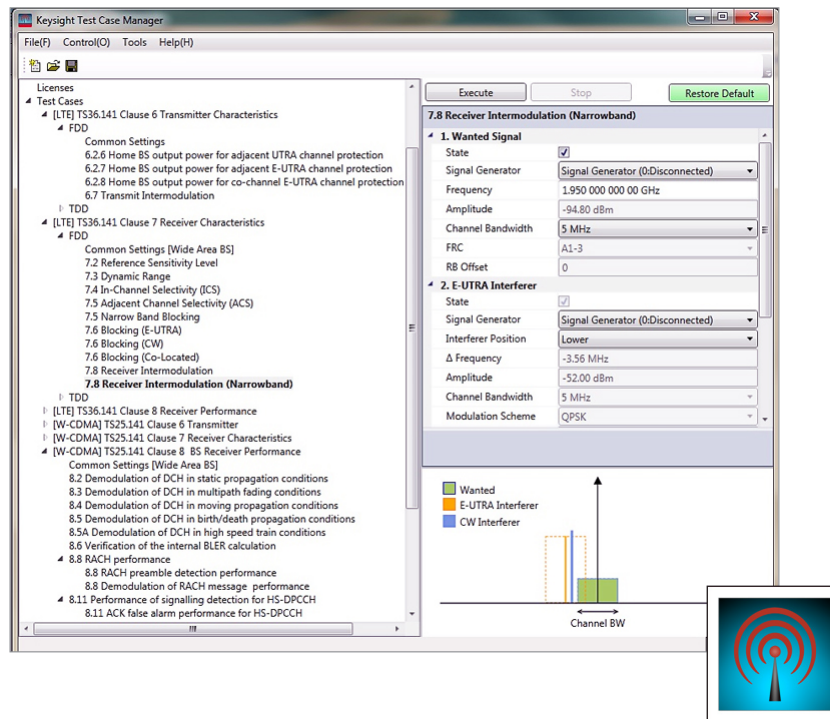# Keysight Technologies
Test Case Manager N7649B

Technical 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
– Supports LTE and LTE-Advanced eNB receiver test for FDD and TDD
– Supports W-CDMA/HSPA+ BTS receiver tests
– Accelerate the signal creation process with an intuitive user interface

KEYSIGHT
TECHNOLOGIES

Unlocking Measurement Insights

Top Features

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.
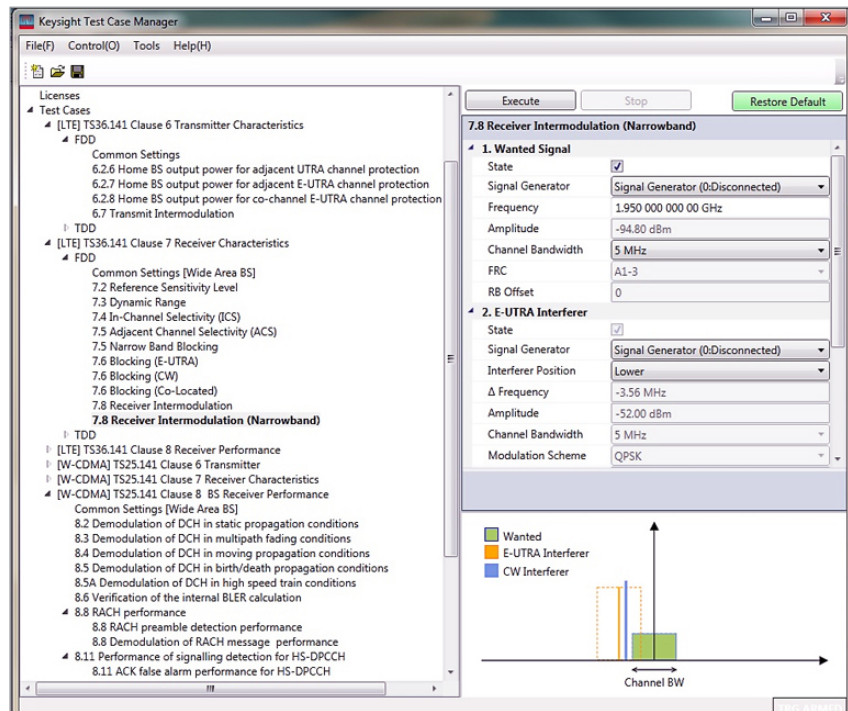

Figure 1. Test Case Manager main window.

