

# iQflex™

## For WLAN and Bluetooth



## VSA Performance

Parameter	Specification
Frequency	<ul style="list-style-type: none"> <li>• Baseband</li> <li>• 2400 - 2500 MHz</li> <li>• 4900 - 6000 MHz</li> </ul>
Analog bandwidth	60 MHz
Quantization	14 bits
Sampling frequency	80 MHz at ADC
Sampling resolution	1 sample
Waveform Capture Duration	13 ms
Pre-trigger capture	$(2^{20} - 1)$ samples (~1,000,000 samples)
Sampling filter amplitude variation	$\leq 0.25$ dB (0 – 10 MHz offset frequency)
Sampling filter group delay variation	$\leq 300$ ps (0 – 10 MHz offset frequency)
Noise figure	$\leq 25$ dB
Input amp level (max)	<ul style="list-style-type: none"> <li>• 2400 – 2500 MHz: +30 dBm</li> <li>• 4900 – 6000 MHz: +30 dBm</li> </ul>
Power measurement accuracy	<ul style="list-style-type: none"> <li>• Specification: <math>\pm 1.0</math> dB (for levels <math>\geq -50</math> dBm)</li> <li>• Typical: <math>\pm 0.5</math> dB</li> </ul>
Residual EVM	VSA contribution to measurement of 802.11a/g/n/p/j OFDM signals <ul style="list-style-type: none"> <li>• Input power <math>\geq -35</math> dBm</li> <li>• Specification: <math>\leq -35</math> dB (<math>\leq 1.78\%</math>)</li> <li>• Typical: <math>-41</math> dB (0.89%)</li> </ul>
SNR	VSA contribution to measurement of 802.11b/g DSSS signals <ul style="list-style-type: none"> <li>• Input power <math>\geq -10</math> dBm</li> <li>• 100 kHz resolution BW</li> <li>• Specification: <math>\geq 55</math> dB</li> <li>• Typical: 60 dB</li> </ul>
Spurious response	<ul style="list-style-type: none"> <li>• 802.11b/g DSSS signals</li> <li>• Measured w.r.t. spectral mask</li> <li>• out-of-band: <math>\leq -45</math> dB</li> <li>• In-band: <math>\leq -55</math> dB with 100 kHz resolution BW</li> </ul>
Amplitude flatness	$\leq 0.2$ dB (0 – 10 MHz offset frequency)
Integrated phase noise	Typical: 0.5 degrees (100 Hz – 1 MHz) (2.4 GHz band)
Input return loss	$\geq 10$ dB

## VSG Performance

Parameter	Specification
Frequency	<ul style="list-style-type: none"> <li>• Baseband</li> <li>• 2400 - 2500 MHz</li> <li>• 4900 - 6000 MHz</li> </ul>
Analog bandwidth	70 MHz
Quantization	14 bits
Sampling frequency	80 MHz
Sampling resolution	1 sample
Waveform Duration (max.)	13 ms
Pre-trigger capture	$(2^{20} - 1)$ samples (~1,000,000 samples)
DAC filter amplitude variation	Typical: $\leq 0.25$ dB (0 – 20 MHz offset frequency)
DAC filter group delay variation	Typical: $\leq 400$ ps (0 – 20 MHz offset frequency)
Output level	<ul style="list-style-type: none"> <li>• 2400 – 2500 MHz: -95 to 0 dBm</li> <li>• 4900 – 6000 MHz: -95 to -10 dBm</li> </ul>
Output power accuracy	<ul style="list-style-type: none"> <li>• Specification: <math>\pm 1.0</math> dB (0 to -95 dBm)</li> <li>• Typical: <math>\pm 0.6</math> dB</li> </ul>
EVM	<ul style="list-style-type: none"> <li>• 2400 – 2500 MHz <ul style="list-style-type: none"> <li>- 802.11g/n OFDM signals <ul style="list-style-type: none"> <li>• <math>\leq -38</math> dB (output level: -95 to -10 dBm)</li> <li>• <math>\leq -35</math> dB (output level: -10 to -5 dBm)</li> </ul> </li> <li>- 802.11b/g DSSS signals: <math>\leq -30</math> dB (output level: -95 to 0 dBm)</li> </ul> </li> <li>• 4900 – 6000 MHz <ul style="list-style-type: none"> <li>- 802.11a/j/n/p <ul style="list-style-type: none"> <li>- <math>\leq -38</math> dB (output level: -95 to -15 dBm)</li> <li>- <math>\leq -35</math> dB (output level: -15 to -10 dBm)</li> </ul> </li> </ul> </li> </ul>
SNR	<ul style="list-style-type: none"> <li>• 802.11b/g DSSS signals only</li> <li>• 100 kHz resolution BW</li> <li>• Specification: <math>\geq 55</math> dB</li> <li>• Typical: 70 dB</li> </ul>
Undesired sideband	$\leq -45$ dBc (0.1 – 10 MHz; CW output)
Carrier leakage	$\leq -45$ dBc (CW output)
Spurious	<ul style="list-style-type: none"> <li>• Specification: <math>\leq 50</math> dBc (in-band)</li> <li>• Typical <ul style="list-style-type: none"> <li>- <math>\leq -20</math> dBc out-of-band (harmonics)</li> <li>- <math>\leq -35</math> dBc out-of-band (non-harmonic)</li> </ul> </li> </ul>
Integrated phase noise	Typical: 0.5 degrees (100 Hz – 1 MHz)
Output return loss	$\geq 10$ dB

