

Keysight Technologies

N1960A GS-8800 Series (8960)

Wireless Communication

Design Verification (DV)

and Conformance Test (CT) System



Data Sheet

N1960A

A single platform test system

- Accelerates design verification (DV) and conformance test (CT)
- Supports GSM, GPRS, EGPRS, EGPRS¹, and DARP (Bands GSM
- 850, GSM 900, DCS1800, and PCS 900)
 - 3GPP TS51.010-01. Sections 12, 13, 14, 16, 21, and 22
- Supports W-CDMA, HSDPA, HSUPA, HSPA+, and DC-HSDPA (Bands I to IX, XI, and XIX)²
 - 3GPP TS34.121-1. Sections 5, 6, 7, 9, and 10
 - Rel. 99, Rel. 5, Rel. 6, Rel. 7 and Rel. 8
- Supports cdmaOne, cdma2000®, 1xEV-DO, 1xEV-DO Rev. A, and 1xEV-DO Rev. B (Band Classes 0, 1, 3, 4, 6, 10, 14, and 15)³
 - 3GPP2 C.S0011 and 3GPP2 C.S0033
- Supports TD-SCDMA, TD-HS-DPA, and TD-HSUPA (Bands A and F)
 - 3GPP TS34.122. Sections 5, 6, 7, and 9

The Keysight Technologies, Inc. N1960A test systems are designed for mobile phone design verification and conformance testing. In the design verification environment, tests can be easily configured or modified to suit your specific test requirements. In the conformance testing environment, tests have been pre-configured according to test specifications 3GPP TS51.010-1, TS34.121-1, 3GPP TS34.122, 3GPP2 C.S0011, and 3GPP2 C.S0033.

Features and Benefits

GS-8800 is a series of scalable test systems built on the 8960 wireless communications test set and covers the entire product lifecycle reducing time-to-market and minimize capital investment

- Design verification
- Conformance
- Manufacturing

GCF-and PTCRB-validated RF conformance test systems ensure quality products and reduce time-to-market

- Designed to 3GPP TS51.010-1 and TS34.121-1 standards
- High accuracy measurements with excellent repeatability

1. Also known as Evolved EDGE and available on DV test system only
2. CT system supports Bands I, II, IV, V, and VIII only
3. 1xEV-DO Rev. B supports Band Classes 0, 1, 3, 4, and 6 only

N1960A Test System Overview

The N1960A test systems are full-featured 2G/2.5G/3G test systems for mobile phone conformance test, design, verification test, and quality assurance evaluation. The systems perform high accuracy measurements and provide excellent repeatability and performance test as prescribed by the Global Certification Forum (GCF) or PCS-type certification review board (PTCRB) for UMTS mobile phones. The multi-technology test platform supports:

- GSM/GPRS/EGPRS/EGPRS2 (3GPP TS51.010-01)
- W-CDMA/HSDPA/HSUPA/HSPA+/ DC-HSDPA (3GPP TS34.121-1)
- TD-SCDMA/TD-HSDPA/TD-HSUPA (3GPP TS34.122)
- cdmaOne/cdma2000/1xEV-DO/ 1xEV-DO Rev. A and 1xEVDO Rev. B (3GPP2 C.S0011 and 3GPP2 C.S0033)

Keysight N1960A test systems are designed to meet existing radio technology format requirements while providing an easy upgrade path for future technology formats. The system architecture makes it easy to add radio technologies to meet additional conformance test needs.

The test system configuration can be modified or scaled to provide the test application capabilities you need for every stage of your product's life-cycle—whether it's during design validation, manufacturing, or quality assurance.

The single-platform scalability for multiple radio technology formats, bands, and product life-cycle, safeguards your investment.

N1960A System Characteristics

Flexibility

The N1960A supports multiple formats and bands

- GSM, GPRS, EGPRS, EGPRS2, and DARP (GSM 850, GSM 900, DCS 1800, PCS 1900)
- W-CDMA, HSDPA, HSUPA, HSPA+, and DC-HSDPA (Bands I to IX, XI, and XIX)¹
- cdmaOne, cdma2000, 1xEV-DO, 1xEV-DO Rev. A and 1xEV-DO Rev. B (Band Classes 0, 1, 3, 4, 6, 10, 14, and 15)²
- TD-SCDMA, TD-HSDPA, and TD-HSUPA (Bands A and F)

Easy-to-use user interface

Each N1960A test system is equipped with an easy-to-use user interface, making it simple for end users to change test parameters and run conformance tests.

