-TM3.2	QPSK EVM	
	QPSK	E-TM3.3	QPSK EVM	
	16QAM	E-TM3.3	16QAM EVM	
10 MHz	64QAM - 1RB	E-TM2	64QAM EVM	< 0.7 %
	64QAM - Full RB	E-TM3.1	64QAM EVM	
	16QAM	E-TM3.2	16QAM EVM	
	QPSK	E-TM3.2	QPSK EVM	
	QPSK	E-TM3.3	QPSK EVM	
	16QAM	E-TM3.3	16QAM EVM	
20 MHz	64QAM - 1RB	E-TM2	64QAM EVM	< 0.78 %
	64QAM - Full RB	E-TM3.1	64QAM EVM	
	16QAM	E-TM3.2	16QAM EVM	
	QPSK	E-TM3.2	QPSK EVM	
	QPSK	E-TM3.3	QPSK EVM	
	16QAM	E-TM3.3	16QAM EVM	

a. Symbol timing adjust: max of EVM window start/end.

## Recommended Configuration

### N5162A MXG ATE vector signal generator

#### N7625B Signal Studio software with the following options<sup>1</sup>:

N7625B-EFP	Basic 3GPP LTE TDD (Release 8) capability
N7625B-QFP	Advanced 3GPP LTE TDD (Release 8) capability
N7625B-3FP	Connectivity to the N5162A MXG ATE vector signal generator

#### N5162A MXG ATE with the following options:

N5162A <sup>2</sup>	N5162A MXG ATE vector signal generator
N5162A-503	250 kHz to 3 GHz frequency range
N5162A-652 <sup>3</sup>	Internal baseband generator (60 MSa/s) up to 48 MHz RF bandwidth
N5162A-019	Increase baseband generator memory to 64 MSa

#### Other N5162A MXG ATE options to consider:

N5162A-403 <sup>4</sup>	Calibrated AWGN
N5162A-506	250 kHz to 6 GHz frequency range
N5162A-654 <sup>3</sup>	Internal baseband generator (125 MSa/s) for up to 100 MHz bandwidth
N5162A-UNV <sup>5</sup>	Enhanced dynamic range
N5162A-1EA	High output power (for PA testing)
N5162-1EQ	Low output power (for Rx testing)
N5162A-UNZ	Fast switching (for manufacturing environments)

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<sup>1</sup> Recommended options are for a fixed, perpetual license; transportable and time-based license options are also available.

<sup>2</sup> N5162A requires firmware revision A.01.40 or later. If using with the PXB, firmware A.01.44 or later is required. Download firmware from [www.agilent.com/find/upgradeassistant](http://www.agilent.com/find/upgradeassistant).

<sup>3</sup> Options 652 and 654 are not required if are using the PXB to play your waveforms.

<sup>4</sup> Option 403 is not required if you are using the PXB to play your waveforms. The PXB has a separate AWGN option that is included in the N5106A-2B2 bundle. To use AWGN on the ESG or MXG without the PXB, option 403 is required.

<sup>5</sup> For improved ACP performance.

## N5182A MXG vector signal generator

### N7625B Signal Studio software with the following options<sup>1</sup>:

N7625B-EFP	Basic 3GPP LTE TDD (Release 8) capability
N7625B-QFP	Advanced 3GPP LTE TDD (Release 8) capability
N7625B-3FP	Connectivity to the N5182A MXG vector signal generator

### N5182A MXG with the following options:

N5182A <sup>2</sup>	N5182A MXG vector signal generator
N5182A-503	250 kHz to 3 GHz frequency range
N5182A-652 <sup>3</sup>	Internal baseband generator (60 MSa/s) for up to 48 MHz RF bandwidth
N5182A-019	Increase baseband generator memory to 64 MSa

### Other N5182A MXG options to consider:

N5182A-403 <sup>4</sup>	Calibrated AWGN
N5182A-506	250 kHz to 6 GHz frequency range
N5182A-654 <sup>3</sup>	Internal baseband generator (125 MSa/s) for up to 100 MHz RF bandwidth
N5182A-UNV <sup>5</sup>	Enhanced dynamic range
N5182A-1EA	High output power (for PA testing)
N5182-1EQ	Low output power (for Rx testing)
N5182A-UNZ	Fast switching (for manufacturing environments)

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1 Recommended options are for a fixed, perpetual license; transportable and time-based license options are also available.

2 N5182A requires firmware revision A.01.10 or later for the basic capabilities and firmware revision A.01.20 or later for the advanced capability. If using with the PXB, firmware A.01.44 or later is required. Download firmware from [www.agilent.com/find/upgradeassistant](http://www.agilent.com/find/upgradeassistant).

3 Options 652 and 654 are not required if are using the PXB to play your waveforms.

4 Option 403 is not required if you are using the PXB to play your waveforms. The PXB has a separate AWGN option that is included in the N5106A-2B2 bundle. To use AWGN on the ESG or MXG without the PXB, option 403 is required.

