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PXT E6621A
LTE Wireless Communications Test Set

Accelerate time-to-market for LTE UE designs

Technical Overview



Figure 1. Agilent PXT E6621A LTE wireless communications test set

The Agilent Technologies PXT E6621A LTE wireless communications test set represents a significant breakthrough in LTE UE testing. It incorporates flexible base station/network emulation and RF parametric tests into one integrated unit and extends Agilent's unmatched portfolio of LTE test solutions for development and verification.

The PXT includes a suite of LTE RF measurements that may be used for characterization, calibration, and verification purposes.

With realistic base station/network emulation, the PXT LTE test set offers a controlled environment which can be used to provide network signaling to verify UE functional performance such as throughput. The PXT provides maximum flexibility to configure a range of connection and network parameters. This enables test, stress, and debug of the protocol and data handling capabilities of designs including circuit switched fall back (CSFB), simultaneous voice and LTE (SVLTE), and single radio voice call continuity (SRVCC).

Optional software applications are available to enable more detailed protocol and application testing and analysis.

With the PXT, Agilent helps you get designs to market faster and more efficiently, and continues to provide you with comprehensive tools for all stages of the product lifecycle.

Signaling Test Items

- Support for multiple 3GPP LTE dated specifications, optional FDD and TDD
- Settable frequency, power, modulation schemes, bandwidth, and grant/allocation
- Attach, connection, reconfiguration, authentication, NAS and RRC security
- High data throughput using internal test mode or end-to-end IP data—up to 102 Mbps DL, 51 Mbps UL, and Cat 3FDD
- Transmission modes 1-4 and 6, SISO, Tx diversity, open-loop MIMO and closed-loop MIMO operation
- UE reporting for ACK/NACK's lost packets, UCI and measurement reporting, as well as CQI, PMI, and RI for FDD
- LTE-to-LTE handovers
- 2G GSM/(E)GPRS, 3G W-CDMA/HSPA, cdma2000®/1xEV-DO/eHRPD, and TD-SCDMA interRAT handovers when connected to the Agilent 8960 Series 10 wireless communications test set
- LTE real-time protocol logging and analysis
- Highly configurable detailed signaling control with LTE message editor application

