

# **Keysight 89600 VSA and 89600 WLA Software**

## **Revision History**

**VSA2020 Update 1.0** (Build 25.20; Release Date August 2020)  
License Version 2020.0701 required

### **89601200C: 89600 VSA Basic Software**

- CCDF summary table is added to most of the measurements

### **89601BHNC: 5G NR Modulation Analysis**

- Uplink and downlink modulation quality measurements comply with 3GPP TS 38 series v.16.1.0 (2020-03) specification
- 3GPP Release-16 specification feature support
  - NR unlicensed (NR-U)
    - PDSCH Type B symbol extension
    - Uplink Intra-Cell Guard-Band
  - Enhanced MIMO (eMIMO)
    - Low PAPR DMRS for PDSCH
    - Low PAPR DMRS for PUSCH CP-OFDM
    - Low PAPR DMRS for PUSCH DFT-s-OFDM & PUCCH Formats 3 & 4
  - Enhanced Dynamic Spectrum Sharing (eDSS)
    - PDSCH Type-B symbol extension
    - Multiple LTE-CRS rate matching
  - UL-SCH parameter n\_RAPID for scrambling msgA PUSCH
- Speed improvement to modulation quality measurements
- Result Trace
  - Per-slot summary
  - New implementation of RMS Error Vector Spectrum and RMS Error Vector Time
- Miscellaneous updates
  - 1024QAM and 8-PSK modulation analysis. Not part of 3GPP's NR definition

### **89600CSP-H51: Channel Sounding Analysis**

- Work with provided demo signal or Keysight N7608C Signal Studio Pro for Custom Modulation
- Support latest Keysight signal sources and analyzer platforms up to mmWave frequency, including M9384B VXG, N9040B/N9041B UXA, Infiniium UXR-Series real-time oscilloscopes
  - Support complex channel impulse response, frequency response, and sound metrics such as frequency error, symbol clock error, and RMS delay spread
  - Analyze up to 64 channels of data

### **89601BHQC: Pulse Analysis**

- Angle of Arrival Measurement
  - Support up to 4 receiver antennas and provide simultaneous measurement of azimuth and elevation angles of the emitter relative to the receiver antenna orientation

### **VSA2020 Update 0.1 (Build 25.01; Release Date April 2020)**

License Version 2020.0301 required

#### 89601200C: 89600 VSA Basic Software

- Fix the installer not installing the Visual Studio 2015-2019 redistributable
- Fix the VXT2 model name typo from N9410A/N9411A to M9410A/M9411A
- Resampler behavior change: data from hardware is now resampled only when needed to improve speed

#### 89601BHNC: 5G NR Modulation Analysis

- Constrain 5G NR 8x8 MIMO to DL only

### **VSA2020 (Build 25.00; Release Date April 2020)**

License Version 2020.0301 required

#### 89601200C: 89600 VSA Basic Software

- Recall recording supports larger than 2GB file size for both N5106A and N5110A formats
- Sequential data capture within a measurement
- Support for N9021B with 510MHz analysis bandwidth
- N9040B/N9041B with U9361F/G calibration usability improvement
- M9410A/M9411A VXT PXI Transceiver additional functionality
  - Multiple-channel support (up to 4 channels)
  - Support for selecting PXI trigger lines as an input trigger
- Support for InfiniiVision DSOX1202A/DSOX1202G/DSOX1204A/DSOX1204G
- Support for Infiniium UXR0051AP Single Channel UXR-Series Oscilloscope with DDC (Digital Down Converter)
- Support for M9383B/M9384B: Single channel VXG mmWave Vector Signal Generator: 1 MHz to 44 GHz
- Use on virtual machines no longer restricted

#### 89601AYAC: Digital Demodulation Analysis

- Custom IQ Modulation Analysis

- New Adaptive Equalizer mode that allows minimization of the entire error vector, not just at the decision points

#### 89601BHNC: 5G NR Modulation Analysis

- Demodulation speed improvement
- GUI responsiveness improvement
- Uplink and downlink modulation quality measurements comply with 3GPP TS 38 series v.15.8.0 (2019-12) specification
- Dynamic spectrum sharing
- Support per subcarrier IQ imbalance estimation and compensation
- Support IQ Offset compensation
- Carrier Aggregation
  - Support sequential data capture
  - Support auto configuration for data capture based on Carrier Center location
  - Support per carrier input channel mapping
  - Improved GUI usability
  - Improved Test Model usability
- UL Spectrum Flatness Measurement
- Add peakEVM, magError, phaseError results
- Test Models updated based on TS38.141 v.15.8.0 (2019-12) standard
- Time Scale Factor
- DL MIMO up to 8x8
- PUCCH Format 3 and Format 4
- UL SRS
- 3D EVM Trace

#### 89601BHQ: Pulse Analysis

- Frequency Hopping Analysis
  - Allow specifying dwell time and settling tolerance for hop state calculation
  - Allow specifying start, stop and step frequency for hopping states analysis
- Pulse Scoring
  - Support pulse pattern (train) search and scoring of the patterns
  - Train Search Table
- Allows specifying phase shift angle for BPSK modulation
- Cumulative pulse table

#### 89601BHTC: IoT Analysis, IEEE 802.15.4/4z High Rate Pulse Repetition Frequency Ultra-Wide Band (HRP UWB) Analysis

- Three PHY modes: Non-ERDEV, ERDEV-BPRF and ERDEV-HPRF
- Channels 0-15 with corresponding pulse bandwidths

