

## Agilent WLAN Test Tools for R&D

• Selection Guide



Wireless Local Area Networks (WLAN), specifically the IEEE 802.11a/b/g WLAN (or Wi-Fi) standards, use RF transmission to provide a wireless extension of the ethernet. The use of WLANs has become common in homes, offices, and “hot spots” in restaurants, hotels, and airports.

Agilent offers a variety of 802.11a/b/g WLAN technology test tools for R&D and integration with the frequency, performance, and versatility to meet your measurement needs. To help you determine which WLAN technology tool is right for you, this selection guide provides an overview and a side-by-side comparison of our WLAN technology products.

Agilent Technologies’ 802.11a/b/g test equipment solutions can help you take your WLAN technology ideas from conception to consumer. Agilent has the industry’s most extensive offering of WLAN technology test tools for R&D, and integration. Whether you are engaged in designing the WLAN technology chipsets and components, integrating chipsets and components into modules, or integrating modules into host devices, we can help you get your WLAN technology products to market faster.



**Agilent Technologies**

# Signal Analysis Solutions



## 89641A 6 GHz vector signal analyzer

- Advanced analysis and troubleshooting of WLAN modulated signals.
- DC - 6.0 GHz frequency coverage with 36 MHz of analysis bandwidth.
- Optional second IF/baseband channel for direct baseband I & Q input.

This analyzer features unique error analysis tools, including adaptive equalization, to help you find and analyze problems with your WLAN signals. These problems include symbol timing errors, filtering errors, DAC overflow, incorrect sinX/X compensation, as well as RF problems such as IQ imbalance, quadrature skew, and IQ offset.



## 89650S 26.5 GHz vector signal analysis bundle

- Advanced analysis and troubleshooting of WLAN modulated signals
- Exceptional analysis bandwidth
- Excellent dynamic range and accuracy

The 89650S combines Agilent's high performance E4440A 26.5 GHz PSA spectrum analyzer with the advanced 89601A vector signal analysis VSA software, running on your PC to provide you advanced vector signal analysis capability with up to 80 MHz of bandwidth.



## N4010A wireless connectivity test set

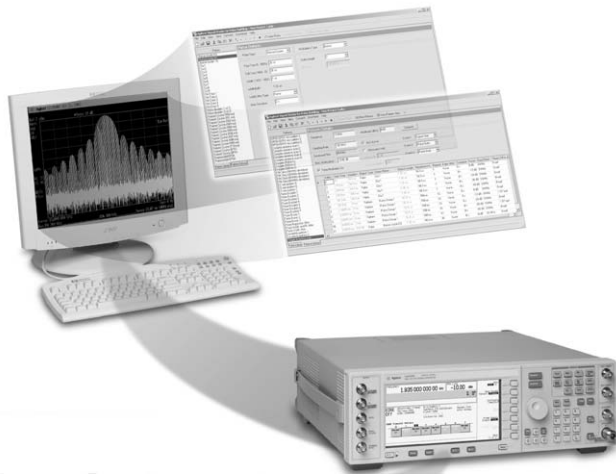
- One button, standards based, pass/fail WLAN measurements.
- Combines a fully calibrated vector signal generator and wide bandwidth signal analyzer into a single test set.
- Repeatable measurement results from development through to production.

The N4010A wireless connectivity test set with WLAN options combines a fully calibrated vector signal generator and wide bandwidth signal analyzer into a single test set. Agilent's N4010A with its fully flexible arbitrary waveform capability is able to support any vendor's chipsets. Link to 89601A VSA software for advanced analysis of WLAN modulated signals. Combine with ESA-E Series spectrum analyzers for full suite of in-band and out-of-band transmitter measurements.

### Performance Comparison

Capture Hardware	89650S 26.5 GHz vector signal analysis Bundle	89641 vector signal analyzer	N4010A wireless connectivity test set
<b>Frequency range</b>	3 Hz to 26.5 GHz	DC to 6 GHz	2.37 to 2.53 GHz 4.80 to 5.875 GHz
<b>Bandwidth</b>	80 MHz	36 MHz	22 MHz
<b>Residual EVM</b>			
IEEE 802.11a/g	-47 dB (typical)	-45 dB	2% (typical)
IEEE 802.11b	< 1% (typical)	2%	Not specified
<b>Spectral flatness</b>	±0.25 dB	±0.2 dB	±0.5 dB power accuracy
<b>Signal capture memory</b>	Up to 128 Msa (complex)	Up to 384 Msa (complex)	Up to 5 ms at 22 MHz
<b>Demod analysis capability</b>	802.11a/b/g, HIPERLAN/2	802.11a/b/g, HIPERLAN/2	802.11a/b/g
<b>Baseband I/Q</b>	No	Yes (Optional)	No
<b>Required options</b>	Option B7R	Option B7R and Option 110	Option 102 or 103

# Signal Generator Solutions



## E4438C ESG vector signal generator with Signal Studio for WLAN

- Easily configure IEEE 802.11a/b/g frames from the intuitive user interface.
- Simulate channel impairments by adding multipoint reflections to the waveform.
- Fully coded 802.11 WLAN frames enable FER, PER, and BER testing receiver sensitivity.