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.
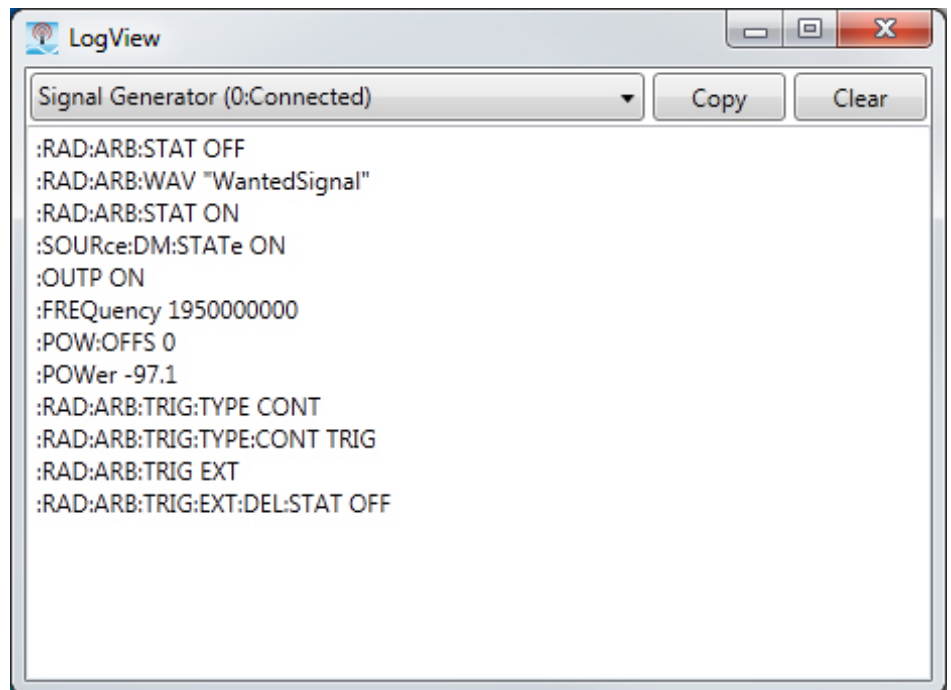

Figure 2. SCPI Log viewer provides useful information to help automate conformance tests.

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.
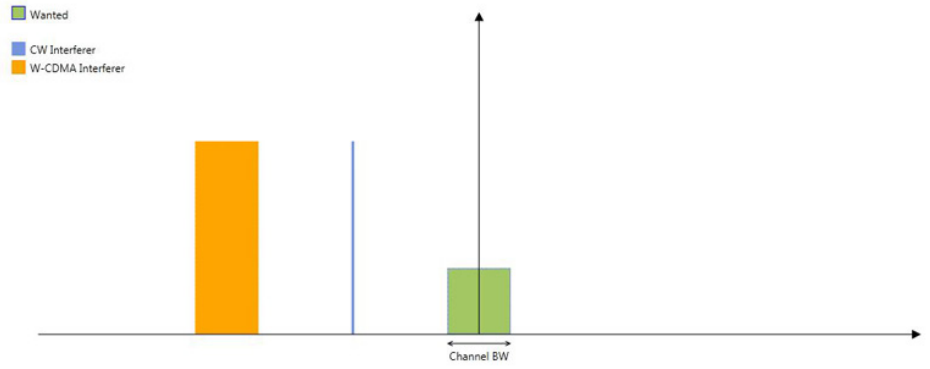
Figure 3. Signal graphic for TS36.141 7.8 receiver intermodulation test.

Base Station Receiver Test

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 tests (Option ETP)

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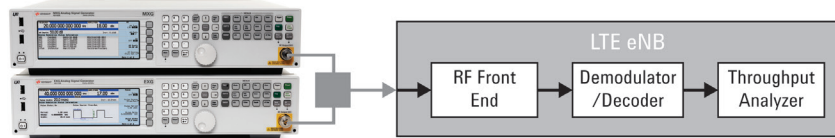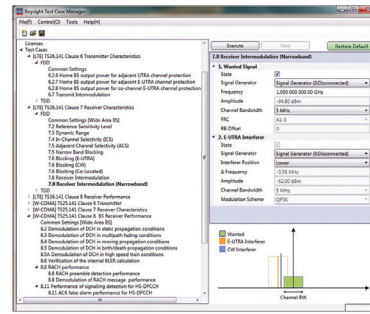

Figure 4. Typical Base Station receiver characteristics test configuration using Test Case Manager with Option ETP, FTP and X-series signal generators.

Supported test cases

The following test cases are supported:

The following test cases are supported according to TS 36.141 V11.11.0 (2014-12) for clause 6, 7 and 8:

6. Transmitter Characteristics

6.2.6	Home BS output power for adjacent UTRA channel protection
6.2.7	Home BS output power for adjacent E-UTRA channel protection
6.2.8	Home BS output power for co-channel E-UTRA channel protection
6.7	Transmit Intermodulation

7. Receiver Characteristics

7.2	Reference Sensitivity Level
7.3	Dynamic Range
7.4	In-Channel Selectivity (ICS)
7.5	Adjacent Channel Selectivity (ACS)
7.5	Narrow Band Blocking
7.6	Blocking (E-UTRA Interferer)
7.6	Blocking (CW Interferer)
7.6	Blocking (Co-Located)
7.8	Receiver Intermodulation
7.8	Receiver Intermodulation (Narrowband)

