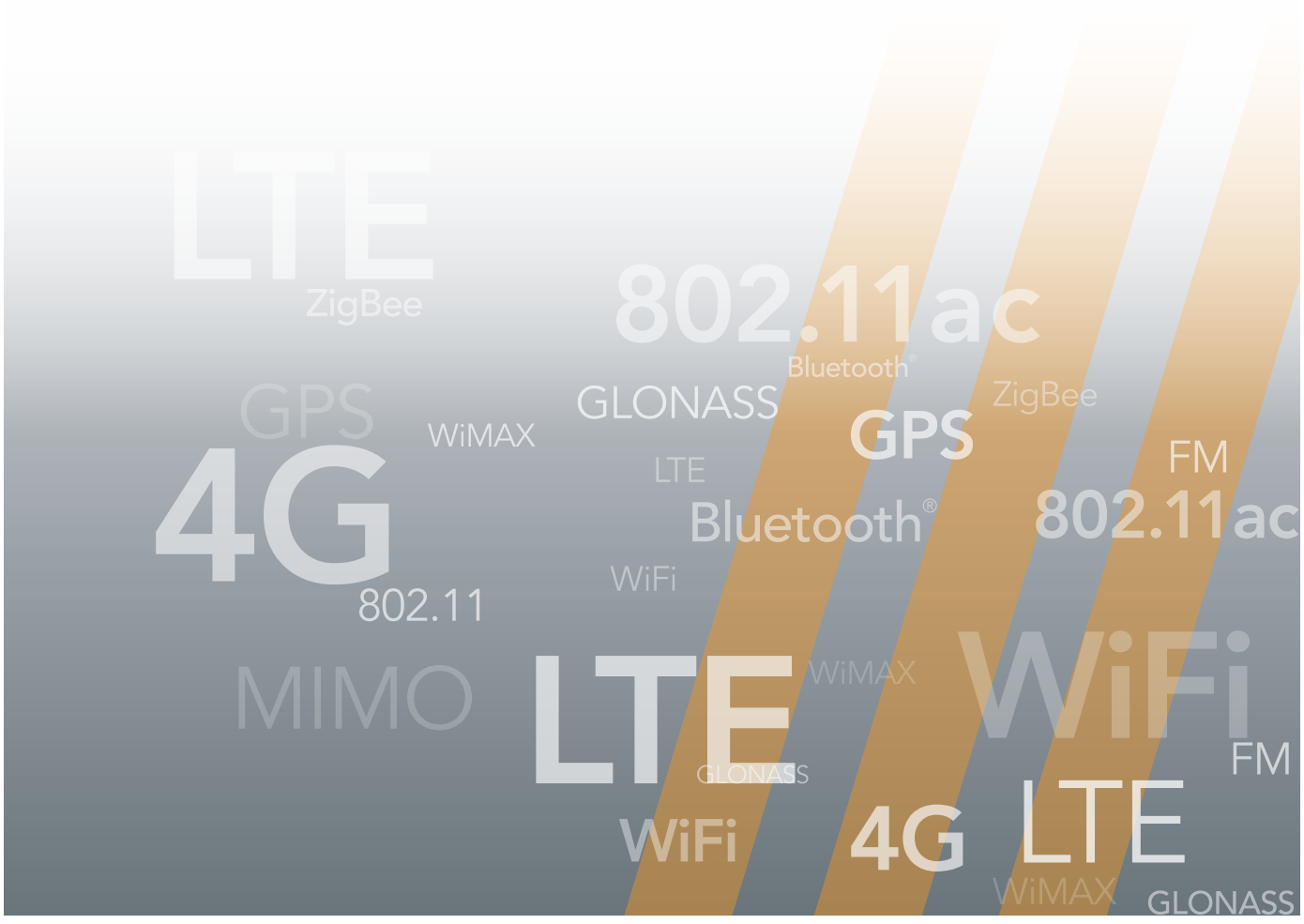
iQview

TECHNICAL SPECIFICATIONS

# IQview™
## For WLAN and Bluetooth




LITEPOINT

## VSA Measurement Parameters (IQsignal Interface)

| Parameter | Specification | Description |
|---|---|---|
| Capture Mode | Single / continuous | Enables one-shot or repetitive data capture and analysis |
| Capture duration | 100 µs, 200 µs, 300 µs, 400 µs, 500 µs, 1 ms, 2 ms, 3 ms, 4 ms, 5 ms, 10 ms, 13 ms | |
| Signal type | 802.11a/g/n/j (OFDM) [HT 20/HT 40]<br>802.11b/g (DSSS) | Signal type to be analyzed<br>Generally, analysis of the beginning of the packet determines the signal type; if both types are selected, the 802.11b specification is selected as the default type.<br>• 802.11a/g/n/j OFDM signals:<br>- 6 Mbps BPSK<br>- 9 Mbps BPSK<br>- 12 Mbps BPSK<br>- 18 Mbps QPSK<br>- 24 Mbps 16-QAM<br>- 36 Mbps 16-QAM<br>- 48 Mbps 64-QAM<br>- 54 Mbps 64-QAM<br>• 802.11b/g DSSS signals:<br>- 1 Mbps BPSK DSSS<br>- 2 Mbps QPSK DSSS<br>- 5.5 Mbps CCK DSSS<br>- 11 Mbps CCK DSSS<br>• Turbo (2x), half-rate, and quarter-rate modes OFDM signals |
| Input mode | Baseband / RF | Selects type of signal input and enables appropriate ports |
| IQ swap | Off / On | Interchanges I and Q channel signals on input ports |
| Triggers | • Free run<br>• External trigger (TTL input)<br>• Signal trigger (RF input mode only) | • Data capture trigger mechanism<br>• Signal trigger requires input power:≥-30 dBm |
| Max signal level | • RF input: -60 to +30 dBm in 1 dB increments<br>• Baseband input: -60 to +30 dBV in 1 dB increments | Peak signal level at instrument input, affecting display ranges<br>• Determined automatically using the Auto Range function<br>• Limited by VSA performance (see below) |