Scalability and upgradability

The N1960A test systems can be easily upgraded to include other radio technology formats on the same hardware platform by adding the necessary radio technology format software option.

In addition, the N1960A design verification test systems can be scaled up to conformance test systems for conformance testing, or scaled down to the N8993A bench-top test systems to support manufacturing and quality assurance testing.

Accuracy and repeatability

The N1960A test systems provide accurate measurements and repeatable results due to equipment stability and complete system calibration. They leverage the measurement speed, accuracy, and repeatability strengths of Keysight products; creating reliable, high performance results.

The measurement steps are accurate and compliant with 3GPP and 3GPP2 Tx/Rx RF parametric testing.

Comprehensive test coverage

The N1960A test system covers a large array of test cases specified in 3GPP TS51.010-1, 3GPP TS34.121-1, 3GPP TS34.122, 3GPP2 C.S0011, and 3GPP2 C.S0033. Keysight is committed to support more test case sections and enhancing test coverage as technology standards evolve and also committed to maintain the GCF and PTCRB certification.

Software support

N1960A's Software and Technical Support Contract (STSC) is available for purchase, which entitles you to software updates and feature enhancements, as well as direct access to a technical expert for technical support over the course of the STSC. A minimum 1-year STSC is mandatory for a new system purchase. For more info on STSCs, please visit www.keysight.com/find/gs8800

1. CT system supports Bands I, II, IV, V, and VIII only
2. 1xEV-DO Rev. B supports Band Classes 0, 1, 3, 4, and 6 only

Hardware Architecture

The N1960A test system is comprised of multiple racks (1.6 or 2.0 m in height) with integrated test equipment and test software.

The typical base system consists of the following standard components

- 8960 Series 10 (E5515E) wireless communications test set
- N9020A spectrum analyzer
- E4438C digital signal generator
- E8257D microwave generator
- 66319D power supply
- N1913A single channel power meter
- N1914A dual channel
- N9370A switch driver
- Spirent SR5500M fading simulator
- N1962A GSM filter module
- N1961A RF interface box
- Industrial PC
- GS-8800 measurement software
- GS-8800 calibration software
- GS-8800 data viewer software

Optional 'add-on' components include¹:

- Plus 1
 - Anite fader adapter unit
 - Anite baseband processor
- 2G Section 21 multi-cell
 - N8990A-P06 add-on RF test set
 - Five additional E4438C digital signal generator
- 3G Section 10 inter-cell handover
 - N8990A-P06 add-on RF test set
 - One additional 8960 Series 10 (E5515E) wireless communications test set
- 3GPP2 1xEVDO Rev B
 - Two additional 8960 Series 10 (E5515E) wireless communications test sets
- 3G TD-SCDMA/TD-HSDPA
 - U9572A band extension module 1
- 3G W-CDMA band extension
 - U9580A W-CDMA Band 11 filter module

N1961A RF Interface Box

Automated testing is enabled by the N1961A RF interface box, which switches the appropriate instruments to the user equipment (UE) based on a particular test. It consists of functional modules such as a common filter module, reverse power protection module, fading module, maximize input level module, and filter modules for respective wireless technology formats. Test procedure automation is achieved with a combination of the RF interface box, automated UE control feature, and the test software.

1. These add-ons are necessary to perform more comprehensive performance test requirements in the 3GPP standard, such as transmit diversity mode and multi-cells configuration.

Software Architecture

The GS-8800 software is based on the Keysight Wireless Test Manager (WTM) platform. GS-8800 automates RF parametric tests according to the 3GPP TS51.010-1, TS34.121-1, TS34.122, 3GPP2 C.S0011, and 3GPP2 C.S0033 specifications by creating default test cases. These test cases make it convenient to perform design verifications or conformance test. The software is also designed with a user-friendly graphical user interface (GUI) (Figure 1). The N1960A conformance test system also comes with a test client GUI (Figure 2) with easy configuration of test cases, PICS/PIXIT information, and easy automated retest of failed test cases. In addition, the test client is able to selectively perform subtests for a chosen test step, reducing the time required to identify root-cause failures for failed tests.