8. Receiver Performance

8.2.1	PUSCH in multipath fading propagation conditions
8.2.1A	PUSCH in multipath fading propagation conditions transmission on two antenna ports
8.2.2	UL timing adjustment
8.2.3	HARQ-ACK multiplexed on PUSCH
8.2.4	High-Speed Train conditions
8.3.1	ACK missed detection for single user PUCCH format 1a
8.3.2	CQI missed detection for PUCCH format 2
8.3.3	ACK missed detection for multi user PUCCH format 1a
8.3.4	ACK missed detection for PUCCH format 1b with channel selection
8.3.5	ACK missed detection for PUCCH format 3
8.3.6	NAK to ACK detection for PUCCH format 3
8.3.7	ACK missed detection for PUCCH format 1a transmission on two antenna ports
8.3.8	CQI performance requirements for PUCCH format 2 transmission on two antenna ports
8.3.9	CQI performance requirements for PUCCH format 2 with DTX detection
8.4.1	PRACH false alarm probability and missed detection

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/HSPA+ BTS receiver tests (Option FTP)

TCM supports W-CDMA/HSPA+ BTS receiver test cases that are defined in TS25.141 clause 6 two General test cases, 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 25.141 V 12.1.0 (2013-09) for clauses 6, 7 and 8	
6.4.6	Home base station output power for adjacent channel protection
6.6	Transmit intermodulation
7.2	Reference Sensitivity Level
7.3	Dynamic Range
7.4	Adjacent Channel Selectivity (ACS)
7.5	Characteristics Blocking
7.6	Intermodulation Characteristics
7.6	Intermodulation Characteristics (Narrowband)
8.2	Demodulation of DCH in static propagation conditions
8.3	Demodulation of DCH in multipath fading conditions
8.4	Demodulation of DCH in moving propagation conditions
8.5	Demodulation of DCH in birth/death propagation conditions
8.5A	Demodulation of DCH in high speed train conditions
8.6	Verification of the internal BLER calculation
8.8	RACH performance
8.11	Performance of signalling detection for HS-DPCCH
8.11A	Performance of signalling detection for 4C-HSDPA HS-DPCCH
8.11B	Performance of signalling detection for 8C-HSDPA HS-DPCCH
8.12	Demodulation of E-DPDCH in multipath fading conditions
8.13	Performance of signalling detection for E-DPCCH in multipath fading conditions

Hardware, Software, and License Requirements

Signal Studio option requirements

For TS36.141 clause 6 transmitter test

Model-Option	Description
– N7624B-1FP or 3FP[1], HFP, SFP	Signal Studio for LTE and LTE-Advanced FDD (LTE FDD Basic and Advanced)
– N7625B-1FP or 3FP[1], EFP, QFP	Signal Studio for LTE and LTE-Advanced TDD (LTE TDD Basic and Advanced)
– N7600B[2]-1FP or 3FP[1], EFP	Signal Studio for W-CDMA/HSPA+ (Basic R7)

1. 1FP for E4438C, 3FP for N5182A/B or N5172B.
2. W-CDMA option required for LTE clause 6 test item.

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 (LTE FDD Basic and Advanced)
– N7625B-1FP or 3FP[1], EFP, QFP	Signal Studio for LTE and LTE-Advanced TDD (LTE TDD Basic and Advanced)

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.

For TS25.141 clause 7 and 8 tests

Model-Option	Description
- N7600B-3FP or 6FP, WFP	Advanced W-CDMA/HSPA+ real-time R8 UL

Supported signal generators and recommended options

For TS36.141, TS25.141 clause 6 transmitter test and 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 6 transmitter test and clause 7 receiver characteristics test.

For TS36.141 and TS25.141 clause 6, 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.

Using PXB's Channel Fader

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

Software licensing and configuration

Test Case Manager offers the following licensing option:

Model-Option	Description
N7649B-ETP	LTE FDD and TDD eNB Receiver Tests, Transportable, Perpetual
N7649B-FTP	W-CDMA/HSPA+ BTS Receiver Tests, 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

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

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
www.keysight.com/find/LTE

Keysight's W-CDMA/HSPA+ design and test solutions
www.keysight.com/find/WCDMA

Literature

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

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

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

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

myKeysight

www.keysight.com/find/mykeysight

A personalized view into the information most relevant to you.

www.lxistandard.org

LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

Three-Year Warranty

www.keysight.com/find/ThreeYearWarranty

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

www.keysight.com/find/AssurancePlans

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

www.keysight.com/go/quality

Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2008
Quality Management System

Keysight Channel Partners

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/n7600b

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 11 2626
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-04-23-15)

KEYSIGHT
TECHNOLOGIES

Unlocking Measurement Insights