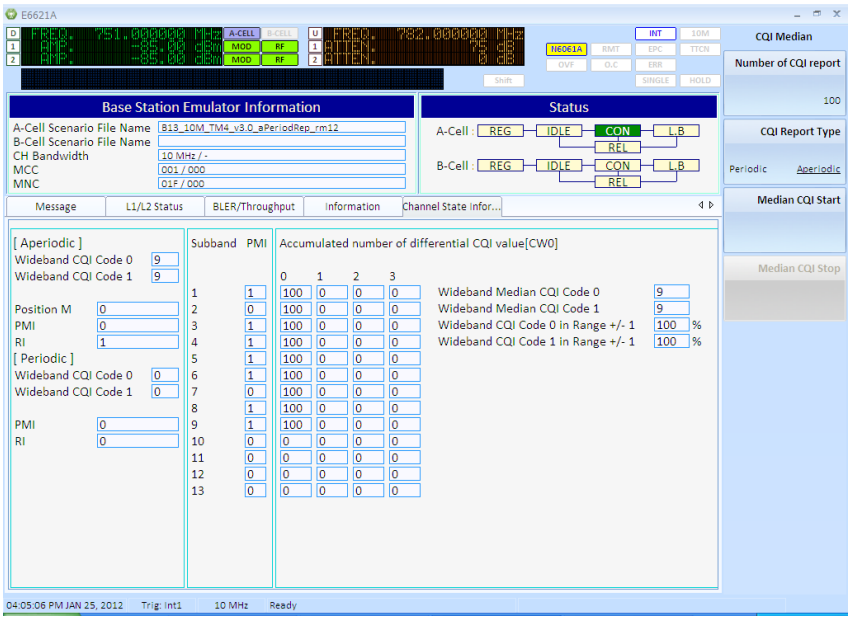


Figure 2. N6050A LTE mobile test software channel state information screen

UE Receiver (DL) Test

- Measurements based on 3GPP 36.521 requirements
- Measurements in UE test mode, end-to-end data test or with UE set to receive only
- High data throughput using internal test mode or end-to-end IP data–up to 102 Mbps, DL, 51 Mbps UL, and Cat 3 FDD
- Settable frequency, power, modulation schemes, bandwidth, and grant/allocation
- Display of UE reports (CQI, PMI, RI, UCI and power headroom, buffer reporting)
- 2x2 downlink MIMO channel with wide-band and sub-band CQI per code
- Built-in traffic generation for UE downlink test
- ACK/NACK/lost packet reports
- DL error rate percentage (text and graphical)
- DL instantaneous throughput (text and graphical)
- OCNG and AWGN impairments



Figure 3. N6052C category 3 MIMO throughput – 102 Mbps DL/51 Mbps UL

UE Transmitter (UL) Test

- Measurements based on 3GPP 36.521 requirements
- Measurements in test mode, end-to-end data test or with UE set to transmit only
- Settable frequency, power, modulation schemes, bandwidth, and grant/allocation
- Channel power, power spectrum, power versus time, and flatness
- Occupied bandwidth
- Spectrum emission mask
- Adjacent channel power
- Constellation, EVM
- Frequency and timing error
- Received I/Q data
- UL throughput
- Supports 89600 VSA software for additional in-depth RF analysis



Figure 4. N6061A IQ data measurement



Figure 5. 89600 VSA software support

LTE Message Editor

LTE message editor is a highly flexible tool for configuring of Layer 3 messages (RRC and NAS). It provides detailed parameter control offering far more flexibility than a normal one-box tester.

- Create and modify scenario files for download into the PXT
- Complete control over all settings including system, network, and base station information
- Send erroneous messages to test UE responses
- Easy to use, with intuitive tree menu structure for message management
- Share scenarios during collaborative test development and for faster troubleshooting

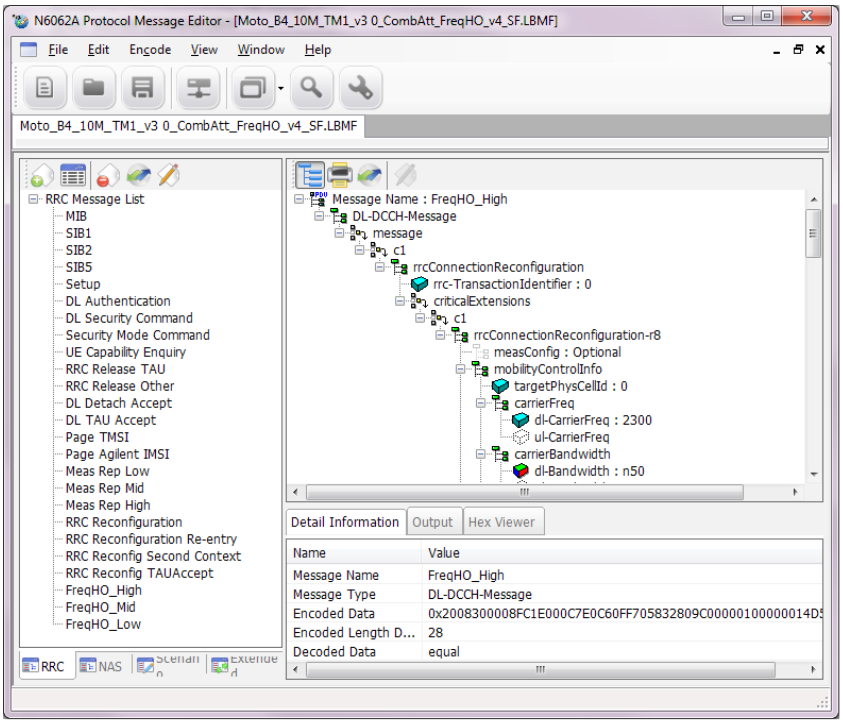


Figure 6. Absolute signaling flexibility with message editor

LTE Protocol Logging and Analysis

LTE protocol logging and analysis are essential tools for debugging interoperability issues that are inevitable with evolving radio technologies such as LTE. Even relatively simple tests such as UE attach can become frustrating without the tools to adequately debug and resolve issues.