- Standard combinations of SHR, STS and PHR/PSDU parameters
  - Traces and Metrics
    - RRC Correlated trace and Main Lobe/Side Lobe metrics (including pass/fail indication)
    - RMARKER location relative to beginning of recording (for calculating Time of Flight)
    - Channel Impulse Response/Frequency Response
    - Transmit Mask (including pass/fail indication)
    - Frequency Error/Chip Clock Error
    - Peak/Average Power for SHR, STS, and Data (PHR/PSDU)
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**VSA2019 Update 1.3 (Build 24.23; Release Date December 2019)**  
License Version 2019.0901 required

89601200C: 89600 VSA Basic Software

- Support for UXR DDC
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**VSA2019 Update 1.2 (Build 24.22; Release Date November 2019)**  
License Version 2019.0901 required

**Issues Resolved:**

- Can't connect with .NET API after upgrading VSA 2019 U1 to U1.1
  - 5G NR SCPI command not available for PdschCollection.DmrsNidSource
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**VSA2019 Update 1.1 (Build 24.21; Release Date October 2019)**  
License Version 2019.0901 required

**Issues Resolved:**

- Abnormal memory usage
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**VSA2019 Update 1.0 (Build 24.20; Release Date September 2019)**  
License Version 2019.0901 required

## Enhancements:

### 89601200C: 89600 VSA Basic Software

- Support for “C” licenses
- Default auto-range speed-up for X-Series signal analyzers with wideband digitizer option with firmware revision A.25.00 or later
- Improve speed and better filter flatness for fractional delay corrections when not doing sample rate resampling during data acquisition or playback
- Infiniium UXR-Series Oscilloscope Frequency Extension
- Supports M9381A PXIe Vector Signal Generator: 1 MHz to 3 GHz or 6 GHz
- N9040/N9041/M9410/M9411 Spur Avoidance
- M9410/M9411 Single channel

### 89601BHNC: 5G NR Modulation Analysis

- Demodulation speed improvement
- Uplink and downlink modulation quality measurements comply with 3GPP TS 38 series v.15.6.0 (2019-06) specification
- Supports SSB and PxSCH beamforming measurement. Provide 3D beam pattern trace, beam peak summary table and beamforming weight table.
- Supports four BWPs
- “Results & Filters” panel to change colors of channels, filter channels from measurement traces and/or EVM computation
- PDCCH and PDSCH measurement related to CORESET0
- Condition Number measurement for MIMO
- Test Models updated based on TS38.141 v.15.2.0 (2019-06) standard

### 89601AYAC: Digital Demodulation Analysis

- Custom IQ Modulation Analysis
  - Faster loading time for very high order modulation QAM signals with large constellation definitions (> 1024 states)
  - Recall constellation definitions from files exported by Keysight Signal Studio for Custom Modulation (N7608B)

### 89601BHQ: Pulse Analysis

- Pulse de-interleaving works with up to 30 emitters with different PRI, pulse width, modulation, etc
- Pulse Scoring
  - Pulse scoring is the quality index of how pulse parameters/metrics (Top Level, Width, PRI, Freq Mean and FM Slope) are consistent with reference pulse(s).
  - Scoring results are displayed in the Pulse Table and are scored as a 0 (worst) to 1 (best) range value.

### 89601BHTC: IoT Analysis

- IEEE 802.15.4 High-rate PHY Ultra Wide Band (HRP UWB) Measurement
  - Standard combinations of Code Index, Delta Length, SYNC Length, and SFD Length
  - Channels 0-15
  - Traces and Metrics
    - RRC Correlated trace and Main Lobe/Side Lobe metrics (including pass/fail indication)
    - Channel Impulse Response/Frequency Response
    - Transmit Mask (including pass/fail indication)
    - Frequency Error
    - Chip Clock Error
    - Time Offset from trigger

### Issues Resolved:

- [5G NR] SyncNotFound status bit not set
- [5G NR] Unable to reliably demod UL when DL is present
- [802.11ax] Poor EVM on segment 2 when analyzing 80 + 80
- [FMCW] reported phase noise too high

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**VSA2019 (Build 24.00; Release Date March 2019)**  
License Version 2019.0301 required

### Enhancements:

#### Option 200: Basic VSA

- Vector mode FFT and Main Time length increased 32x to maximum of 16 MPts
- Measurement block diagram for configuration navigation and overview
- Data file recall allows users to enter sampling rate and center frequency for binary file format
- Wideband IF trigger output from X-series signal analyzer
- Ranging enhancements for X-series signal analyzer
- Up to 8x8 MIMO for M9420A/M9421A
- Updates to N9041 EDC (external digitizer control) with up to 5GHz bandwidth as Beta
- Infiniium UXR-Series Oscilloscope frequency extension as Beta
- E7515A UXM multi-channel as Beta
- M1740 + M9410A/M9411A as Beta

#### Option BHN: 5G NR/Pre-5G Modulation Analysis

- 5G NR Modulation Analysis

- New modulation quality measurements comply with 3GPP TS 38 series v.15.3.0 and v.15.4.0
- Carrier aggregation up to 16 component carriers
- UL code-book based MIMO up to 4x4
- DL MIMO up to 4x4
- DL Test Model
- Conformance Test
- Auto detection
- PUCCH (format 3,4) EVM
- Multiple PUSCH channels
- DCI decoding
- PRACH

#### Option BHQ: Pulse Analysis

- Pulse descriptor word export for Keysight UXG
- Up to 1024 chips BPSK/QPSK demodulation