| External attenuation | -25.0 to 125.0 dB with 0.1 dB resolution | • Attenuation between DUT output and IQview input (applied as a correction to measurements)<br>• RF input mode only |
| AGC (lev auto) | Off / On | • Automatically sets peak signal level for each data capture iteration (alternatively, use Auto Range to initially set peak signal level)<br>• RF input mode only |
| EVM & power averaging | 1, 10, 20, 40, 60, 80, 100 | Number of measurements (packets) used to calculate average EVM and power<br>• IEEE 802.11a/g standard specifies this as 20; LitePoint API allows arbitrary number of measurements to be used |

<table>
<tr><td>Rx IF</td><td>0 MHz, 5 MHz, 10 MHz, 11 MHz</td><td>• To assess Tx performance at IF, downconvert the signal to 5 MHz,10 MHz, or 11 MHz and input it to the baseband ports<br>• To assess Tx performance at baseband or at a supported RF channel, set to 0 MHz</td></tr>
<tr><td>RF channel<br>(RF mode only)</td><td colspan="2">• User-defined center frequency (within 2400-2500 MHz or 4900-6000 MHz with 1 MHz resolution)<br>• Selectable pre-programmed center frequencies:
<table>
<tr><td colspan="6">channel number / center frequency (MHz)</td></tr>
<tr><td>1/2412</td><td>9/2452</td><td>00/4980</td><td>52/5260</td><td>116/5580</td><td>153/5765</td></tr>
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<tr><td>6/2437</td><td>14/2484</td><td>40/5200</td><td>104/5520</td><td>136/5680</td><td>00/5885</td></tr>
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</table></td></tr>
</table>