- Real time logging and post capture analysis of all layers from L1 to NAS
- Message filtering—sort data by protocol layer
- View detailed decodes down to bit level
- Export files into Wireshark-supported format

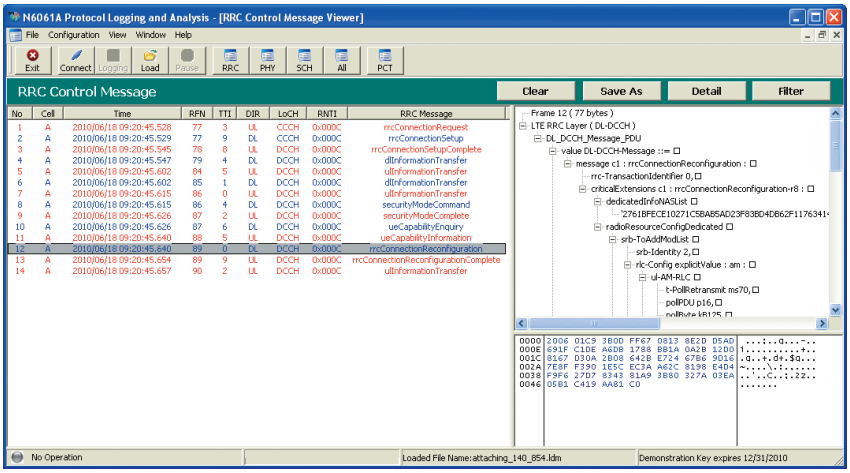


Figure 7. Real-time logging and post capture analysis of all layers from L1 to NAS

Easily Test Real-World User Experiences

Agilent's Interactive Functional Test (IFT) software, designed to fully utilize the industry-leading signaling and data capabilities of the Agilent 8960 (E5515C/E) and PXT (E6621A) wireless communications test sets, provides a solution for real-world functional test of mobile devices. Bring real-world test into the design cycle earlier by automating and simplifying design, verification, stress test, and realistic user-experience scenarios.

- System configuration wizard
- Easy and flexible set up of operations
- Ability to perform operations simultaneously (just as an end-user would)
- Easy script development for test sequence repetition