The GS-8800 software automates test execution, enabling a large number of test cases to run in a relatively short time frame.

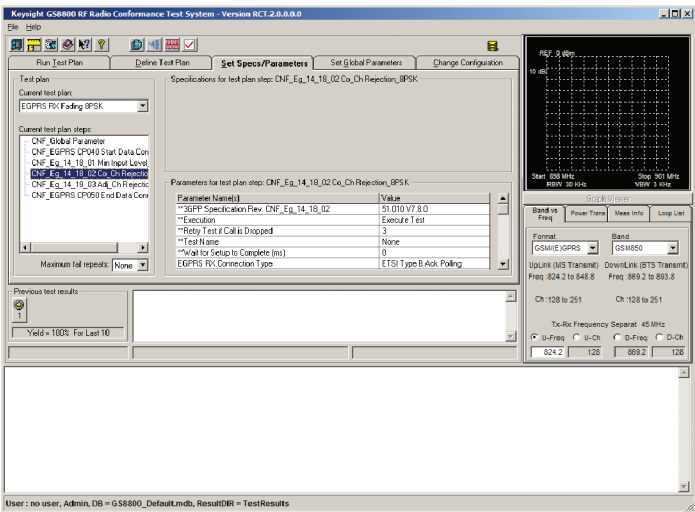


Figure 1: GS-8800 software GUI overview

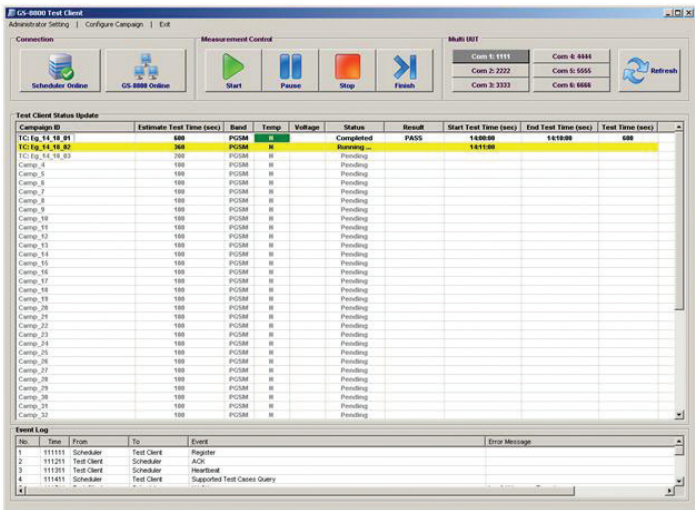


Figure 2: GS-8800 test client GUI for conformance test system

The GS-8800 measurement software provides integrated data collection. Results reporting, saved in a comma-separated value (CSV) format, makes it easy to share the data with other applications. The viewer (Figure 3) software application, provided as a standard option, allows you to perform offline graphical analysis on measurement data.

The GS-8800 calibration software provides measurement points to collect path frequency characteristics, ensuring system measurements are within designated accuracy. The operation is simplified with clear instructions displayed on the screen.

Calibration results are stored in calibration files and used for all subsequent measurements. Frequent system calibration helps prevent bad cables or worn calibration equipment from jeopardizing the accuracy and repeatability of your measurement results.

Measurement Uncertainty

System uncertainty can arise from sources including stability of instrument, linearity of instrument, mismatch between DUT and the test system, and the repeatability of the RF interface box switching. The N1960A conformance test system is designed in accordance to the measurement uncertainties as required by the 3GPP standard.

ISO 17025 Calibration

ISO 17025 calibration is required for conformance testing and N1960A test system is compliance to ISO 17025.