## VSA Measurement Parameters – 802.11a/g/j OFDM Signals (IQsignal Interface)

| Parameter | Specification | Description |
|---|---|---|
| Phase tracking / correction | • Off<br>• Symbol-by-symbol correction (fast)<br>• 10-symbol moving average (slow) | • Phase tracking method<br>• Symbol-by-symbol correction is specified by IEEE standard for EVM calculation but will mask measurement of Tx phase noise |
| Channel estimate | • Raw<br>- averaging over long training sequence<br>- averaging over full packet<br>• Second order polynomial fit (using long training sequence) | • Channel estimation method<br>• Averaging over long training sequence is most common in practical receiver implementations |
| Symbol timing tracking | Off / On | • Timing jitter correction<br>• Symbol timing tracking is specified by IEEE standard |
| Frequency sync | Short training sequence Long training sequence Full data packet | • Carrier frequency error estimation method<br>• Estimation based on short or long training sequence is most common in practical receiver implementations |
| Amplitude tracking | Off / On | Automatic gain control |

**Note that the specified corrections are implemented prior to taking the measurement; for example, EVM is calculated after any specified corrections are applied, thereby affecting the results.**

## VSA Measurement Parameters – 802.11b/g DSSS Signals (IQsignal Interface)

| Parameter | Specification | Description |
|---|---|---|
| Equalizer taps | • Off<br>• 5 taps<br>• 7 taps<br>• 9 taps | Intersymbol interference correction |
| Remove DC | Off / on | DC offset correction |
| EVM calculation | • 11b std Tx mod acc<br>• RMS error vector | • Choice of transmit modulation accuracy measurements<br>• Per 802.11b-1999 18.4.7.8 ("11b std Tx mod acc"), EVM is calculated over the last 1000 chips; or, if not available, it is calculated over the complete PSDU<br>• Per classic definition of EVM ("RMS error vector"), EVM is calculated over the full PSDU; or, if not available, it is calculated over all samples after the preamble |

**Note that the specified corrections are implemented prior to measurement taking and that carrier and symbol timing recovery are always enabled for 802.11b/g DSSS signals.**

## 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 | < -55 dBc (50 kHz RBW) |
| Harmonics | out-of-band: ≤ -45 dB<br>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)<br>± 0.5 dB (typical) |
| Waveform Capture Duration | 400 ms |

Generator

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

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

| Measurement | Description | Performance |
|---|---|---|
| TX output power | Transmit DUT output power (dBm) | VSA Measure Power Accuracy:<br>± 1.0 dB (specification)<br>± 0.5 dB (typical) |
| TX output spectrum | Transmit DUT power spectral density | |
| 20 dB bandwidth | Bandwidth between the +/- 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:<br>± 1.0 dB (specification)<br>± 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:<br>± 1.0 dB (specification)<br>± 0.6 dB (typical) |
| Bit error rate (BER) | Bit error rate for 1 and 3 Mbps data rates | Source Power Accuracy:<br>± 1.0 dB (specification)<br>± 0.6 dB (typical) |
| RMS EVM (EDR) | RMS EVM for Bluetooth EDR | Residual VSA EVM:<br>≤ -30 dB (3.1%) ( ≥ -35 dBm power to + 10 dBm)<br><br>Residual VSG EVM:<br>≤ -30 dB (3.1%) ( ≥ -35 dBm power to + 10 dBm) |
| Peak EVM (EDR) | Peak EVM for Bluetooth EDR | |

## VSA Measurement Results – Graphical Display (IQsignal Interface)

| Parameter | Description |
|---|---|
| Amplitude | Instantaneous and peak power averaged over a symbol duration (dBm) versus time |
| Spectrogram | • 3D plot of power spectral density versus time<br>• Time is displayed on x-axis; frequency offset on y-axis; color coding represents power (maximum strength is red; minimum strength is green) |
| PSD | • Power spectral density (dBm/Hz) versus frequency offset<br>• Center frequency ± 20 MHz (LitePoint API provides ± 40 MHz)<br>• Resolution bandwidth 156.25 kHz (LitePoint API produces 1024-point FFT) |