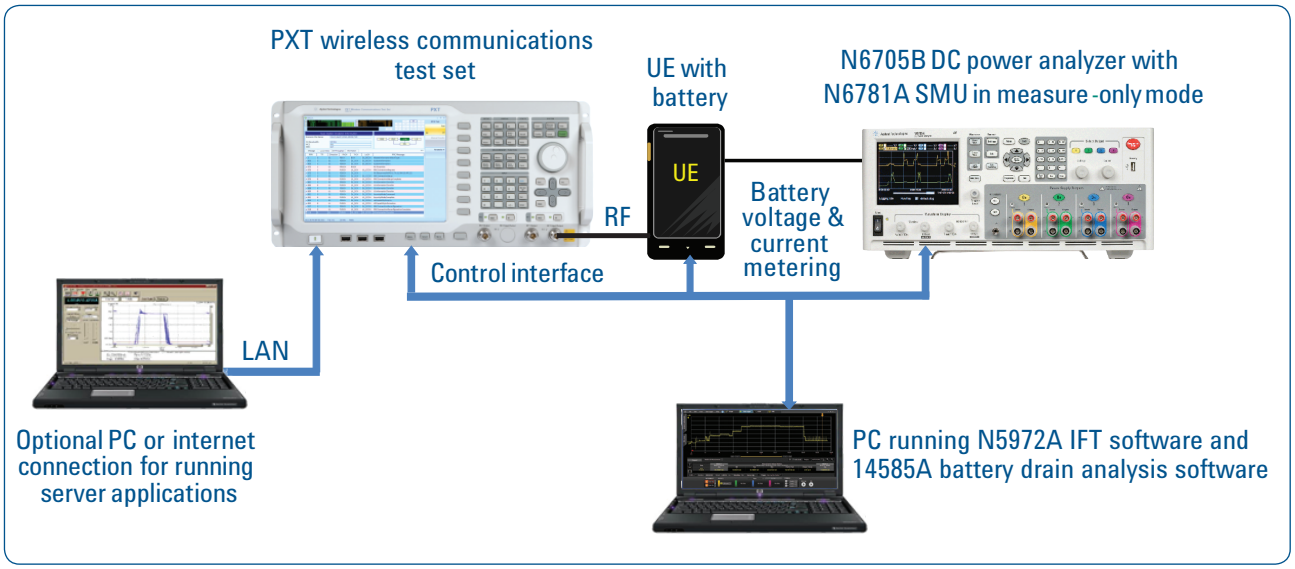


Figure 8. Interactive functional test system

Network Operator Test Plans

Let Agilent write your operator-specific test plans for you

In addition to requiring the minimum regulatory requirements be met, many network operators require additional testing to approve the UE for use on their networks. Understanding the test requirements and creating test plans for every operator can be time consuming and extend time to market.

Agilent smoothes the path through the operator specific approvals process by providing pre-packaged automated test scripts for many operator-specific test plans, providing the required test output in the formats required by each operator.

N5973A
The N5973A scripts support the following Verizon Wireless compliance test plans 1FP: LTE-CDMA interRAT, 2FP: LTE-CDMA interRAT SVD, and 4FP: IMS VoIP

- Verizon Wireless-listed test solution
- Automatically outputs results in the Verizon Wireless required format
- Supports the established Agilent 8960 and PXT wireless communications test sets
- Includes the Agilent E6966A IMS-SIP server and client

N5974A-9FP
IFT automation for AT&T Wireless compliance test plan, battery drain operations

- AT&T Wireless-listed test solution
- Automatic test scripts based on the AT&T Wireless test plan
- Compatible with selected Agilent DC power sources for battery emulation
- Supports the established Agilent 8960 and PXT test sets

N5978A-1FP
IFT automation for TD-LTE IOT test plan, Phase 1

- Automatic test scripts based on the TD-LTE IOT test plan
- Supports the established Agilent 8960 and PXT test sets

Easily Test Real-World User Experiences

Efficiently verify performance of UE in an All-IP IMS-SIP test environment

The Agilent Technologies E6966A IMS-SIP network emulator software is designed to complement the powerful 8960 and PXT wireless test sets, delivering unique capabilities for UE performance testing. These test sets establish data connection to UEs with various radio access technologies, including LTE (VoLTE), W-CDMA/HSPA, and more. Use the E6966A's IMS-SIP server/client pair for testing voice, video, and SMS services on all-IP networks.

E6966A lets you

- Manually, or automatically control via a defined API
- View detailed call flow logs and ladder diagrams
- Allocate IPv6 and IPv4 addresses
- Achieve registration, authentication, and de-registration
- View detailed call flow logs
- Insert error conditions for atypical response testing

