(R)Evolution of wideband analysis: Go wide – Go deep

UXA: See the real performance

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  µWave & Comms products
  Sales specialist
Expanding X-Series signal analyzer portfolio

**EXA**
*Balance the Challenges*
10 Hz to 44 GHz, 40 MHz BW
Available with RTSA

**MXA**
*Accelerate in Wireless*
10 Hz to 26.5 GHz, 160 MHz BW
Available with RTSA

**PXA**
*Drive your Evolution*
3 Hz to 50 GHz, 160 MHz BW
Available with RTSA

**CXA**
*Master the Essentials*
9 kHz to 26.5 GHz, 25 MHz BW

**UXA**
*See the Real Performance*
3 Hz to 26.5 GHz, 510 MHz BW
Available with RTSA

100% code compatibility
Similar user experience

89600B VSA software
Premier signal analysis & troubleshooting

Oct 14
UXA: New flagship of X-Series signal analyzers

Feature summary

See the Real Performance

- World’s widest analysis and real-time bandwidths up to 510 MHz
- Industry’s leading phase noise performance
- Most intuitive UI with 14.1” capacitive multi-touch screen display
UXA – Advancing Technology to Deliver Performance

New proprietary ADC
2.4GSa/s 14 bit

New Wide BW Front End
510 MHz Analysis
Excellent RF flatness

New Proprietary DAC
DDS based LO
Excellent Phase Noise
Low Spurious

New large touch-screen display with modern GUI

Wideband Digital IF provides High Dynamic Range

510MHz BW
Wideband AIF DSP Block Diagram:

ADC

Data Receiver

NCO₁

NCO₂

SRAM

14 bit
2400 MSample
Real

To Primary
Wideband DIF

300 MSample
Complex

To Secondary
Wideband DIF

300 MSample
Complex

Decimator Block
Anti-alias filter

Decimator

\( \div 4 \)

Clock divider

Decimator Block
Anti-alias filter

Decimator

\( \div 4 \)

Clock divider
IQ Stitching

- Two times FFT
- To Align Phase, the system must measure path delay for each DIF
- Concatenate
- IFFT

Results are much better than time interleaved samplers or RF stitching (hi/lo band) that are sometimes used in scopes
Higher IF Frequencies

<table>
<thead>
<tr>
<th>IF Path</th>
<th>PXA</th>
<th>UXA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium 40MHz</td>
<td>250.0MHz</td>
<td>250.0MHz</td>
</tr>
<tr>
<td>Wideband 160MHz</td>
<td>300.0MHz</td>
<td></td>
</tr>
<tr>
<td>Wideband 0 - 255MHz</td>
<td></td>
<td>750.0MHz</td>
</tr>
<tr>
<td>Wideband 255 - 510MHz</td>
<td></td>
<td>877.1484375MHz</td>
</tr>
</tbody>
</table>

IF path capable of handling more than 1 GHz of BW

⇒ Use oscilloscope or external DIF board for even wider demod. BW
N9040B UXA Signal Analyzer
IF Performance for characterizing challenging signals

- Maximise dynamic range and accuracy with excellent IF frequency response of <0.7dB

- See your signals of interest clearly with SFDR of >75dBc across 510MHz BW

- Continuous Background Calibration Improves SFDR
Much improved phase noise
Enabled by Keysight proprietary technologies

1 GHz Carrier

Phase Noise

Offset

Better
Worse

New frequency reference board

New Proprietary DAC
DDS based LO

UXA
PXA
PSA
Why is the wider, cleaner analysis BW important? Analyze complex signals, ensure measurement quality

- **High resolution radar imaging**: 510 MHz BW signal allows radar cross section in cm
- **Swept RF & Barker coded radar** demand wide signal bandwidth
- **Digital pre-distortion (DPD) for PA** in base stations require wide BW (e.g. 3x or 5x of a 80 MHz BW signals)

Emerging comms are bandwidth hungry
Capture more information w/ wider real-time BW

20 ns Pulse

802.11ac 160 MHz BW carrier

PXA 160 MHz

UXA 510 MHz
Ext Mixing: Spurious Response Benefit in mm-bands

Improved LO spectral purity at the External Mixing port:

Response to a 355 GHz Signal using VDI WR 2.2 mixer

Response after applying Image Suppression
The Atomic Frequency Reference (AFR) is a cesium-based atomic clock that UXA/PXA/MXA/EXA can use to discipline (adjust) the Internal 10 MHz reference and increase the frequency accuracy.