| | |
|---|---|
| Spectrum mask | • Power spectral density (dBm/Hz) versus frequency offset plus applicable 802.11a/b/g/n/j spectral mask [HT 20/HT 40]<br>• Center frequency ± 33 MHz<br>• Resolution bandwidth 100 kHz |
| Symbol constellation | Visual display of each demodulated symbol in the I/Q complex plane (data symbols are red; pilot tones are green) |
| Spectral Flatness | Variation from average energy as a function of OFDM subcarrier number (802.11a/g/n/j OFDM signals only) |
| LO (DC) leakage | • 802.11a/g/n/j OFDM signals: variation from center carrier (dB) as a function of OFDM subcarrier number<br>• 802.11b/g DSSS signals: power spectral density (dBm/Hz) versus frequency offset |
| Phase noise (PSD) | Phase noise power spectral density (dBc/Hz) versus frequency offset |
| Phase noise (time) | Integrated phase noise (degrees) versus time |
| CCDF (complementary cumulative distribution function) | Probability of peak signal power being greater than a given power level versus peak-to-average power ratio (dB) |
| Power-on ramp | • Relative power level (% of average) versus time<br>• Accompanying numerical data<br>- power-on time from 10% to 90%<br>- power-on time from ≥ 90% power level to detected start of packet (not provided for 802.11a/g/n/j OFDM signals) |
| Power-down ramp | • Relative power level (% of average) versus time (802.11b/g CCK signals only)<br>• Accompanying numerical data<br>- power-off time from 90% to 10% (not reliable for 802.11a/g/j OFDM signals)<br>- power-off time from ≤ 90% power level to detected end of packet (not provided for 802.11a/g/n/j OFDM signals) |
| I & Q signals | I/Q signal voltages (Vrms) versus time |
| STS pretzel | Short Training Symbols pretzel; i.e., x-y plot of I signal versus the Q signal during the short training sequence (802.11a/g/n/j OFDM signals only) |
| Frequency error | • Frequency error (kHz) versus time<br>• 802.11a/g/n/j OFDM signals: frequency error during short and long training sequences<br>• 802.11b/g DSSS signals: frequency error during entire packet |
| EVM versus carrier | Error Vector Magnitude averaged over all symbols for each subcarrier (dB) versus OFDM subcarrier number |
| EVM versus time | • 802.11a/g/n/j OFDM signals: Error Vector Magnitude averaged over all subcarriers (dB) versus time<br>• 802.11b/g DSSS signals: instantaneous EVM per symbol (dB) versus time |
| Eye diagram | I and Q channels versus time (802.11b/g DSSS signals only) |
| Amplitude variation (amplitude versus time) | Difference between symbol power and average power of long training sequence (dB) versus symbol number (802.11a/g/n/j OFDM signals only) |

## VSA Measurement Results – Numerical Data (IQsignal Interface)

| Parameter | Description |
|---|---|
| Packet information | • 802.11a/g/n/j OFDM signals<br>- data rate<br>- number of symbols<br>- number of bytes in PSDU<br>- coding rate<br>- PSDU CRC (passed / failed)<br>• 802.11b/g DSSS signals<br>- data rate<br>- number of bytes<br>- preamble (short / long)<br>- PSDU CRC (passed / failed) |
| Note that the above packet information is displayed only with certain graphical displays. | |
| EVM all | • EVM averaged over all symbols and all subcarriers (dB; %)<br>• 802.11a/g/n/j OFDM signals only |
| EVM data | • EVM averaged over all symbols and all data subcarriers (dB; %)<br>• 802.11a/g/n/j OFDM signals only |
| EVM pilots | • EVM averaged over all symbols and all pilot subcarriers (dB; %)<br>• 802.11a/g/n/j OFDM signals only |
| PSDU: EVM av. | • EVM averaged over all PSDU data symbols (or, if "11b std Tx mod acc" is selected, over last 1000 samples) (dB; %)<br>• 802.11b/g DSSS signals only |
| PSDU: EVM peak | • Peak EVM value (dB; %)<br>• 802.11b/g DSSS signals only |
| Peak power | Peak power over all symbols (dBm) |
| RMS power (all) | Average power of complete data capture (dBm) |
| RMS power (no gap) | Average power over all symbols after removal of any gap between packets (dBm) |
| Max avg power | Peak value of the amplitude as a moving average over 40 samples (dBm) |
| Note that the above measurements are shown for the current data packet and as averaged over the last N packets. | |
| I/Q amplitude error | I/Q amplitude imbalance (%) and approximate contribution to EVM (dB) |
| I/Q phase error | I/Q phase imbalance (degrees) and approximate contribution to EVM (dB) |
| Total I/Q mismatch (combined) | Approximate contribution of amplitude and phase imbalances to EVM (dB) |
| Frequency error | Carrier frequency error (kHz) |
| Symbol clock error | Symbol clock frequency error (ppm) |
| RMS phase noise | Integrated phase noise (degrees) |
| Note that the above measurements are shown for the current data packet only. | |