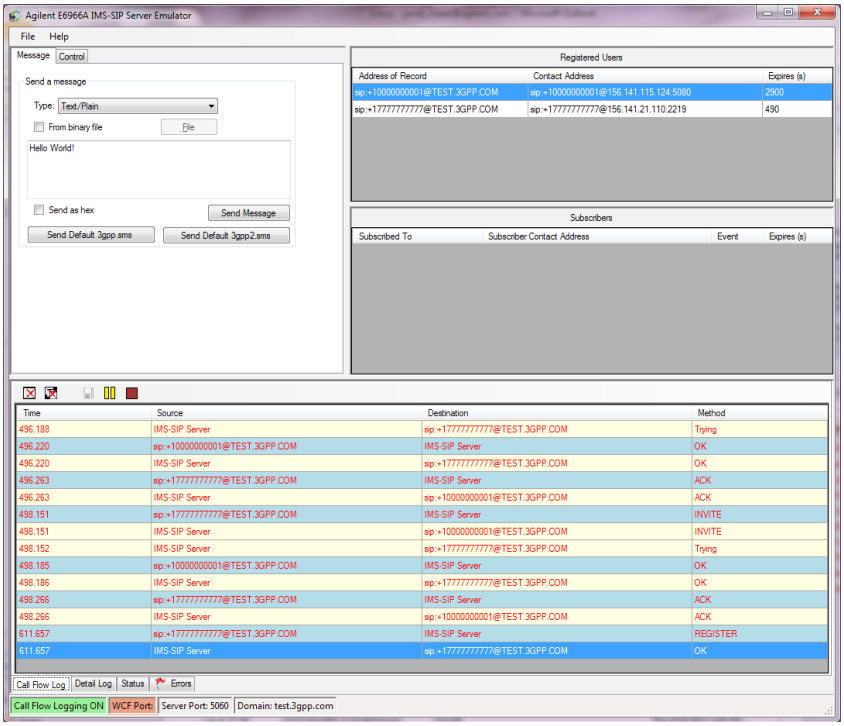


Figure 9. View of registration and connection log on E6966A IMS-SIP server

Quickly and easily automate wireless device calibration and test

Agilent's Wireless Test Manager software makes it quick and easy to automate and optimize wireless device calibration and test. The Wireless Test Manager supports the popular wireless technologies, runs on a Windows® PC and supports Agilent test system hardware. Features include ready-to-use tests, test plans, test sequencing, Visual Basic® 6 or Visual Basic .NET test development (using customer-supplied Visual Basic 6 or Visual Basic .NET software) and custom application development utilities. (Test development platform is dependent on Wireless Test Manager product selection.)

Wireless Test Manager lets you

- Pre-defined test steps and devices with user-friendly Windows® interface
- Define and change test plans easily—without any programming
- Use Visual Basic .NET-based development platform for maximum flexibility when customizing test steps and adding new instruments
- Use PC-based software designed for fast development and deployment for manufacturing, service, and R&D needs

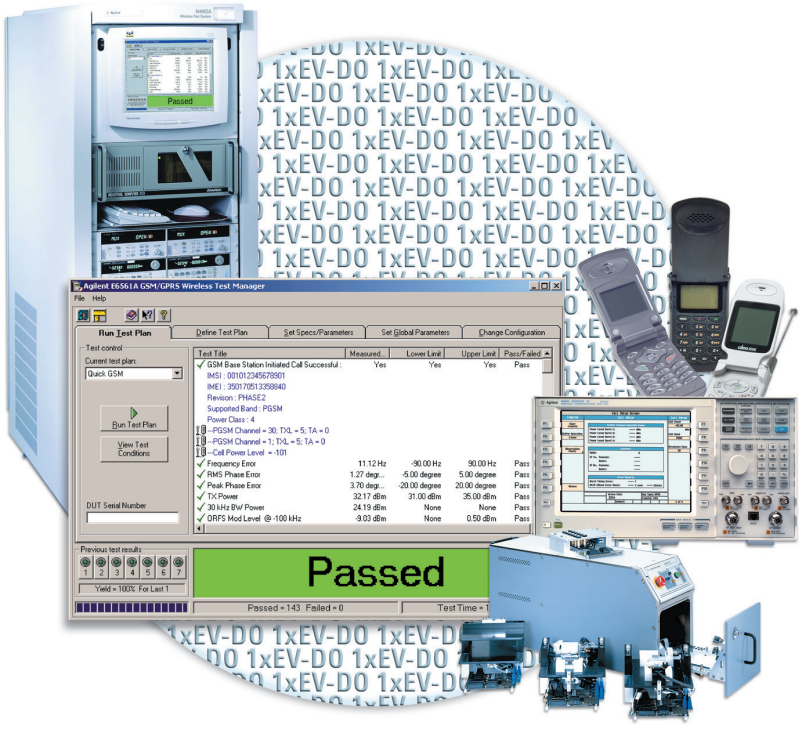


Figure 10. Simplify your automated test plans with Agilent WTM software

Product Configuration

The flexible PXT instrument can be used in a variety of configurations.