## Interfaces



### Front Panel

Component	Type	Description
RF receive	Type N female	<ul style="list-style-type: none"><li>• RF input signal (configurable as output via LitePoint API)</li><li>• 50 Ohms</li><li>• Supports both 2.4-2.5GHz and 4.9-6.0 GHz bands</li></ul>
RF transmit	Type N female	<ul style="list-style-type: none"><li>• RF output signal (configurable as input via LitePoint API)</li><li>• 50 Ohms</li><li>• Supports both 2.4-2.5GHz and 4.9-6.0GHz bands</li></ul>



## Rear Panel

Component	Type	Description
Trigger input	BNC female	<ul style="list-style-type: none"> <li>Rising-edge input trigger signal</li> <li>5V TTL interface</li> <li>Input voltage <math>\geq 0.5V, \leq 5.5V</math></li> <li>Pulse width <math>\geq 25</math> ns</li> </ul>
Marker output	BNC female	<ul style="list-style-type: none"> <li>Rising-edge output trigger signal</li> <li>TTL/CMOS-compatible interface</li> <li>Pulse width <math>\geq 25</math> ns</li> <li>Delay to 1st sample output = 12.5 ns</li> <li>+ 1 sample</li> </ul>
Power	Pushbutton	<ul style="list-style-type: none"> <li>On/Off</li> <li>Reset (hold for 4 secs)</li> </ul>
10/100 Mbps Ethernet	RJ-45	TCP/IP connectivity
10 MHz reference	BNC female	<ul style="list-style-type: none"> <li>10 MHz reference clock input connector</li> <li>1 k<math>\Omega</math></li> <li>0.1 to 2.0 Vrms input level</li> </ul>
AC in	15A IEC connector	<ul style="list-style-type: none"> <li>For use with country-specific cord and plug</li> <li>90–132 VAC or 198–264 VAC (automatically switched)</li> <li>47–63 Hz</li> </ul>
0 / 1	switch	Master power switch
Unused ports	<ul style="list-style-type: none"> <li>15-pin D-sub (VGA monitor port)</li> <li>6-pin mini-DIN female (PS2 keyboard port)</li> <li>6-pin mini-DIN female (PS2 mouse port)</li> <li>36-pin D-sub (1284-C) parallel port</li> <li>USB port (2)</li> <li>audio jacks (3)</li> <li>DB-9 female RS-232 serial port</li> <li>TV output ports (2: S-video, RCA)</li> </ul>	FOR USE BY AUTHORIZED PERSONNEL ONLY

## General

Control interfaces	<ul style="list-style-type: none"><li>• LitePoint API—command set with DLL interface to support Visual C/C++ programming of test scripts</li><li>• IQdebug—a Windows-based debugging tool, connected via Ethernet</li></ul>
Connectivity	TCP/IP over 10/100BaseT Ethernet default IP address: 192.168.100.254 ports 4000, 5001, 5002 must be open for access through a firewall
Frequency	10 MHz
Temperature stability	±2.5 ppm (0°C to +55°C)
Aging	±1.0 ppm/year

## Bluetooth (1.0, 2.0, 2.1) Hardware Technical Specifications

### Analyzer

Input frequency range	2400 - 2500 MHz
Input power range	+30 to -148 dBm (1 Hz BW)
Measurement Bandwidth	60 MHz (± 30 MHz quadrature)
Quantization	14 bits
Input Return Loss	> 10 dB
Spurious	< -55dBc (50 kHz RBW)
Harmonics	out-of-band: ≤ -45 dB in-band: ≤ -55 dB (100 kHz resolution BW)
Integrated Phase Noise	0.5 degrees (100 Hz – 1 MHz) (typical)
Signal to Noise Ratio	≥ 55 dB (measured in 100 kHz resolution bandwidth)
Power Measurement Accuracy	± 1.0 dB (specification) ± 0.5 dB (typical)
Waveform Capture Duration	400 ms