## VSA Performance*

| Parameter | Specification |
|---|---|
| Frequency | Baseband<br>2400 - 2500 MHz<br>4900 - 6000 MHz |
| 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 | ≤ 0.25 dB (0 – 10 MHz offset frequency) |
| Sampling filter group delay variation | ≤ 300 ps (0 – 10 MHz offset frequency) |
| **RF Port** | |
| Noise figure | ≤ 25 dB |
| Input amp level (max) | • 2400 – 2500 MHz: +30 dBm<br>• 4900 – 6000 MHz: +30 dBm |
| Power measurement accuracy | • Specification: ± 1.0 dB (for levels ≥ -50 dBm)<br>• Typical: ± 0.5 dB |
| Residual EVM | VSA contribution to measurement of 802.11a/g/n/j OFDM signals<br>• Input power ≥ -35 dBm<br>• Specification: ≤ -35 dB (≤ 1.78%)<br>• Typical: -41 dB (0.89%) |
| SNR | VSA contribution to measurement of 802.11b/g DSSS signals<br>• Input power ≥ -10 dBm<br>• 100 kHz resolution BW<br>• Specification: ≥ 55 dB<br>• Typical: 60 dB |
| Spurious response | 802.11b/g DSSS signals<br>• Measured w.r.t. spectral mask<br>• out-of-band: ≤ -45 dB<br>• In-band: ≤ -55 dB with 100 kHz resolution BW |
| Amplitude flatness | ≤ 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 | ≥10 dB |

| Baseband port | |
|---|---|
| Input level | • 5 - 1000 mVrms<br>• ± 1.5 V peak |
| Residual EVM | VSA contribution to measurement of 802.11a/g/n/j OFDM signals<br>• 5 mVrms ≤baseband input ≤150 mVrms<br>• Specification: ≤-45 dB (≤ 0.57%) |
| SNR | VSA contribution to measurement of 802.11b/g DSSS signals<br>• 5 m Vrms ≤baseband input ≤150 mVrms<br>• 100 kHz resolution BW<br>• Specification: ≥65 dB |
| Residual I/Q DC offset | ≤ 2 mV |
| Residual I/Q amplitude imbalance | Typical: 1% |
| Residual I/Q phase imbalance | Typical: 0.5 degrees |
| Integrated phase noise | Typical: 0.2 degrees (100 Hz – 1 MHz) |

*All performance specified at 25°C
*All specifications apply to hardware version 1.5.7

## VSG Signal Parameters (IQsignal Interface)

| Parameter | Specification | Description |
|---|---|---|
| Tx mode | Continuous / # packets (1 to 65,334) | Enables continuous transmission or transmission of the specified number of packets of the stored waveform |
| Signal type | • 802.11b/g DSSS signals<br>- 1 Mbps BPSK DSSS<br>- 2 Mbps QPSK DSSS<br>- 5.5 Mbps CCK DSSS<br>- 11 Mbps CCK DSSS<br>• 802.11a/g/n/j OFDM signals<br>- 6 Mbps BPSK<br>- 9 Mbps BPSK<br>- 12 Mbps QPSK<br>- 18 Mbps QPSK<br>- 24 Mbps 16-QAM<br>- 36 Mbps 16-QAM<br>- 48 Mbps 64-QAM<br>- 54 Mbps 64-QAM | Either the default supplied waveforms or custom waveform files can be used<br>• Default 802.11b/g DSSS signals—long preamble and either<br>- Raised cosine-filtered (length 10 symbols)<br>or<br>- Gaussian-filtered (length 6 chips; BT product 0.5) and convolved with a rectangular pulse with a duration of 1/11 µsec<br>• 1 Mbps (default: 100 or 1000 symbols)<br>• 2 Mbps (default: 100 or 1000 symbols)<br>• 5.5 Mbps (default: 100 or 1000 symbols)<br>• 11 Mbps (default: 1000 symbols)<br>• Default 802.11a/g/n/j OFDM signals—raised cosine window of length 10 symbols<br>- BPSK (default: 9 Mbps, 100 or 1000 symbols)<br>- QPSK (default: 18 Mbps, 1000 symbols)<br>- 16-QAM (default: 36 Mbps, 1000 symbols)<br>- 64-QAM (default: 54 Mbps, 1000 symbols) |
| Output mode | Baseband / RF | • Selects type of signal output and enables appropriate ports<br>• RF output mode enables both RF and baseband ports |
| IQ swap | Off / On | Interchanges I and Q channel signals on output ports |
| Signal level | | • Desired RMS signal level of output signal<br>• Limited by VSG performance according to signal type (see below) |