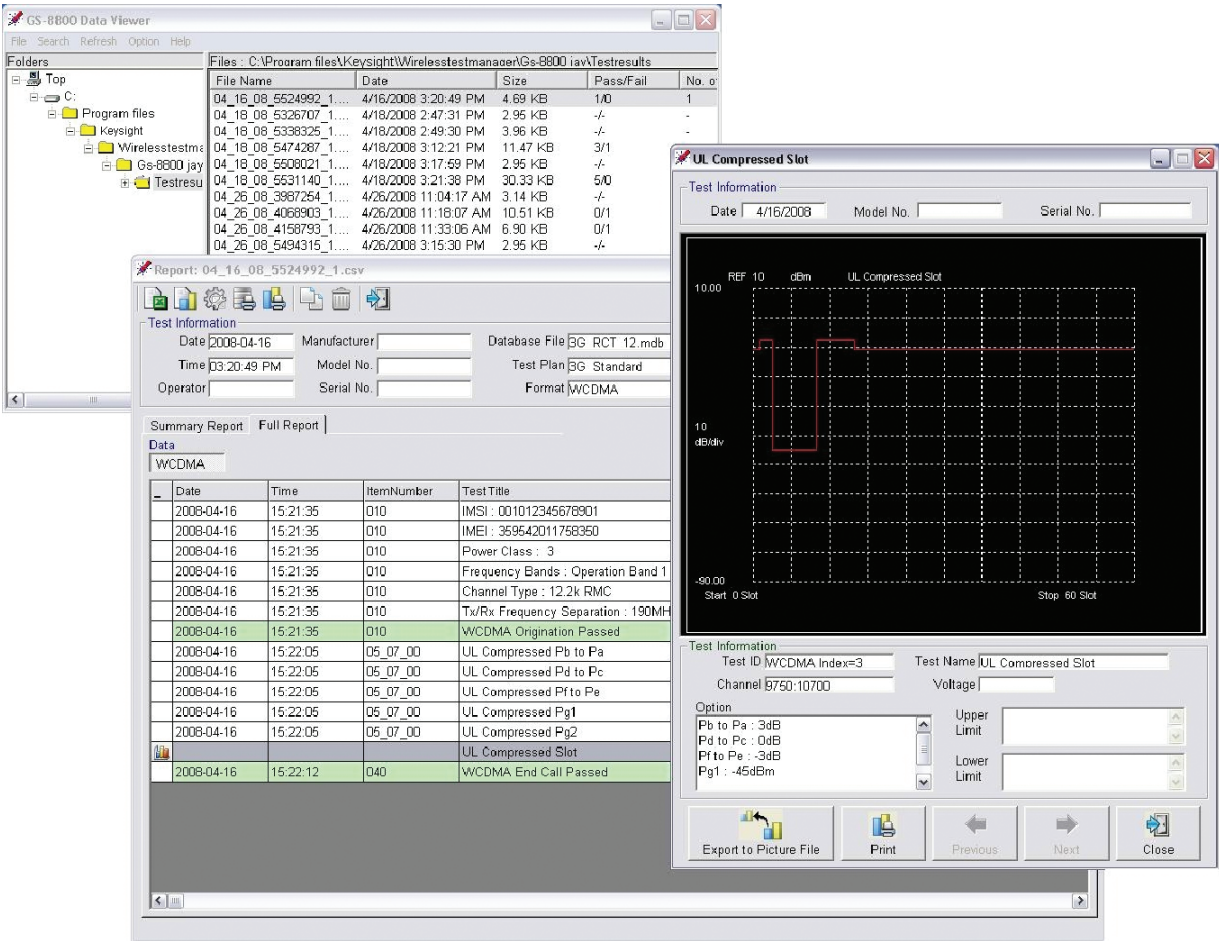


Figure 3: GS-8800 software data viewer

Specifications

Input and output

RF input/output

DUT RF IN/OUT (N1961A front)	Maximum input: 4 W CW, 0 VDC Maximum output: Typically +15 dBm, actual maximum output level depends on use Input impedance: 50 ohm nominal
CAL RF OUT (N1961A front)	Maximum output: +15 dBm Maximum reverse power: 1 W CW, 0 VDC Nominal impedance: 50 ohm

External reference input

EXT REF IN (Located at rear panel of the rack)	Input frequency: 10 MHz (± 5 ppm) Input level range: 0 to +13 dBm Input impedance: 50 ohm nominal
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PC/peripheral input/output

USB	Six auxiliary ports are available: Two on the front panel and four on the rear panel of the industrial PC
Serial (RS-232)	Two on the front I/O panel of the rack, DB9 male connector
LAN	One on the front I/O panel of the rack, one on the rear I/O panel (for intra/internet connection) 100 Base-T Ethernet, RJ-45 connector
GPIO	One on the front I/O panel of the rack for additional instrument connection