- Optional PXT instrument hardware and firmware to configure the instrument for maximum flexibility or minimum cost
- Additional PC and applications to further extend flexibility, debug, and analysis
- Connections to Agilent 8960 with lab applications for 2G/3G/cdma2000 I-RAT handover testing
- Options automation and network operator automated test scripts

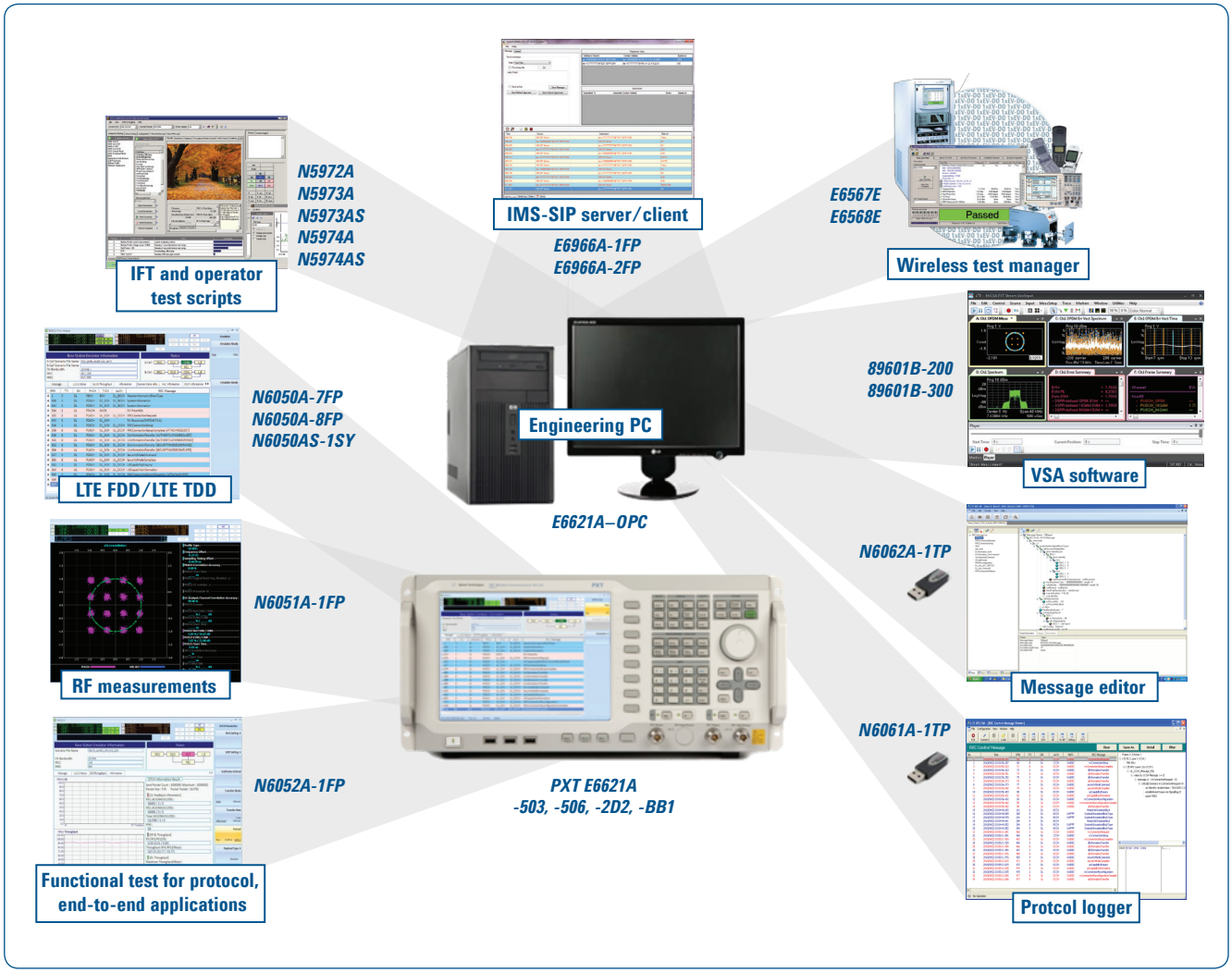


Figure 11. Maximum flexibility to satisfy all configuration needs

E6621A Specifications

PXT frequency range	
E6621A	PXT wireless communications test set
E6621A-503	Frequency range from 500 MHz to 3.0 GHz (default)
E6621A-506	Frequency range from 500 MHz to 5.9 GHz
Other PXT options	
E6621A-2D2	Downlink 2x2 MIMO (default)
E6621A-BB1	Enhanced baseband processing (Adds hardware required for 2-cell)
PXT application options	
N6050A	LTE mobile test software
N6050A-7FP	LTE FDD base station emulation
N6050A-8FP	LTE TDD base station emulation
N6051A-1FP	LTE RF parametric test with test mode signaling
N6052A-1FP	LTE functional and application test
PC for N6061A and N6062A	
E6621A-0PC	Desktop PC, high performance
PC application options	
E6966A	IMS-SIP network emulator software
E6567E	cdma2000/1xEV-DO/LTE Wireless Test Manager
E6568E	2G/3G/LTE Wireless Test Manager
N5972A-1FP	IFT software
N5973A-1FP	IFT automation for Verizon Wireless compliance test plan, LTE-CDMA Inter-RAT operations
N5973A-2FP	IFT automation for Verizon Wireless compliance test plan, simultaneous voice and data
N5973A-4FP	IFT automation for Verizon Wireless compliance test plan, IMS-VoIP
N5974A-9FP	IFT automation for AT&T Wireless compliance test plan, battery drain operations
N5978A-1FP	IFT automation for TD-LTE IOT test plan, Phase 1
N6061A-1TP	LTE protocol logging and analysis
N6062A-1TP	LTE message editor

Software and technical support contract