#### Option BHT: NB-IoT Modulation Analysis

- Uplink support
  - NPUSCH Format 1 and 2
  - 15 kHz or 3.75 kHz subcarrier spacing
  - 1, 3, 6, or 12 tones
  - Autodetection of many parameters including number of subcarriers, spacing, and offset
  - Decoding support
- NPRACH formats 0 and 1
- Downlink
  - NPRS analysis
  - NPDSCH decoding

#### Issues Resolved:

- [5G NR] MIB decoded info is not accurate
- [5G NR] Decoded PBCH bits do not change with decoding type selected
- [5G NR] PUSCH RB Number restricted per TS38.211 6.3.1.4
- [802.11ax] Memory Leak
- [802.11ax] SIG-B modulation format is wrong
- [Custom IQ] Pattern Search no longer works
- Long startup time when obtaining licenses from Agileesofd server

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**VSA2018 Update 1.0 (Build 23.20; Release Date September 2018)**  
License Version 2018.0901 required

**Enhancements:**

Option 200: Basic VSA

- User Correction - Support cascaded S parameter files
- Updated Display Themes
- Fixed length segmented capture for X-series signal analyzer
- Support for Infiniium UXR-Series Oscilloscope
- Input extension usability enhancement
- Support for N9041B EDC (external digitizer control) with up to 5GHz bandwidth [Beta]
- Support for M9410A/M9411A [Beta]

Option BHN: 5G NR/Pre-5G Modulation Analysis

- 5G NR Modulation Analysis
  - New modulation quality measurements comply with 3GPP TS 38 series v.15.1.0 and v.15.2.0
  - UL MIMO (non-codebook based) up to 4x4
  - Multiple PDSCH, PDCCH and CSI-RS channels
  - Mixed numerology SSB/PDSCH
  - PDCCH EVM and decoding
  - PUSCH transform precoding (DFT-s-OFDM)
  - PUCCH (format 0,1) EVM and decoding
  - Cell ID auto-detection
  - PBCH decoding with SFN info, SSB index and MIB
  - CSI-RS (single antenna port)
  - In-band emissions

Option BHQ: Pulse Analysis

- Sidelobe level measurement

Option BHT: NB-IoT Modulation Analysis

- New option - Only Downlink support in this release.
  - Operation modes: In-band (same or different PCI), Standalone, Guard-band
  - Physical channels: NPBCH, NPDCCH, NPDSCH
  - Physical signals: NRS, NPSS, NSSS



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**VSA2018 Update 0.1 (Build 23.01; Release Date April 2018)**  
License Version 2018.0301 required

**Issues Resolved:**

- Crash during startup
  - Floating licenses not accessed properly
  - 5G NR – IQ Offset reading reports 999
  - 5G NR - SSB L64 measurement fails when active index goes beyond 31
  - 5G NR - No error message when there is no channel active
  - 5G NR - Channel frequency response not continuous in the SSB frequency range
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**VSA2018 (Build 23.00; Release Date March 2018)**  
License Version 2018.0301 required

**Enhancements:**

Option 200: Basic VSA

- Save and recall recordings in sdf and hdf5 format supports 64 bit addressing
- Padding or repetition of recording files during the recall process
- Support HiSlip connections with Infiniium scopes
- Support for Infiniium scopes with software version 6.20 installed
- Support for wideband M9393A
- Support for E7515A/E7515B UXM
- Support for M8920A

Option AYA: Digital Modulation Analysis

- SOQPSK type A and B filter types
- Longer result length for OQPSK measurements

Option BHM: DOCSIS 3.1 Modulation Analysis

- DOCSIS3.1 US support for multi-group mini-slot configuration in manual mode

Option BHN: 5G NR/Pre-5G Modulation Analysis

- EVM based auto range
- New measurement 3GPP Compliant 5G NR analysis
  - New modulation quality measurements comply to latest version of 3GPP specifications (February, 2018)
  - DL (SS, PBCH, PDSCH) or UL(PUSCH, PUCCH) CP-OFDM analysis

- All numerologies (15, 30, 60, 120, 240 KHz subcarrier spacing)
- Modulation up to 256QAM
- PDSCH, PUCCH and PUSCH decoding
- Pre-5G
  - BRS symbol power trace for beam sweeping test
  - Symbol vs. Power trace
  - PCI detection using Keysight FieldFox with 10 MHz BW

Option BHQ: Pulse Analysis

- Multi emitter pulse analysis
- Colorization of scatter plot for pulse deinterleaving

Option BHX: 802.11ax Modulation Analysis

- EVM based auto range
- RU Info Trace with streams and users
- Channel matrix by RU
- Enhanced autodetection for trigger based PPDU format

**Issues Resolved:**

- Ignore environment variable LM\_LICENSE\_FILE to avoid slow startup
- Custom IQ channel frequency response inverted
- SCPI with multiple commands in one line does not work
- Docsis 3.1 upstream SCPI command for Normalize IQ setting added
- Docsis 3.1 Phy38 burst flatness failures
- 802.11ax removed non-standard usage of legacy preamble L-LTF to improve accuracy of channel estimation

**Version 22.21 (Release Date August, 2017)**

License Version 2017.0401 required

**Issues Resolved:**

- Option 301 functionality enabled by Trial and Distributor licenses

**Version 22.20 (Release Date July, 2017)**

License Version 2017.0401 required

**Enhancements:**

#### Option 200: Basic VSA

- Support for M9393A VSA with M9203A digitizer
- Support for Input 2 of Keysight N9041B UXA with extended frequency range to 110GHz
  - manual ranging control only
- Power Spectrum measurement now included with option 200
- Support for additional Math Function features
  - Cross correlation
  - Differentiate
  - Smoothing
  - Sine
  - Cosine
  - Tangent
  - Power operator
  - Constants