Timebase specification

Internal timebase	Internal timebase of the 8960/E5515E wireless communications test set is fed to all other instruments in the system. The 8960's internal oven-controlled crystal oscillator's specifications are as follows <ul style="list-style-type: none"> – Aging rates: $< \pm 0.1$ ppm per year, $< \pm 0.005$ ppm peak-to-peak per day during any 24-hour period starting 24 hours or more after a cold start – Temperature stability: $< \pm 0.01$ ppm, frequency variation from +25 °C over the temperature range 0 to +55 °C – Warm-up time: 5 minutes to be within ± 0.1 ppm of frequency at one hour, 15 minutes to be within ± 0.01 ppm of frequency at one hour
	When the external reference signal is present on the EXT REF IN, the system instruments will be locked to it

Recommended system path loss calibration interval

Nominal	Three months
Exception	System path loss calibration must be performed when any of the following events occur to the signal path: <ul style="list-style-type: none"> – Any instrument RF interconnect cable is replaced – Any instrument is calibrated – Any instrument is repaired and re-calibrated

Specifications (continued)

General specifications

Operating conditions

General	Indoor
Storage temperature	-20 to +70 °C
Operating temperature	+10 to +30 °C
Accuracy specified temperature	+20 to +30 °C (Refer to measurement accuracy specification of individual radio technology for further information)
Humidity (relative)	5 to 80% relative humidity (non-condensing)
Altitude	0 to 2 km
Power requirement	90 to 254 VAC, 50 to 60 Hz, 4118 VA maximum

Rack dimensions

1.6 m rack (EIA: 32 RU)	
Two racks configuration (H x W x D)	1620 mm x 1200 mm x 875 mm (63.8 in x 47.2 in x 34.4 in)
Three racks configuration (H x W x D)	1620 mm x 1800 mm x 875 mm (63.8 in x 70.9 in x 34.4 in)
2 m rack (EIA: 32 RU)	
Two racks configuration (H x W x D)	2025 mm x 1200 mm x 875 mm (80 in x 47.2 in x 34.4 in) When mounting work surfaces, maximum extra-depth is 550 mm (21.6 in)

Weight (approximate)

1.6 m rack x 2 racks	555 kg maximum (1,223.5 lbs)
1.6 m rack x 3 racks	714 kg maximum (1,570.8 lbs)
2m rack x 2 racks	555 kg maximum (1,223.5 lbs)

Regulatory compliance

Safety

IEC 61010-1:2001/EN 61010-1:2001

Canada: CAN/CSA-C22.2

No. 61010-1-04, 206349

USA ANSI/UL 61010-1:2004



Standard limit

CISPR 11:2003 / EN 55011:2007

IEC 61000-4-2:2001 / EN 61000-4-1995+A1:1998+A2:2001

IEC 61000-4-3:2002 / EN 61000-4-3:2002

IEC 61000-4-4:2004 / EN 61000-4-4:2004

IEC 61000-4-5:2001 / EN 61000-4-5:1995+A1:2001

IEC 61000-4-6:2003 / EN 61000-4-6:2007

IEC 61000-4-11:2004 / EN 61000-4-11:2004

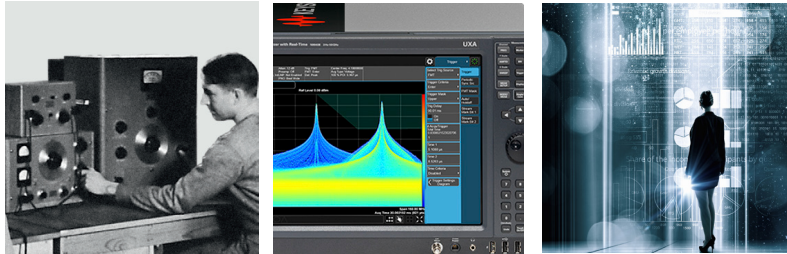
Canada: ICES/NMB-001: Issue 4, June 2006

Australia/New Zealand: AS/NZS CISPR 11:2004

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Published in USA, December 1, 2017
5990-5805EN
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