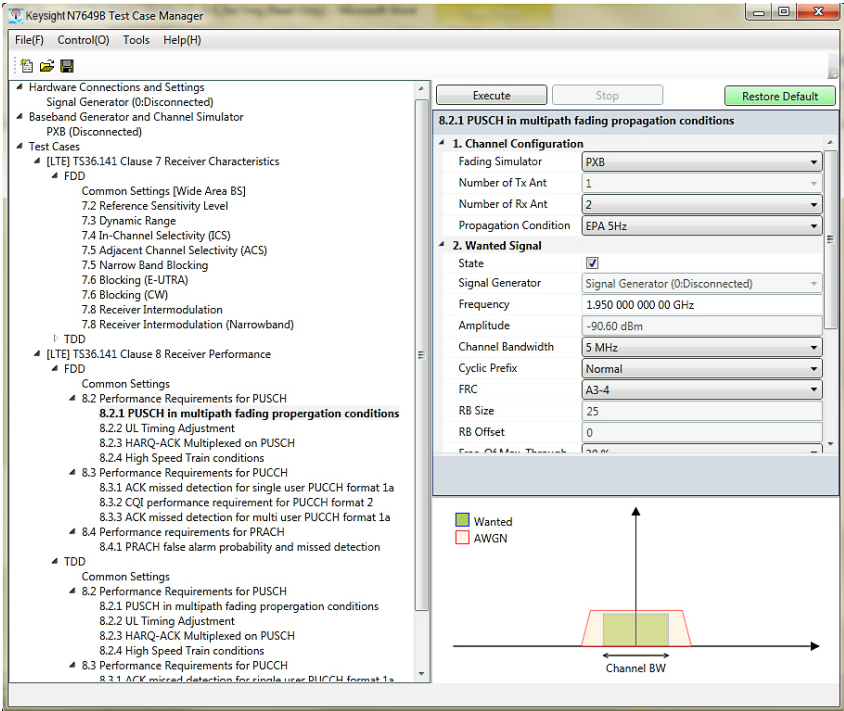


Keysight Technologies

Test Case Manager N7649B

Technical Overview



Overview

- Predefined standard-based conformance test setups save time and give you confidence that your measurements are standard-compliant
- Generate wanted and interference signals using single or multiple signal generators with ease
- SCPI command list expedites test automation
- Accelerate the signal creation process with an intuitive user interface
- Supports LTE eNB receiver test for FDD and TDD
- Supports W-CDMA BTS receiver characteristics testing

Simplified Conformance Test Configuration

Keysight Technologies, Inc. Test Case Manager is software that provides a simple and easy-to-use user interface and works with the Keysight Signal Studio software to perform standard-required conformance tests. Test Case Manager (TCM) reduces the time you spend on configuration by creating signals compliant with the conformance test requirements and automatically setting up the signal generators.

Simple user interface

TCM lists the test cases in the left pane of the user interface, as shown in Figure 1. By clicking on one of the test cases, you can bring up properties with modifiable parameters in the right pane. It lists a minimum set of parameters to modify. Based on the chosen parameters, TCM automatically configures the rest of the parameters according to the standard requirements, reducing ambiguity and operating errors.

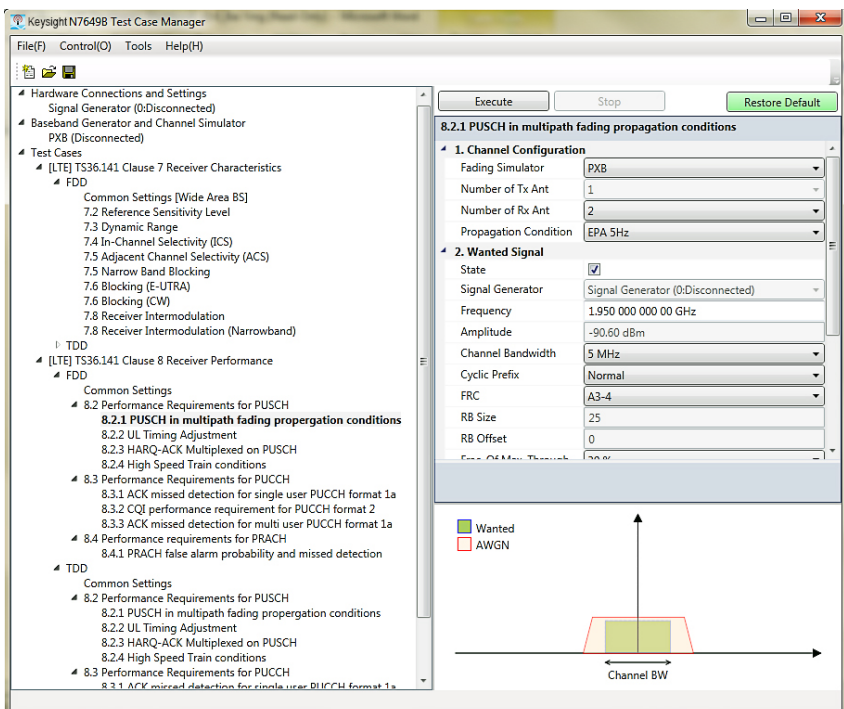


Figure 1. Test Case Manager main window.