#### Options BHD/BHE: LTE FDD/TDD Modulation Analysis

- 3D beamforming

#### Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- 3D beamforming

#### Option BHF: Custom OFDM Modulation Analysis

- Half subcarrier shift
- DFT-S-OFDM modulation

#### Option BHM: DOCSIS 3.1 Modulation Analysis

- DOCSIS3.1 US Normalize IQ setting added

#### Option BHN: Pre-5G Modulation Analysis

- New option
- Provides OFDM measurement trace data results for subframe analysis of signals described by the 5GTF V5G.211 standard
- Setup file compatibility with Keysight N7630C Signal Studio software

#### Option BHQ: Pulse Analysis

- Additional modulation types supported
  - BPSK
  - QPSK
  - Frank Code
  - P1 – P4 Code
- Graph trace for analysis

#### Option BHX: 802.11ax Modulation Analysis

- MU auto detection
- Symbol clock error compensation

- Inband emission measurement
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**Version 22.01 (Release Date April, 2017)**  
License Version 2017.0401 required

**Issues Resolved:**

- Crash during startup
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**Version 22.00 (Release Date April, 2017)**  
License Version 2017.0401 required

**Enhancements:**

Option 200: Basic VSA

- Support for 32 bit application removed. Only 64 bit application provided starting with this release.
- Support for floating and USB licenses using Agileesofd daemon
- Keysight E7760 Wideband Transceiver support
- Input 1 of Keysight N9041B UXA support
- Keysight InfiniiVision 1000 X-series support
- Keysight M9242A PXIe Modular Oscilloscope support
- Keysight M9710A AXIe 10-bit High-Speed Digitizer support
- 2x2/3x3/4x4 MIMO support for VXT M9421A
- The maximum VSA recording length can go up to 800M samples with Keysight S-series Oscilloscopes
- Removed support for InfiniiVision 6000 series
- Removed support for InfiniiVision 7000 series
- Removed support for Infinium 80000A/B series
- Removed support for N7109A
- Removed support for N4010A

Option BHF: Custom OFDM Modulation Analysis

- New tracking selection to include the Data Subcarriers to improve phase and timing performance

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Up to 64 channel measurement.

Option BHJ: 802.11 n/ac Modulation Analysis

- 802.11n analysis now included with option BHJ

Option BHM: Docsis 3.1 Modulation Analysis

- DOCSIS3.1 US measurement enhancements
  - New optional multi-carrier filter for optimal EVM results
  - New trace for IQ Meas Full-Band and RMS IQ Meas Full-Band
  - Color annotation to data segment in the IQ Meas trace
  - Synchronized ACP display of null subcarriers in the trace result
- DOCSIS3.1 DS measurement enhancements
  - New measurement results for channel power
  - New optional notch filter to reject the adjacent interference for optimal EVM results
  - New trace for IQ Meas Full-Band and RMS IQ Meas Full-Band
  - Color annotation to data segment in the IQ Meas trace

Option BHX: 802.11ax Modulation Analysis

- New option
- OFDMA and MU-MIMO for both uplink and downlink
- All PPDU formats and up to 8 users and 8x8 MIMO
- LDPC decoding

**Issues Resolved:**

- LTE E-TM setup files corrupt
- Custom IQ Sync Not Found does not set a bit in the status register
- Docsis 3.1 Upstream Marker coupling does not work as expected
- Infiniium V,Z scopes front panel locked after disconnect or exit
- Digital Demod Custom APSK SNR cannot be read via API
- Custom OFDM Average symbol clock error is always positive
- Full bandwidth not available with DSA/DSO Z634A

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**Version 21.20 (Release Date August, 2016)**  
License Version 2016.0401 required

**Enhancements:**

Option 200: Basic VSA

- Windows 10 support
- Manual control of X Series analyzer attenuator and gain settings
- UXA as a tuner for Z9070B
- UXA option H1G support
- N9030B option B5X support

- New API command to set range in units of dBm

Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Support for RB power auto detection threshold

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Support for RB power auto detection threshold

Option BHJ: 802.11 ac Modulation Analysis

- Limited support for 802.11ax as beta
  - Single user only

Option BHM: Docsis 3.1 Modulation Analysis

- DOCSIS3.1 US measurement enhancements
  - BER measurement
  - Add Copy to Manual
- DOCSIS3.1 DS measurement enhancements
  - Multi-carrier filter
  - Allow defining of exclude subcarriers for MER calculation

**Issues Resolved:**

- Docsis 3.1 downstream PLC raw data bits inverted

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**Version 21.00 (Release Date April, 2016)**

License Version 2016.0401 required

**Enhancements:**

Option 200: Basic VSA

- Support for S-Series scopes with E band mixers
- Support for “B” models of CXA, EXA, MXA and PXA
- Support for Infiniium DSAZ592A, DSOZ592A, DSAZ632A, DSOZ632A
- Support for Z9070B RF Tuner as a standard hardware configuration
- 16-channel support with dual M9703A or M9703B Digitizers

Option B7U: Modulation Analysis for W-CDMA (3GPP) and HSPA+

- DTCH based BER/BLER (RMC 12.2K)

Option BHF: Custom OFDM Analysis

- Variable CP and time gaps
- Multi carrier filtering

Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Time scale factor extended to 1000