5 For improved ACP performance.

## E4438C ESG vector signal generator

### N7625B Signal Studio software with the following options<sup>1</sup>:

N7625B-EFP	Basic 3GPP LTE TDD (Release 8) capability
N7625B-QFP	Advanced 3GPP LTE TDD (Release 8) capability
N7625B-1FP	Connectivity to the E4438C ESG vector signal generator

### E4438C ESG with the following options:

E4438C <sup>2</sup>	E4438C ESG vector signal generator
E4438C-503	250 kHz to 3 GHz frequency range
E4438C-601	Internal baseband generator (8 MSa memory)

### Other N5182A MXG options to consider:

E4438C-403	Calibrated noise (AWGN)
E4438C-602	Internal baseband generator (64 MSa memory)

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<sup>1</sup> Recommended options are for a fixed, perpetual license; transportable and time-based license options are also available.

<sup>2</sup> E4438C requires firmware revision C.04.86 or later. If using with the PXB, firmware C.05.23 or later is required. Download firmware from [www.agilent.com/find/upgradeassistant](http://www.agilent.com/find/upgradeassistant).

<sup>3</sup> Option 403 is not required if you are using the PXB to play your waveforms. The PXB has a separate AWGN option that is included in the N5106A-2B2 bundle. To use AWGN on the ESG or MXG without the PXB, option 403 is required.

## Agilent 16800/16900 logic analyzer and N5343A/N5344A DigRF solution

Use the N7625B Signal Studio application to generate and download custom waveforms to your Agilent 16800/16900 series logic analyzer or N5343A/N5344A DigRF solution. The integration of DigRF logic analysis tools with Agilent N7625B Signal Studio for 3GPP LTE TDD provides a cross-domain solution to help you rapidly deploy your DigRF based designs.

### N7625B Signal Studio software with the following options<sup>1</sup>:

N7625B-R7L	Connectivity to the 16800/16900 logic analyzer and the N5343A/N5344A DigRF solution.
N7625B-R80	Basic LTE TDD release 8 capability for the 16800/16900 logic analyzer and the N5343A/N5344A DigRF solution.
N7625B-R89	Advanced LTE TDD release 8 capability for the 16800/16900 logic analyzer and the N5343A/N5344A DigRF solution.

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<sup>1</sup> Recommended options are for a fixed, perpetual license; transportable and time-based license options are not available for 16800/16900 logic analyzers or N5343A/N5344A DigRF solutions.

## Agilent N5106A PXB baseband generator and channel emulator

Download standards-based 3GPP LTE TDD waveforms from the N7625B Signal Studio for 3GPP LTE TDD software to the Agilent N5106A PXB baseband generator and channel emulator and apply these waveforms to simulate real-world channel conditions for your DUT with single channel and multiple channel coexistence configurations.

### N7625B Signal Studio software with the following options<sup>1</sup>:

N7625B-6FP	Connectivity to the N5106A PXB baseband generator and channel emulator ( <i>required</i> ) <sup>2</sup>
N7625B-EFP	Basic 3GPP LTE TDD (Release 8) capability
N7625B-QFP	Advanced 3GPP LTE TDD (Release 8) capability
N7625B-WFP	Advanced 3GPP LTE TDD Real Time (Release 8) capability

### N5106A PXB with the following options (both of the following bundles are required for verifying MIMO performance)

N5106A-2B2	2x2 MIMO baseband generation and channel emulation bundle
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This bundle includes:

N5106A-616	6 DSP blocks on 3 baseband cards
N5106A-634	4 I/O channels - 4 analog I/Q out and 4 digital on 2 I/O cards
N5106A-EFP	Baseband Generation
N5106A-JFP	Calibrated AWGN
N5106A-QFP	Fading and SISO channel models
N5106A-LTE	LTE MIMO software application bundle

This bundle includes<sup>2</sup>:

N5106A-TFP	LTE channel models
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<sup>1</sup> Recommended options are for a fixed, perpetual license; transportable and time-based license options are also available.

<sup>2</sup> The N5106A-LTE bundle is required for MIMO testing and includes options N7625B-6FP and N5106A-TFP.



**MIMO Considerations**

For MIMO testing with the PXB, refer to the PXB online documentation.

The recommended configurations listed above can be used for MIMO test setups using multiple signal generators with synchronized waveform playback. For some applications such as beamforming or long-term tests, it may be desirable to have more precise baseband timing alignment (error of less than one cycle of the baseband generator clock) and/or RF phase coherency between the signal generators. The E4438C ESG signal generator has special options available to provide these capabilities. The N5182A MXG and N5162A MXG ATE provide precise baseband timing alignment as a standard feature, and Option 012 provides LO IN/OUT for RF phase coherency. For more information about the performance of various hardware configurations for MIMO testing, see the MIMO Characteristic Performance Analysis in the online documentation. This topic includes links to detailed descriptions of the following hardware configurations:

- Multiple Antennas Solution without Baseband Timing or Phase Coherence for MxN MIMO
- Multiple Antennas Solution with Baseband Timing Alignment without Phase Coherence for MxN MIMO
- Multiple Antennas Solution with Baseband Timing Alignment and RF Phase Coherence for MxN MIMO

## Free Trials

Try the software today. Evaluate the user interface and generate signals for 14-days prior to purchase.