Signal Studio for 802.11 WLAN technology simplifies your role in creating 802.11a/b/g test signals for use with the E4438C ESG with coverage up to 6 GHz. Use the software to create fully-coded, standards-based 802.11 frames and modulated data streams.

## N4010A wireless connectivity test set

- WLAN receiver tests according to standards.
- Combines a fully calibrated vector signal generator and wide bandwidth signal analyzer into a single test set.
- Repeatable measurement results from development through to production.

The N4010A wireless connectivity test set with WLAN options combines a fully calibrated vector signal generator and wide bandwidth signal analyzer into a single test set. Agilent N4010A with its fully flexible arbitrary waveform capability is able to support any vendor's chipsets.

Hardware	N4010A wireless connectivity test set	E4438C ESG vector signal generator
<b>Frequency range</b>	2.4 to 2.4835 GHz and 4.9 to 5.875 GHz	250 KHz to 6 GHz
<b>Playback (capture) memory</b>	64 Msamples	64 Msamples
<b>Output power range</b>	-90 to -10 dBm	Up to +17 dBm*
<b>Residual EVM</b>		
IEEE 802.11a/g	< 2% (typical)	< 1% (typical)
IEEE 802.11b	Not specified	< 1% (typical)
<b>Modulation capability</b>	802.11a/b/g	802.11a/b/g
<b>Required options</b>	Option 102 or 103, and Option 110	Option 601 or 602 and Option 417

\* depends on crest factor

## WLAN RF tests

	IEEE Reference			89650S 26.5 GHz			
				Vector Signal Analysis Bundle	89641A Vector Signal Analyzer	N4010A wireless connectivity test	E4438C ESG vector signal generator
<b>IEEE 802.11 RF layer tests</b>	802.11a	802.11b	802.11g				
<b>Transmitter tests</b>							
Output power	17.3.9.1	18.4.7.1.2	19.4.7.1	■ <sup>1</sup>	■	■	
Power rise/fall		18.4.7.6		■	■	▲ <sup>2</sup>	
Spectrum mask	17.3.9.2	18.4.7.3	19.5.4	■	■	■	
Carrier suppression		18.4.7.7		■	■	■	
Center frequency leakage	17.3.9.6.1			■	■	■	
Spectral flatness	17.3.9.4			■	■	■	
Transmission spurious		18.4.6.8		■ <sup>3</sup>	▲ <sup>4</sup>	▲ <sup>5</sup>	
Center frequency tolerance	17.3.9.4	18.4.7.4.5	19.4.7.2	■	■	■	
Symbol clock frequency tolerance	17.3.9.5		19.4.7.3	■	■	▲ <sup>2</sup>	
Constellation error	17.3.9.6.3		19.7.2.7	■	■	■	
Error vector magnitude		18.4.7.8	19.7.2.7	■	■	■	
<b>Transceiver test</b>							
Out-of-band spurious emission	17.3.8.4		19.4.3	■ <sup>3</sup>	▲ <sup>4</sup>		
<b>Receiver tests</b>							
Sensitivity	17.3.10.1	18.2.8.1	19.5.1			▲ <sup>6</sup>	▲ <sup>6</sup>
Maximum input level	17.3.10.4	18.4.8.2	19.5.3			■	■
Adjacent channel rejection	17.3.10.2	18.4.8.3	19.5.2			■ <sup>7</sup>	■ <sup>7</sup>
Non-adjacent channel rejection	17.3.19.5					■ <sup>7</sup>	■ <sup>7</sup>
Clear channel assessment	17.3.10.5	18.4.8.4	19.1.2			■	■

- Full measurement capability
- ▲ Some measurement limitations

1. Channel power measurement indicates average transmit power
2. Full measurement capability available using 89600 Series VSA software or 89607A in conjunction with N4010A
3. Requires manual user setup
4. To frequencies up to 6 GHz
5. This is an out-of-band measurement and requires a spectrum analyzer such as ESA-E Series.
6. Test signal is fully-coded which enables vendor-specific PER measurements to be performed. The ESG and N4010A do not perform PER measurements
7. Use a second signal generator as interferer. CW interference (for blocking tests) can be generated using an Agilent E8257D PSG analog signal generator



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