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- LTE-A CSI-RS 8x8 MIMO Info Table
- PSDCH (physical sidelink dedicated channel) support
- Time scale factor extended to 1000

Option BHL: Channel Quality Measurement

- Significant speed improvement for the case of large tone count
- Stimulus bandwidth can now extend to full measurement span (previously limited to span x 5/6)
- Sample utility supports N8241A AWG and M8190A + PSG

Option BHM: Docsis 3.1 Modulation Analysis

- Upstream measurement (New)
- DOCSIS3.1 Downstream measurement enhancements
  - Embedded profile editor for Profile A-P and support for mixed modulation
  - Allow removal up to 5 sub-carriers for MER calculation

Option BHP: FMCW Radar Analysis

- Copy Auto to Manual function for auto detected reference regions
- Support for customizable decimation for FM traces

Option BHQ: Pulse Analysis

- Ability to export the entire recording at once for Pulse Descriptor Word (PDW)
- Support for 2-channel measurements

**Issues Resolved:**

- Custom IQ Equalizer behavior changes after pressing Reset
- Aborting measurement or recording causes error message “error locking deep capture resource”
- DSP error when configuring triggering with UXA

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**Version 20.20 (Release Date October, 2015)**

License Version 2015.0601 required

**Enhancements:**

Option 200: Basic VSA

- Support for M9420A VXT PXIe Transceiver Modules
- Support for InfiniiVision 3000T Series

- Support for Infiniium DSAZ594A, DSOZ594A
- E-Band Mixer Utility

Option BHF: Custom OFDM Analysis

- IEEE 802.11ah presets added

Option BHJ: 802.11 ac Modulation Analysis

- 1024QAM support

Option BHM: Docsis 3.1 Downstream Modulation Analysis

- BER testing for variable-bit-loading profiles

Option BHP: FMCW Radar Analysis

- New measurement pause test conditions (“between” and “not between”)

Option BHQ: Pulse Analysis

- New measurement pause test conditions (“between” and “not between”)

**Issues Resolved:**

- Crash occurs when sending SCPI commands while connected to PXI hardware

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**Version 20.00 (Release Date July, 2015)**  
License Version 2015.0601 required

**Enhancements:**

Option 200: Basic VSA

- Increase maximum input sample points from 82 MSa to 134 MSa for the 64-bit version
- Support for M9290A CXA-m PXIe Signal Analyzer
- Support for M1971E smart mixer
- Support for Infinivision 6000X Series
- Support for Infiniium V Series
- 5 MSa limit removed from X- Series analyzers

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- DL PDSCH 256QAM (E-TM3.1a) support in 3GPP Rel-12
- UL virtual cell ID support in 3GPP Rel-11

Option BHJ: 802.11 ac Modulation Analysis

- Frequency estimation mode selection
- Automatic symbol timing adjustment
- Frequency dependent IQ impairment estimation and compensation



Option BHK: Custom IQ Modulation Analysis

- Add disabling frequency estimation option
- Improved constellation preset UI (including new DVB-APSK presets)
- Improved synchronization pattern search

Option BHM: Docsis 3.1 Downstream Modulation Analysis

- New demodulation result summary for raw bit stream and information through demodulation and decoding process
- User profiler editor for profile configuration even with mixed modulation formats
- MER for ZBL
- Average power over measurement interval in dBm

Option BHP: FMCW Radar Analysis

- New FMCW phase noise spectrum trace

Option BHQ: Pulse Analysis

- Add triangular FM chirp, Barker code detection and analysis
- Automatic detection of modulation per pulse (CW, LFM, Triangular FM, and Barker)
- Save PDW into .csv file for use by Keysight UXG

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**Version 19.50 (Release Date April, 2015)**  
License Version 2014.1101 required

**Enhancements:**

Option AYA: Digital Modulation Analysis

- Added 4RC reference filter for HCPM modulation used by APCO25

Option BHJ: 802.11 ac Modulation Analysis

- Added two frequency estimation modes, preamble & pilots, preamble & pilots & data

Option BHM: Docsis 3.1 Downstream Modulation Analysis

- New Option

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**Version 19.02 (Release Date March, 2015)**  
License Version 2014.1101 required

## Issues Resolved:

- UXA external/IFMag/FMT triggers produce DSP errors for higher spans (>230MHz).
  - UXA Time Qualified Trigger minimum step size increased for higher spans (>230MHz).
  - Startup error when Keysight IO Libraries is not installed.
  - Crash when CSI-RS is enabled in LTE Advanced measurement.
  - Degraded CSI-RS EVM when measurement interval is  $\leq 1$  slot.
  - Power Spectrum measurement not enabled with trial license.
  - Symbol clock error reported is not accurate with Upstream Docsis signals
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## Version 19.00 (Release Date December, 2014) License Version 2014.1101 required

## Enhancements:

### Option 200: Basic VSA

- Option 300: Hardware Connectivity is now included with option 200
- Support for N9040B, UXA.
- Support for segmented capture.
- Time qualified triggering.
- VXI hardware support discontinued.

### Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Support for Version 13.1.1 Signal Studio Setup files

### Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Cross-carrier in-band emission measurement
- Cross-carrier scheduling
- DCI decoding for Rel-10
- Transmission Mode 9 (up to 8x8 MIMO) auto-detection

### Option BHK: Custom IQ Modulation Analysis

- Support for analysis on two channels

### Option SSA: Spectrum Analysis

- Support for zero span measurement
- Equivalent sweep time
- Sweep trigger
- SCPI for gate trigger
- Additional X-series SA compatible SCPI commands

Option BHL: Channel Quality Measurement

- New Option
- Multi-tone stimulus based channel response measurement

Option BHP: FMCW Radar Analysis

- New Option
- Modulation quality measurements on multi-chirp linear FM modulated signals

Option BHQ: Pulse Analysis

- New Option
- Support for various Keysight hardware platforms with wide dynamic range and analysis bandwidth required by narrow pulse analysis

**Issues Resolved:**

- Crash occurs after presetting a multi-measurement configuration that includes one or more digital demod measurements.
  - Sync search fails in Custom IQ.
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**Version 18.70 (Release Date August, 2014)**  
License Version 2014.0501 required

**Enhancements:**

Option 200: Basic VSA

- Cosmetic rebranding to Keysight Technologies
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**Version 18.50 (Release Date August, 2014)**  
License Version 2014.0501 required

**Enhancements:**

Option 200: Basic VSA

- Sequencing measurements
- Trace Averaging
- In process SCPI Server including support for HiSLIP connections
- Support for running 89600 in process

Option 300: Hardware Connectivity

- Support for Infiniium Z-Series scopes.
- Support for M9393A.

- Resource sharing of M9393 and M9391 Vector Signal Analyzers using M9000 Resource Manager.

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- SCPI Support

Option BHF: Custom OFDM Analysis

- Support for 8192-QAM and 16384-QAM

Option SSA: Spectrum Analysis

- New Option
- Supports M9391A and M9393A
- Limited X-Series SA Mode Compatible SCPI

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**Version 18.02 (Release Date September, 2014)**

License Version N/A required

This version was never officially released but was mistakenly included on the factory disk image of X Series analyzers that shipped with A.14.54 software. This version will not run with an error message:

```
>> Startup Failed
>> Unable to load one or more of the requested types. Retrieve the LoaderExceptions property for more information.
>> Agilent 89600 VSA software failed to start - exit code -1.
```

If you have this version installed on your analyzer please upgrade to a released version.

---

**Version 18.00 (Release Date May, 2014)**

License Version 2014.0501 required

**Enhancements:**

Option 200: Basic VSA

- Support for Windows 8 (WinXP no longer supported)
- Increase maximum input sample points by 10-fold for the 64-bit version.
- Increase the maximum decimation factor to allow narrower RBW for wide-band analysis for the 64-bit version.
- Graph traces can use stimulus/response data at different center frequencies.
- Support of Matlab Simulink discontinued.

Option 300: Hardware Connectivity

- Support for Infiniium S-Series scopes.

- Support logic analyzers with the 64 bit application.

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Support for UL-MIMO single channel analysis.
- Support measuring LTE release-11 defined sub-frame type.
- Add Time Alignment Error results between component carriers to the error summary table.

Option BHK: Custom IQ Modulation Analysis

- New option.

Model 89620B/BN: 89600 WLA software

- Support for Release 10 RRC message decoding.

---

**Version 17.22** (Release Date April, 2014)  
License Version 2013.0601 required

**Issues Resolved:**

- Measurements can be slowed on some processors due to blocking threads in the Intel DSP libraries.
- Legacy floating licenses (agilevs2) not working, introduced in 17.21.

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**Version 17.21** (Release Date February, 2014)  
License Version 2013.0601 required

**Issues Resolved:**

- Errors when running on Intel Haswell processors.

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**Version 17.20** (Release Date October, 2013)  
License Version 2013.0601 required

**Enhancements:**

Option 300: Hardware Connectivity

- Added user preference to automatically restore measurement after hardware configuration change.

Option AYA: Digital Modulation Analysis

- Added presets and new metrics to support Wi-SUN 2-FSK modulation quality measurements.
- Enhanced custom APSK measurement to handle non-uniform phase shift definitions for the case of 4 or 6 constellation states.
- Added MER metrics to the Syms/Errs summary table for 8PSK.
- Extended QAM modulation quality analysis to include QAM2048 and QAM4096.

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**Version 17.00 (Release Date June, 2013)**  
License Version 2013.0601 required

**Enhancements:**

Option 200: Basic VSA

- Complex Stimulus / Response: new Graph traces for computing and plotting AM/AM, AM/PM, Gain Compression, Differential EVM and other key metrics for power amplifiers and other two port devices.
- Added support for Blackman-Harris, Kaiser-Bessel, and Gaussian window types.

Option 300: Hardware Connectivity

- Support for frequency-mask triggering (FMT) using Agilent X-Series Analyzers Option RT1/RT2.
- Support for Agilent Infiniium MSOX90000 Series oscilloscopes.

Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Improved power level auto-detection for downlink control channels (P-SS, S-SS, PBCH, PCFICH).
- Uplink auto-detection of frame boundary (for automatic exclusion of EVM transient time).

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Updates to decoding for UL PUCCH UCI.

Model 89620B/BN: 89600 WLA software

- Support for simultaneous Uplink and Downlink measurements and protocol analysis has been added.
- Charting capabilities have been improved.
- Examples have been added to demonstrate protocol analysis verification tasks such as: UL/DL throughput, UL power control, and connection setup.

### Issues Resolved:

- Errors when attempting to upload large files to a signal generator
- 

### Version 16.20 (Release Date March, 2013) License Version 2012.1201 required

### Enhancements:

#### Option 200: Basic VSA

- Additional SCPI commands and queries for all Input Correction and Correction APIs

#### Option 300: Hardware Connectivity

- Support for Agilent Infiniium 9000 H-Series oscilloscopes.
- Support for 13 GHz models of Agilent Infiniium 90000 X-Series oscilloscopes.