Controls multiple instruments

Some tests require the use of multiple instruments, such as when it is necessary to generate both wanted and interferer signals, making operation of the instruments more complicated. With TCM, controlling multiple instruments is very easy. You can register multiple instruments in the connection list and give them unique names that can be easily identified. You can quickly alternate control of the different instruments by using the drop down menu. Configured instrument lists are stored in a setup file and can be recalled when needed.

SCPI log

TCM logs all of the SCPI commands it uses to control the signal generators and generated waveforms are stored in the local folder. The SCPI log and generated waveform files can also be used to automate test without using Test Case Manager.

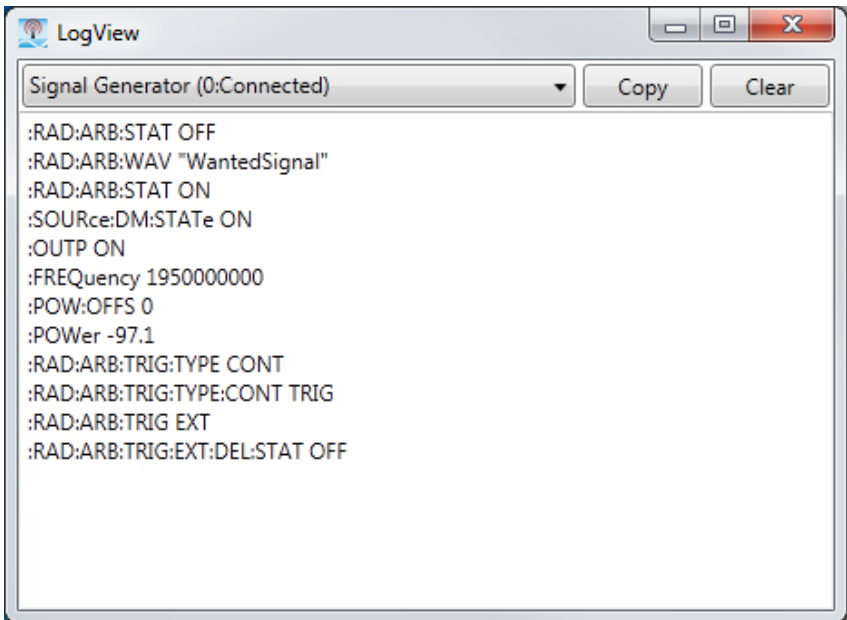


Figure 2. SCPI Log viewer provides useful information to help automate conformance tests.

Base Station Receiver Test

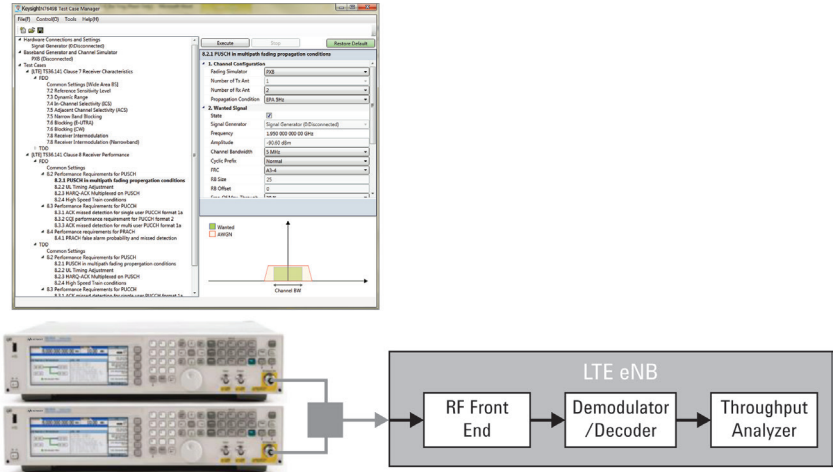


Figure 3. Typical Base Station receiver characteristics test configuration using Test Case Manager with Option ETP, FTP and X-series signal generators.

To perform receiver conformance tests, simply select one of the test cases listed on the left side of the window and specify a few sets of minimum required parameters, such as wanted frequency or system channel bandwidth. The rest of the parameters are automatically determined according to the 3GPP standard. TCM uses Signal Studio to generate standard compliant waveforms based on a specified parameter. It then downloads the waveforms and configures one or more signal generator settings such as amplitude or frequency, based on the standard requirements. You can define all necessary settings required to perform complex receiver characteristics tests and more complex configurations with fading, MIMO, and closed-loop HARQ for clause 8 performance tests using Test Case Manager, thereby significantly simplifying tasks.