<table>
<tr><td>Common mode voltage</td><td>• Yes / No<br>• If yes, I and Q channels can be set together or independently from 0.000V to 3.000V with 0.001V resolution</td><td>Sets common mode output voltage of baseband outputs</td></tr>
<tr><td>RF channel (RF output mode only)</td><td colspan="2">• User-defined center frequency (within 2400-2500 MHz or 4900-6000 MHz with 1 MHz resolution)<br>• Selectable pre-programmed center frequencies:
<table>
<tr><td colspan="6">channel number / center frequency (MHz)</td></tr>
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</table></td></tr>
<tr><td>Signal impairments</td><td colspan="2">• I/Q amplitude imbalance: -10.00% to +10.00% with resolution of 0.01%<br>• I/Q phase imbalance: -10.00 degrees to +10.00 degrees with resolution of 0.01 degrees<br>• I/Q group delay imbalance: -1.00 nsec to +1.00 nsec with resolution of 0.01 nsec<br>• I-channel DC offset: -1.00 to +1.00 with resolution of 0.001 (units of Volts for baseband output; dBV for RF output)<br>• Q-channel DC offset: -1.00 to +1.00 with resolution of 0.001 (units of Volts for baseband output; dBV for RF output)</td></tr>
</table>

## VSG Performance

| Parameter | Specification |
|---|---|
| Frequency | • Baseband<br>• 2400 - 2500 MHz<br>• 4900 - 6000 MHz |
| 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: ≤ 0.25 dB (0 – 20 MHz offset frequency) |
| DAC filter group delay variation | Typical: ≤ 400 ps (0 – 20 MHz offset frequency) |

| RF Port | |
|---|---|
| Output level | • 2400 – 2500 MHz: -95 to 0 dBm<br>• 4900 – 6000 MHz: -95 to -10 dBm |
| Output power accuracy | • Specification: ± 1.0 dB (0 to -95 dBm)<br>• Typical: ± 0.6 dB |
| EVM | • 2400 – 2500 MHz<br>- 802.11a/g/n/j OFDM signals<br>• ≤-38 dB (output level: -95 to -10 dBm)<br>• ≤-35 dB (output level: -10 to -5 dBm)<br>- 802.11b/g DSSS signals: ≤ -30 dB (output level: -95 to 0 dBm)<br>• 4900 – 6000 MHz<br>- ≤ -38 dB (output level: -95 to -15 dBm)<br>- ≤ -35 dB (output level: -15 to -10 dBm) |
| SNR | • 802.11b/g DSSS signals only<br>• 100 kHz resolution BW<br>• Specification: ≥ 55 dB<br>• Typical: 70 dB |
| Undesired sideband | ≤ -45 dBc (0.1 – 10 MHz; CW output) |
| Carrier leakage | ≤ -45 dBc (CW output) |
| Spurious | • Specification: ≤ 50 dBc (in-band)<br>• Typical<br>- ≤ -20 dBc out-of-band (harmonics)<br>- ≤ -35 dBc out-of-band (non-harmonic) |
| Integrated phase noise | Typical: 0.5 degrees (100 Hz – 1 MHz) |
| Output return loss | ≥ 10 dB |
| **Baseband Port** | |
| Output level | ≤ 1000 mVrms<br>± 1.5 V peak |
| Dynamic range | ≥ 60 dB |
| EVM | • 802.11a/g/n/j OFDM signals only<br>• Specification: ≤ -45 dB (≤ 0.57%) |
| SNR | • 802.11b/g DSSS signals only<br>• 100 kHz resolution BW<br>• Specification: ≥ 65 dB |
| I/Q DC offset | ≤ 2 mV immediately after automatic DC offset calibration (upon any level change) |
| I/Q amplitude imbalance | Typical: 1% |
| I/Q phase imbalance | Typical: 0.5 degrees |
| Integrated phase noise | Typical: 0.2 degrees (100 Hz – 1 MHz) |