#### Option AYA: Digital Modulation Analysis

- New measurement parameter to specify EVM Normalization Reference as either Constellation Maximum (default) or Reference RMS.
- Improved filter response when filter alpha < 0.4, for the following formats:

BPSK	Custom APSK
QPSK	16-APSK
DQPSK	16-APSK w/DVB
8-PSK	32-APSK
D8PSK	32-APSK w/DVB

#### Option BHF: Custom OFDM Analysis

- Support for 2048-QAM and 4096-QAM.

### Issues Resolved:

- Host ID changes after a reboot
-

**Version 16.01 (Release Date January, 2013)**  
License Version 2012.1201 required

**Issues Resolved:**

- Startup Error on Win XP with no network connectivity and no Windows Updates
- 

**Version 16.00 (Release Date December, 2012)**  
License Version 2012.1201 required

**Enhancements:**

Option 200: Basic VSA

- Improved synchronization within Multi-Measurements Analysis using multiple hardware configurations.
- Support for customized routing of physical input channels onto measurement channels.
- Additional SCPI commands and queries for improved coverage of the .NET API
- Simplified download of current recording for arbitrary waveform playback through Source control.
- Option 105: Dynamic link to ADS/SystemVue is now included with option 200.
- Option 106: Link to MathWorks Simulink is now included with option 200.

Option 300: Hardware Connectivity

- Support for Agilent InfiniiVision 4000 X-Series Oscilloscopes

Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Support for FDD Beamforming has been added.
- Support for analysis of MBSFN with mixed-mode CP's has been added.
- Summary metrics have been added for in-band emissions and spectral flatness measurement results.

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Support for PUCCH Format 3 has been added.
- Support for TM9 (Downlink 8x8 MIMO) has been added.
- Support for CSI-RS analysis has been added.

Option BHJ: 802.11 ac Modulation Analysis

- Support for 8x8 MIMO analysis.
- Support for Multi-User analysis.



- Support for Dynamic Phase Noise measurement.
- Channel equalization has been improved, including an optional frequency-domain smoothing algorithm.

Option BHA: TETRA (TEDS) Modulation Analysis

- New option
- Measurement analysis matching 89600 VSA 12.02 capabilities.

**Issues Resolved:**

- Translator Framework failures related to Null Reference Exception
- 

**Version 15.01 (Release Date August, 2012)**  
License Version 2012.0401 required

**Enhancements:**

Option 300: Hardware Connectivity

- Support for Agilent Infinium 90000 Q-Series Oscilloscopes.
- Support for Agilent InfiniiVision 3000 X-Series 1 GHz Bandwidth Oscilloscopes
- Support for source control using N5172B EXG, N5182B MXG

Option BHF: Custom OFDM Analysis

- Support for non-power-of-two FFT sizes

**Issues Resolved:**

- Unsigned assembly error
  - Connection to Logic Analyzers fails
  - Translator Framework interferes with non-English keyboards
- 

**Version 15.00 (Release Date April, 2012)**  
License Version 2012.0401 required

## Enhancements:

### Option 200: Basic VSA

- Native 64-bit 89600 VSA application (32-bit 89600 VSA application still supported).
- Multi-Measurements Analysis. Note: because this can potentially use a large amount of memory, we recommend using the 64-bit 89600 VSA application when doing Multi-Measurements analysis.
- Multiple Trace Windows.
- Support for channel configurations using 8 input channels.
- Cross-channel measurements (cross-correlation, coherence, etc.) now support arbitrary pairs of channels.
- Improvements to SCPI API help documentation, and some additional commands and queries.
- Source control and arbitrary waveform playback using signal recording files.

### Option 300: Hardware Connectivity

- Support for Agilent InfiniiVision 3000 X-Series oscilloscopes.
- Support for source control using Agilent ESG/MXG/PSG-series signal generators.
- Support for external mixing using Agilent X-series signal analyzers.
- Support for the Agilent N6841A RF Sensor.
- Support for 8-channel configuration of Agilent N7109A Multi-Channel Signal Analyzer.

### Option 105: Link to EEsof ADS/SystemVue

- Support for ADS connectivity is now available with ADS 2011.10.

### New Option 106: Link to the MathWorks Simulink Model-Based Design

- Agilent 89600 VSA Blockset now supports side-by-side installations of 89600 VSA version 14.23 and newer.
- Supports MATLAB versions 2010a and newer.
- 89600 VSA Blockset installation available from the More Installation Choices section of the 89600 Software Installation Manager.

### Option AYA: Digital Modulation Analysis

- Support for Shaped Offset QPSK modulation format, including filter and preset for SOQPSK-TG (IRIG 106).

### Option BHD/BHE: LTE FDD/TDD Modulation Analysis

- Support for Positioning-RS analysis
- Support for analysis of MBSFN-RS/PMCH

- Support for 8-antenna beamforming analysis (TDD only)

Options BHG/BHH: LTE-Advanced FDD/TDD Modulation Analysis

- Support for Inter-band Carrier Aggregation

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**Version 14.23 (Release Date February, 2012)**  
License Version 2011.0701 required

**Enhancements:**

Option 300: Hardware Connectivity

- Support for 160 MHz analysis bandwidth when using N9030A-B1X with PXA Signal Analyzers (requires firmware version A.10.00 or later)

New Option 244: 89600 VSA software for Simulation Environments

- Available for 89601BE and 89601BNE products. Enables simulation environment use of the 89600 VSA software without hardware connectivity.