## Generator

Output frequency range	2400 - 2500 MHz
Output power range	-95 to -10 dBm (modulated) -95 to +0 dBm (CW)
Signal Bandwidth	70 MHz ( $\pm$ 35 MHz quadrature)
Quantization	14 bits
Output Return Loss	> 10 dB
Spurious	specification: $\leq$ -50 dBc (in-band) typical $\leq$ -20 dBc out-of-band (harmonics, to 0 dBm output level) $\leq$ -35 dBc or $\leq$ -80 dBm (whichever is higher) out-of-band (non-harmonic)
Harmonics	out-of-band: $\leq$ -45 dB in-band: $\leq$ -55 dB (100 kHz resolution BW)
Integrated Phase Noise	< 0.5 degrees ( $f < 2.5$ GHz) < 0.8 degrees ( $f < 6$ GHz) 0.5 degrees (100 Hz – 1 MHz) (typical)
Signal to Noise Ratio	$\geq$ 55 dB (measured in 100 kHz resolution bandwidth) (specification) $\geq$ 70 dB (measured in 100 kHz resolution bandwidth) (typical)
Carrier leakage	$\leq$ -45 dBc (CW output) $\leq$ -90 dBm (between packets, when enhanced gap rejection condition enabled)
Power Accuracy	$\pm$ 1.0 dB (specification) $\pm$ 0.6 dB (typical)
Waveform Duration	400 ms

## Bluetooth (1.0, 2.0, 2.1) Measurement Specifications

Measurement	Type	Performance
TX output power	Transmit DUT output power (dBm)	VSA Measure Power Accuracy: $\pm$ 1.0 dB (specification) $\pm$ 0.5 dB (typical)
TX output spectrum	Transmit DUT power spectral density	
20 dB bandwidth	Bandwidth between the $\pm$ 20 dB down points of the modulation waveform	
Frequency deviation	Average and Peak frequency deviation (Hz)	
Carrier frequency Tolerance	Carrier frequency error (Hz)	
Carrier frequency drift	Carrier frequency change over the Bluetooth burst (Hz)	
Relative transmit Power (EDR)	Average power of complete data capture (dBm)	VSA Measure Power Accuracy: $\pm$ 1.0 dB (specification) $\pm$ 0.5 dB (typical)

Carrier frequency stability (EDR)	Frequency drift over the Bluetooth EDR burst duration (Hz)	
Receive sensitivity	Receive sensitivity test using LitePoint or user generated waveforms	Source Power Accuracy: ± 1.0 dB (specification) ± 0.6 dB (typical)
Bit error rate (BER)	Bit error rate for 1 and 3 Mbps data rates	Source Power Accuracy: ± 1.0 dB (specification) ± 0.6 dB (typical)
RMS EVM (EDR)	RMS EVM for Bluetooth EDR	Residual VSA EVM: ≤ -30 dB (3.1%) (≥ -35 dBm power to + 10 dBm)  Residual VSG EVM: ≤ -30 dB (3.1%) (≥ -35 dBm power to + 10 dBm)
Peak EVM (EDR)	RMS EVM for Bluetooth EDR	

## Physical & Environmental

Dimensions	450 mm x 100 mm x 500 mm
Weight	8.2 kg
Power consumption	300W max
Operating temperature	0°C to +55°C (68-2-1, 2, 14)
Guaranteed Specification	+20°C to +30°C ambient
Storage temperature	-40°C to +70°C (68-2-1, 2, 14)
Operating humidity	15% to 95% relative humidity, non-condensing (68-2-30)

## Compliance

EMI compatibility	<ul style="list-style-type: none"> <li>• 89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC</li> <li>• EN55011/ CISPR 11: 1998 + A1+A2</li> <li>• EN61326-1: 1997 + A1 + A2</li> <li>• FCC Part 15 Class A / 04.99</li> <li>• IC CS003</li> </ul>
Safety	<ul style="list-style-type: none"> <li>• 73/23/EEC revised by 93/68/EEC</li> <li>• EN61010-1: 1993 + A2: 1995</li> <li>• UL 61010A R4.02</li> <li>• CAN/CSA c22.2 No. 1010</li> </ul>



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## System Requirements

### IQdebug Monitor and Control Tool

PC	Intel® Pentium processor or higher
Operating system	Microsoft® Windows 2000; Windows XP Professional; Windows XP Home Edition
Memory	≥ 128MB of RAM
Disk space	≥ 200MB of available hard disk space
Monitor	At least 1024 x 768 resolution
Connectivity	TCP/IP over 10/100 BaseT Ethernet

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