LTE FDD and TDD eNB receiver test (Option ETP)

TCM supports LTE base station (eNB) receiver test cases that are defined in TS36.141 clause 7 “Receiver Characteristics” and clause 8 “Performance Requirements”.

Supported test cases

The following test cases are supported:

| The following test cases are supported according to TS 36.141 V 09.11.0 (2012-09) for clause 7 and TS 36.141 V 10.12.0 (2013-09) for clause 8: | | |
|--|---------------------------------------|--|
| 7.2 | Reference Sensitivity Level | 8.2.1 PUSCH in multipath fading propagation conditions |
| 7.3 | Dynamic Range | 8.2.2 UL timing adjustment |
| 7.4 | In-Channel Selectivity (ICS) | 8.2.3 HARQ-ACK multiplexed on PUSCH |
| 7.5 | Adjacent Channel Selectivity (ACS) | 8.2.4 High-Speed Train conditions |
| 7.5 | Narrow Band Blocking | 8.3.1 ACK missed detection for single user PUCCH format 1a |
| 7.6 | Blocking (E-UTRA Interferer) | 8.3.2 CQI missed detection for PUCCH format 2 |
| 7.6 | Blocking (CW Interferer) | 8.3.3 ACK missed detection for multi user PUCCH format 1a |
| 7.8 | Receiver Intermodulation | 8.4.1 PRACH false alarm probability and missed detection |
| 7.8 | Receiver Intermodulation (Narrowband) | |

Test Case Manager supports both FDD and TDD duplex modes of LTE. You can switch between the duplex modes simply and quickly with 1 click on the test case listed on the left-hand side of the window.

W-CDMA BTS receiver characteristics test (Option FTP)

TCM supports W-CDMA BTS receiver test cases that are defined in TS25.141 clause 7.

Supported test cases

The following test cases are supported:

The following test cases are supported according to TS 25.141 V 12.1.0 (2013-09)

| | |
|-----|--|
| 7.2 | Reference Sensitivity Level |
| 7.3 | Dynamic Range |
| 7.4 | Adjacent Channel Selectivity (ACS) |
| 7.5 | Narrow Band Blocking |
| 7.5 | In Band Blocking |
| 7.5 | Out Band Blocking |
| 7.6 | Intermodulation Characteristics |
| 7.6 | Intermodulation Characteristics (Narrowband) |

Signal graphic

The graphic at the bottom of the window shows the position of wanted and interference signals, helping you to easily and quickly review and verify the current settings.

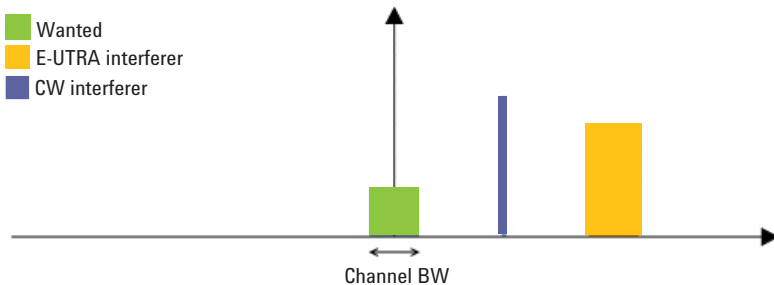


Figure 4. Signal graphic for TS36.141 7.8 receiver intermodulation test.

Single signal generator operation

In option ETP, you can combine wanted and interference signals into a single waveform and generate signals from a single signal generator, simplifying the physical connection and reducing the cost of test. The dynamic range between wanted and interference signals will be limited in single signal generator operation mode. The maximum offset frequency of the interferer will also be limited to the baseband bandwidth of the signal generator.

With Option FTP for W-CDMA BTS receiver test, only multiple signal generator operation mode is supported.

Hardware, Software, and License Requirements

Signal Studio Option requirements

For TS36.141 clause 7 receiver characteristics test only

| Model-Option | Description |
|---|--|
| – N7624B-1FP or 3FP ¹ , HFP, SFP | Signal Studio for LTE and LTE-Advanced FDD (Basic and Advanced R9) |
| – N7625B-1FP or 3FP ¹ , EFP, QFP | Signal Studio for LTE and LTE-Advanced TDD (Basic and Advanced R9) |

1. 1FP for E4438C, 3FP for N5182A/B or N5172B.