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**Version 14.20 (Release Date October, 2011)**  
License Version 2011.0701 required

**Enhancements:**

Option 200: Basic VSA

- C++ redistributables not re-installed during each installation

New Application: 89600 WLA

- The 89600 WLA software lets you perform detailed analysis of your downlink LTE signal by correlating 89600 VSA measurements with protocol events across multiple frames and multiple protocol layers (MAC, RLC, PDCP, and RRC). Demodulation of the LTE signal is performed by the VSA and the results are further decoded by WLA.

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**Version 14.00 (Release Date July, 2011)**  
License Version 2011.0701 required

**Enhancements:**

Option 300: Hardware Connectivity

- Support for N9030A-BBA
- Support for N9030A-550, -544, -543
- Support for N9038A
- Support for M9392

Option AYA: Digital Modulation Analysis

- Custom APSK modulation analysis
- Low SNR mode for OQPSK and DQPSK

Option B7Y: Mobile and Fixed WiMAX modulation analysis

- This license enables both 802.16 OFDM and 802.16 OFDMA

Option BHJ: 802.11 ac Modulation Analysis

- New option

Option BHG: LTE-Advanced FDD Modulation Analysis

- New option

Option BHH: LTE-Advanced TDD Modulation Analysis

- New option

**Issues Resolved:**

Option 200: Basic VSA

- Windows firewall exception installed for floating licenses
- Unable to install Agilent Application Services

Option 300: Hardware Connectivity

- Errors in AliasChecker macro

Option BHE: LTE TDD Modulation Analysis

- Crash when both UL and DL present in the waveform

---

**Version 13.01 (Release Date March, 2011)**  
License Version 2010.1201 required

**Issues Resolved:**

Option 200: Basic VSA

- SystemVue will not connect when using a trial license
- Double characters entered in dialog boxes with Japanese language setting
- Input User Corrections only applied to "I" part of I+jQ signal

Option 300: Hardware Connectivity

- Installation on X-Series signal analyzers
- Connection issues for external PC to X-Series signal analyzers
- ESA models E4402B, E4404B, and E4405B are not recognized

Option AYA: Digital Modulation Analysis

- Sync search without Pulse search disables Search Length

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**Version 13.00 (Release Date February, 2011)**  
License Version 2010.1201 required

Initial release, below are the changes relative to 89601A version 12.xx

**Enhancements:**

Option 200: Basic VSA

- Many more traces (up to 20 traces supported)
- Many more markers (up to 20 markers supported)
- Flexible trace layout. Traces can be docked, floated, and overlaid.
- New Digital Persistence and Cumulative History trace display modes
- Print preview & save screen or selected traces to file
- Macros support Visual Basic .NET and C# languages
- New Output window with Show Code feature
- New SCPI based remote control
- New .NET API based remote control
- COM API Backwards Compatibility (see online help topic “89600B VSA COM API (Backwards Compatibility)”)
- Side-by-Side installation of multiple versions
- Dynamic Context Sensitive Help

- New licensing redemption and software subscription update via Agilent Software Licensing and Agilent Software Manager

#### Option 300: Hardware Connectivity

- Built-in Auto Range function
- Easier to use Hardware Configuration, dynamic HW rediscover
- Custom channel configuration for Infiniium Oscilloscopes
- Input coupling/Impedance and Probe support for Infiniium Oscilloscopes
- Support for Infiniium 90000 X-Series High-performance Oscilloscopes
- Support for N7100 Series SIGINT System

#### Option BHD /BHE: LTE FDD /TDD Modulation Analysis

- Uplink decoding
- Auto-detection of PUCCH parameters
- Auto-detection of UL power levels
- Demodulation of DL in the presence of UL for TDD and vice-versa

#### Option BHE: LTE TDD Modulation Analysis

In addition to the features listed above section, the following features are supported for Option BHE:

- UE-specific RS Analysis with auto-detection
- One layer and dual layer Beamforming analysis with new Antenna Beam Pattern trace

#### Option BHF: Custom OFDM Analysis

New flexible demodulator supports

- TDD or FDD
- FFT size up to 65536 points
- Subcarrier modulation to 1024 QAM
- MIMO (max 4 streams)
- Multi-users (max 8)
- Choice of sync techniques – pilot, preamble, cyclic prefix, etc.
- Choice of EQ training – preamble, pilots, data.

### Issues Resolved:

#### Option 300: Hardware Connectivity

- PSA returns invalid data with long time measurements after changing span.
- No measurement updates occur when using PSA via GPIB
- VISA timeout error while using 90000 series scopes

Option B7U: Modulation Analysis for W-CDMA (3GPP) and HSPA+

- Improved HSPA synchronization algorithm
- Inconsistent results when switching Pilot Aided Timing Estimation on and off

Option B7Z: 802.11n Modulation Analysis

- Software crash when using PXA hardware

Option BHC: RFID Modulation Analysis

- Various measurement setups could cause the software to crash

#### **89600A Features not available 89600B:**

- TETRA/TEDS (option BHA)
- Source Control
- Acqiris ADC Support
- Simulink support
- ADS link (SystemVue link is supported)
- 89607A WLAN Test Suite
- 89604A Distortion Suite
- ESA as a down converter
- PSA as a down converter
- Agilent SI Spectrum Analyzer
- Existing VBScript macros need to be ported to Visual Basic.NET or C#