Great alternative to a Primary Reference Standard which may not be available.

This has no impact on phase noise.

To “Ref in” on analyzer

USB power from analyzer

<table>
<thead>
<tr>
<th></th>
<th>Keysight J7203A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aging Rate per Year</td>
<td>±1x10^{-9}</td>
</tr>
<tr>
<td>Temperature Stability</td>
<td>±5x10^{-10}</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-10 to 70°C</td>
</tr>
<tr>
<td>Achievable Initial Calibration Accuracy</td>
<td>±5x10^{-11}</td>
</tr>
</tbody>
</table>
RTSA Enhancements
Available also on PXA and MXA

Gain Deeper Understanding of Signals in Real-time

• All A.14.5xx RTSA enhancements at no cost to existing RTSA customers

External Mixing
– Supports Keysight smart mixers up to 110 GHz
– Supports other vendors mixers up to 1.1 THz
– Can be used in combination with stitched density feature

Stitched Density
– Enables wideband spectrum monitoring up to 50 GHz or above
– Supported with external mixing for maximum frequency span of mixer
– Variable dwell time settings to increase probability of catching signals

Density/Spectrogram View
– Combined display showing Density & Spectrogram
– Enables simultaneous view of Frequency, Amplitude, Intensity, and Time
RTSA Enhancements
Available also on PXA and MXA

Time Qualified Triggering (TQT)
• Enabled in both FMT and Level Triggers
• Trigger only on signals that are less than, greater than, inside, or outside defined time durations

Interfering Zigbee and WLAN
– Overlapping signals in the frequency domain can be resolved by using TQT

Isolated WLAN signal
– Set Time 1 < 300us to isolate the WLAN signal

Isolated Zigbee
– Set Time 1 > 300us to isolate the Zigbee signal
UXA front view

35.8 cm diagonal
30 cm wide
19 cm high
1280 x 800 resolution
16:10 aspect ratio
Widescreen

X-Series Multi-Touch UI
Simplify measurement set-up
Focus on your design not on test equipment set-up

- Multi-touch interface supports gestures including pinch and zoom
- Familiar X-Series menu structure optimized for touch
- Multi-entry for setting measurement parameters

Block-diagram
Multi-measurements
Full screen
Simplify Measurement set-up

RF input fundamental

2nd harmonic of the input

Real-time SA

IQ analyzer

Multi-(Measurement)-Screen
VSA Opt BHQ Pulse Analysis

Coming Soon (Nov. 2014)
89600 VSA Software Platform
Spanning measurements and instrumentation

Cellular Communications
- LTE-Advanced FDD/TDD
- LTE FDD/TDD
- W-CDMA/HSPA/HSPA+
- TD-SCDMA/HSPA
- GSM/EDGE/EDGE Evo
- cdma2000/1xEV-DO

Wireless Connectivity
- 802.11ac WLAN
- 802.11n WLAN
- 802.11a/b/g/p/j WLAN
- 802.16 WiMAX
- Bluetooth
- Zigbee
- Wi-SUN

Audio/Video Broadcasting
- ATSC, ATSC-M/H
- DVB-C, DVB-S, DVB-S2
- J.83A/B/C
- DOCSIS, ISDB-C
- DAB, DVB-T/H/SH

Detection, Positioning, Tracking & Navigation
- SOQPSK
- Custom APSK
- RFID

General RF & MW
- AM/FM/PM Demod
- Flexible Digital Demod
- Custom OFDM
- Distortion (AM/AM, AM/PM, Gain Compression)

EDA software
- Logic analyzer
- Oscilloscope
- Modular
- Signal analyzer

KEYSIGHT TECHNOLOGIES
Thank You!
UXG Agile Signal Generator
Get Closer to Reality

- Fast frequency, phase and amplitude switching
- Phase repeatability or phase continuity
- Wide chirps (10-25% of carrier frequency)
- Long pulse trains using:
  - List-based pulse descriptor words
  - Rear panel binary or BCD interface
- Great phase noise
  - Similar to PSG-#UNY
- Full instrument security features
- Coherence between units

INTRO
1 OCTOBER 2014!
Microwave Signal Generator Switching Speed

- EW/Sig Sim
- Radar Test
- Radar LO
- Satellite
- RCS
- Antenna Test

UXG
MXG μW
PSG

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