### To evaluate the user interface

- Every Signal Studio software package can be installed on your PC
- No license is required

### To generate signals<sup>1</sup>

- One-time, 14-day free trial license
- Enables signal generation on MXG, ESG, or PSG vector signal generators
- 14-day clock starts upon license redemption
- Enables the playback of waveforms on a specific signal generator
- Enables all optional capabilities in the software
- Can be redeemed for multiple signal generators, one per instrument serial number

### To redeem a trial license<sup>2</sup>

- Method 1: Go to [www.agilent.com/find/signalstudio](http://www.agilent.com/find/signalstudio), select a Signal Studio product, and then select “Free Trial License”
- Method 2: Install the Signal Studio software and select “Get a Free Trial” in the Online Documentation main menu

### Upon trial license expiration

- The trial license will expire 14 days after it is redeemed
- Upon expiration, the signal generator no longer generates signals created by the Signal Studio software
- To continue generating signals, a right-to-use license must be purchased

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<sup>1</sup> Most Signal Studio software products offer a free trial license. The product summary table indicates which Signal Studio products offer a free 14-day trial.

<sup>2</sup> Internet access is required. You will be navigated to the Agilent Software Licensing website.

## Flexible Right-to-Use Licenses

Signal Studio software can be installed on multiple users' PCs to create signals for use with Agilent instruments equipped with right-to-use licenses. Flexible right-to-use licensing options are available to meet your specific test needs, schedules, and budget requirements.<sup>1</sup>

### Transportable, perpetual license

- Enables generation of the signals created by a specific Signal Studio product on a specific instrument, at any one time
- License is transportable from one instrument to another up to 10 times per month
- Permanent ownership of license
- Ideal for cost-effective single/multi-user, multi-instrument use cases
- Transportable licenses are priced at only a 30% premium relative to fixed, perpetual license

### Fixed, time-based license<sup>2</sup>

- Enables generation of the signals created by a specific Signal Studio product on a specific instrument
- License is fixed to a single instrument (not transportable)
- Time-perishable lease of license (1 month)
- Ideal for cost-effective single/multi-user, single-instrument short term and project based use cases
- 1-month time-based licenses are priced at 10% of the fixed, perpetual license

### Fixed, perpetual license

- Enables generation of the signals created by a specific Signal Studio product on a specific instrument
- License is fixed to a single instrument (not transportable)
- Permanent ownership of license
- Ideal for single/multi-user, single-instrument use cases

### Waveform license<sup>3</sup>

- Enables generation of up to 545 user-configured Signal Studio I/Q waveform files
- License I/Q waveform files from any N76xxB Signal Studio software product on a specific instrument
- License is fixed to a single instrument (not transportable)
- Permanent ownership of license
- Ideal for cost-effective deployment of Signal Studio test signals in manufacturing
- Available in packs of 5 or 50 waveform licenses
- Evaluate each of the waveforms for up to 48 hours before assigning individual licenses

<sup>1</sup> Each Signal Studio software license enables signal generation on a specific signal generator (i.e. model number and serial number) at any one time. The Product summary table lists the right-to-use licenses available for each Signal Studio software product.

<sup>2</sup> Upon license expiration, the instrument stops generating signals created by the specific Signal Studio software product. To continue generating signals on the instrument, a new right-to-use license must be purchased. Time-based licenses cannot be upgraded to enable additional capability after initial purchase.

<sup>3</sup> Only available on N5182A MXG, N5162A MXG ATE, or E4438C ESG vector signal generators; up to 9 Waveform 5-packs (MXG/ESG Options 221-229); up to 10 Waveform 50-packs (MXG/ESG Options 250-259)

## Additional Information

### Explore the Online Documentation

For more information about this Signal Studio software, explore the online documentation (help), which includes this technical overview, release notes, user interface descriptions, tutorials, installation information, and an easy-to-use configuration assistant to help you determine the right option combination for your test needs. Access the online documentation at:

[www.agilent.com/find/n7625b](http://www.agilent.com/find/n7625b)

### Related Websites

Signal Creation Software

[www.agilent.com/find/signalstudio](http://www.agilent.com/find/signalstudio)

Agilent's LTE Design and Test Solutions

[www.agilent.com/find/lte](http://www.agilent.com/find/lte)

### Related Literature

*Move Forward to What's Possible in TD-LTE*, Brochure, 5990-4245EN

<http://cp.literature.agilent.com/litweb/pdf/5990-4245EN.pdf>

*Move Forward to What's Possible in LTE*, Brochure, 5989-7817EN

<http://cp.literature.agilent.com/litweb/pdf/5989-7817EN.pdf>

*Agilent 3GPP Long Term Evolution*, Application Note, 5989-8139EN

<http://cp.literature.agilent.com/litweb/pdf/5989-8139EN.pdf>

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

<http://cp.literature.agilent.com/litweb/pdf/5989-6448EN.pdf>

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France	0825 010 700*
	*0.125 €/minute
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Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
Switzerland	0800 80 53 53
United Kingdom	44 (0) 118 9276201

Other European Countries:

[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

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