Software and technical support contracts (STSC) entitle you to software updates and feature enhancements, as well as direct access to technical experts. These contracts are designed to increase your productivity by delivering software updates and providing a formal technical support channel for any operational difficulties you may encounter. The N6050AS STSC entitles the user to software and support for the E6621A PXT products N6061A, N6062A, N6050A, N6051A, and N6052A for both FDD or TDD options.

The N5973AS STSC covers all automation scripts you have purchased for the N5973A and also provides you with updates to the related IFT and IMS-SIP software.

N5973AS-1SY	Software and technical support contract for N5973A
N5974AS-1SY	Software and technical support contract for N5974A
N5978AS-1SY	Software and technical support contract for N5978A
N6050AS-1SY[1]	LTE mobile test software – 1 year STSC

Start-up assistance	
PS-S20-01	1 day start-up assistance
Repair options	
R-51B-001-C	1 year Return-to-Agilent warranty (required option)
R-51B-001-3C	1 year Return-to-Agilent warranty extended to 3 years
R-51B-001-5C	1 year Return-to-Agilent warranty extended to 5 years

1. *Software and technical support contracts with suffix 1SY are valid for one year. To extend your software and technical contract to two or three years use suffix -2SY or -3SY.*

PXT Specifications

The PXT will meet its warranted performance after one hour within the stated environmental operating range plus one hour after turn on. Unless otherwise stated all specifications are valid over the operating temperature range. Supplemental characteristics are intended to provide additional information, useful in applying the instrument by giving typical (expected), but not warranted, performance parameters at room temperature (20 to 30 °C). These characteristics are shown in *italics*. The specifications in this data sheet apply to all instruments after and including serial number MY52190101.

Signal analyzer specifications

Frequency

Frequency range[1]	500 MHz to 3.0 GHz (E6621A-503) 500 MHz to 5.9 GHz (E6621A-506)
Frequency setting resolution	1 Hz
Frequency accuracy	Same as frequency reference