For both TS36.141 clause 7 and 8 tests

| Model-Option | Description |
|---|----------------------------------|
| – N7624B-3FP or 6FP ¹ , WFP ² | Advanced LTE FDD R9 Real-Time UL |
| – N7625B-3FP or 6FP ¹ , WFP ² | Advanced LTE TDD R9 Real-Time UL |

1. 3FP for N5182B/N5172B, 6FP for N5106A.

2. No waveform playback licenses required. Real-time option can play back arbitrary waveforms generated by Test Case Manager.

For TS25.141 clause 7 receiver characteristics test

| Model-Option | Description |
|--|---|
| – N7600B-1FP or 3FP ¹ , EFP, FFP, QFP | Signal Studio for W-CDMA/HSPA+ (Basic and Advanced) |

1. 1FP for E4438C, 3FP for N5182A/B or N5172B.

Supported signal generators and recommended options

For TS36.141, TS25.141 clause 7 receiver characteristics test

| Model-Option | Description |
|--|--|
| Wanted, E-UTRA interferer, CW interferer | |
| – N5182B-506, 656, (657 ¹), 009, 1EQ, 403, UNV | MXG X-Series vector signal generator |
| – N5172B-506, 653, (655 ¹), 009, 403, UNV | EXG X-Series vector signal generator |
| – N5182A-506, 652, (654 ¹), 403, 1EQ, UNV, (019 ²) | First generation MXG vector signal generator |
| – E4438C-506, 601, (602 ^{1,2}), 403 | ESG-C vector signal generator |
| CW interferer for blocking test | |
| – N5183A-520 | MXG Microwave Analog Signal Generator |
| – E8257D-520, UNX | PSG analog signal generator |

1. Wider baseband bandwidth option is recommended for single SG operation that combines wanted and interferer as delta frequency is limited by baseband bandwidth.

2. Required by TS25.141 clause 7 receiver characteristics tests.

For both TS36.141 clause 7 and 8 tests

| Model-Option | Description |
|---|--------------------------------------|
| Using external fader | |
| – N5182B-506, 656, (657), 660 ¹ , 009, 1EQ, 403, UNV | MXG X-Series vector signal generator |
| – N5172B-506, 653, (655), 660 ¹ , 009, 403, UNV | EXG X-Series vector signal generator |

1. Only 1 unit with real-time signal generation option (660) is required for clause 8 closed loop test. Refer to clause 7 configuration for additional E-UTRA interferer SG.

| Model-Option | Description |
|--|--|
| Including MIMO and Channel Fading ³ | |
| – N5106A-622, 632 or 634 ¹ , EFP, JFP, QFP, TFP | PXB baseband generator and channel simulator |
| – N5182B-506 ² | MXG X-Series vector signal generator |
| – N5172B-506 ² | EXG X-Series vector signal generator |

1. Option 632 for 2x Rx antenna and Option 634 for 4x Rx antenna.

2. Same number of units as eNB Rx antenna are required.

3. Additional CW interferer required for clause 7 blocking test.

Ordering Information

Test Case Manager free trial

The N7649B Test Case Manager free 30-day trial license provides the majority of the TCM features and functions, including use of test case and hardware configurations. Redeem a free 30-day trial license online at:

www.keysight.com/find/n7649b_trial

Signal playback requires the related Signal Studio license.

Signal Studio software free trial

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

Software licensing and configuration

Test Case Manager offers the following licensing option:

| Model-Option | Description |
|--------------|---|
| N7649B-ETP | LTE FDD and TDD eNB Receiver Test, Transportable, Perpetual |
| N7649B-FTP | WCDMA BTS Receiver Characteristics Test, Transportable, Perpetual |

System requirements

- PC requirements
 - 200 MB HDD with 2.0 GB free disk space at runtime (5 GB or higher recommended)
 - 1024 x 768 screen resolution (1280 x 1024 or higher recommended)
- Operating system
 - Windows 7 Professional and Ultimate, Enterprise, 32-bit and 64-bit versions
 - Windows XP Professional, SP3 32-bit
- Additional required components:
 - Keysight License Manager version 3.7 or later
 - Keysight IO Libraries, version 15.5 or later
 - Microsoft .NET Framework 4.0
 - Microsoft .NET Framework 3.5 SP1

Additional Information

Websites

Access the comprehensive online documentation, which includes the complete software HELP, download the software, and request a trial license.

Test Case Manager

www.keysight.com/find/N7649b

Signal Studio for 3GPP LTE/LTE-Advanced TDD and FDD

www.keysight.com/find/N7625B

www.keysight.com/find/N7624B

Signal Studio for W-CDMA/HSPA+

www.keysight.com/find/N7600B

Keysight's LTE design and test solutions

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Keysight's W-CDMA/HSPA+ design and test solutions

www.keysight.com/find/WCDMA

Literature

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

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

Signal Studio Software, Brochure, 5989-6448EN

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