Amplitude

Modulated level accuracy 20 MHz channel bandwidth	
Up to 3 GHz, input amplitude	
–40 to –10 dBm	*±0.90 dB*
–50 to –40 dBm	*±1.00 dB*
3 to 5.9 GHz, input amplitude	
–40 to –10 dBm	*±1.00 dB*
–50 to –40 dBm	*±1.00 dB*
Modulated level accuracy 5, 10 MHz channel bandwidth	
Up to 3 GHz, input amplitude	
–40 to –10 dBm	*±0.70 dB*
–50 to –40 dBm	*±1.00 dB*
3 to 5.9 GHz, input amplitude	
–40 to –10 dBm	*±0.70 dB*
–50 to –40 dBm	*±1.00 dB*
UL spurious	*< –65 dBc excluding IF image* *< –50 dBc including IF image*

Performance

EVM accuracy	
Up to 3 GHz, input amplitude	
–30 to –10 dBm	*1.50%*
–40 to –30 dBm	*3.00%*
3 to 5.9 GHz, input amplitude	
–30 to –10 dBm	*2.00%*
–40 to –30 dBm	*3.75%*

1. Frequency can be set from 350 MHz, but with no warranted performance.

PXT Specifications

Signal generator specifications	
Frequency	
Frequency range[1]	500 MHz to 3.0 GHz (E6621A-503) 500 MHz to 5.9 GHz (E6621A-506)
Frequency resolution	1 Hz (0.5 to 1.3 GHz) 2 Hz (1.3 to 3.3 GHz) 4 Hz (3.3 to 5.9 GHz)
Frequency accuracy	Same as frequency reference
Amplitude	
CW level range	RF Out only –110 to –10 dBm RF In/Out –110 to –15 dBm
Level setting resolution	0.1 dB
CW level accuracy/flatness	
Up to 3 GHz, output amplitude	
–106 to –10 dBm[2]	*±0.4 dB*
–110 to –106 dBm	*±0.6 dB*
3 to 5.9 GHz, output amplitude	
–98 to –10 dBm[2]	*±0.6 dB*
–110 to –98 dBm	*±0.7 dB*
Performance	
EVM accuracy	
Up to 3 GHz, output amplitude	
–22 to –10 dBm[2]	*2.00%*
≤ –22 dBm	*1.25%*
3 to 5.9 GHz, output amplitude	
–22 to –10 dBm[2]	*3.00%*
≤ –22 dBm	*1.25%*
Harmonics	*≤ –30 dBc (0.5 to 3.3 GHz)* *≤ –25 dBc (3.3 to 5.9 GHz)* *For level ≤ –10 dBm minus internal loss*
Sub-harmonics	*≤ –30 dBc (3.3 to 4.0 GHz)* *≤ –23 dBc (4.0 to 5.9 GHz)*
Non-harmonic spurious	*≤ –46 dBc*

1. *Frequency can be set from 350 MHz, but with no warranted performance.*
2. *RF In/Out port is only specified up to –15 dBm.*

E6621A Specifications

Maximum data throughput	
Data throughput	
UE test mode or end-to-end IP connection	*102 Mbps (CAT3) DL 51 Mbps UL (CAT3)*

General specifications	
RF input/output impedance	*50 Ω (nominal)*
Maximum safe input level	*+20 dBm*
Interfaces	*USB, LAN, GPIB, trigger in/out, IQ/IF inputs/ outputs, reference input/output*
RF reference input/output	*10 MHz*
Frequency reference accuracy	*± 1E-6*
Aging per year	*5x10E-8 (–20 to 70 °C)*
Temperature stability	*2x10E-8*
Power requirement	*100 to 240 Vac, 50/60 Hz*
Size (w x d x h)	*444 mm x 600 mm x 222 mm*
Weight	*27.6 kg maximum with all possible options*
Operating temperature	*0 to 45 °C*
Storage temperature	*–20 to 70 °C*

Related Agilent Literature

Publication title	Pub number
Greater Insight into LTE Design and Test Brochure	5989-7817EN
Accounting for Antenna and MIMO Channel Effects Using Agilent SystemVue Application Note	5990-6435EN
Testing Handovers Between LTE and 3G cdma2000/1xEV-DO Cellular Networks	5990-8362EN
N5973A IFT Automation Scripts for the Verizon Wireless Compliance Test Plan Technical Overview	5990-9071EN
Agilent 14565B Software and 66319B/D and 66321B/D Mobile Communications DC Sources	5990-3503EN

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