## Interfaces


### Front Panel

| Component | Type | Description |
|---|---|---|
| RF receive | Type N female | • RF input signal (configurable as output via LitePoint API)<br>• 50 Ohms<br>• Supports both 2.4-2.5GHz and 4.9-6.0 GHz bands |
| RF transmit | Type N female | • RF output signal (configurable as input via LitePoint API)<br>• 50 Ohms<br>• Supports both 2.4-2.5GHz and 4.9-6.0GHz bands |
| I/Q baseband receive | BNC female (4 connectors) | • Differential I/Q baseband input signals<br>- I-, I+, Q-, Q+ (4 connectors)<br>• 50 Ohms |
| I/Q baseband transmit | BNC female (4 connectors) | • Differential I/Q baseband ouput signals<br>- I-, I+, Q-, Q+<br>• 50 Ohms |
| Trigger input | BNC female | • Rising-edge input trigger signal<br>• 5V TTL interface<br>• Input voltage ≥ 0.5V, ≤ 5.5V<br>• Pulse width ≥ 25 ns |
| Marker output | BNC female | • Rising-edge output trigger signal<br>• TTL/CMOS-compatible interface<br>• Pulse width ≥ 25 ns<br>• Delay to 1st sample output = 12.5 ns + 1 sample |
| Power | Pushbutton | • On/Off<br>• Reset (hold for 4 secs) |

Rear Panel

| Component | Type | Description |
|---|---|---|
| 10/100 Mbps Ethernet | RJ-45 | TCP/IP connectivity |
| 10 MHz reference | BNC female | • 10 MHz reference clock input connector<br>• 1 kΩ<br>• 0.1 to 2.0 Vrms input level |
| AC in | 15A IEC connector | • For use with country-specific cord and plug<br>• 90–132 VAC or 198-264 VAC (automatically switched)<br>• 47–63 Hz |
| 0 / 1 | switch | Master power switch |
| Unused ports | • 15-pin D-sub (VGA monitor port)<br>• 6-pin mini-DIN female (PS2 keyboard port)<br>• 6-pin mini-DIN female (PS2 mouse port)<br>• 36-pin D-sub (1284-C) parallel port<br>• USB port (2)<br>• audio jacks (3)<br>• DB-9 female RS-232 serial port<br>• TV output ports (2: S-video, RCA) | FOR USE BY AUTHORIZED PERSONNEL ONLY |

## General

| | |
|---|---|
| Control interfaces | • IQsignal Signal Analysis Software Suite—Windows-based tool, connected via Ethernet<br>• LitePoint API—command set with DLL interface to support Visual C/C++ programming of test scripts<br>• IQdebug—a Windows-based debugging tool, connected via Ethernet |
| 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 |
| Internal Reference Oscillator | |
| Frequency | 10 MHz |
| Temperature stability | ±2.5 ppm (0°C to +55°C) |
| Aging | ±1.0 ppm/year |

## 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 | • 89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC<br>• EN55011/ CISPR 11: 1998 + A1+A2<br>• EN61326-1: 1997 + A1 + A2<br>• FCC Part 15 Class A / 04.99<br>• IC CS003 |
| Safety | • 73/23/EEC revised by 93/68/EEC<br>• EN61010-1: 1993 + A2: 1995<br>• UL 61010A R4.02<br>• CAN/CSA c22.2 |

## System Requirements

**IQsignal Signal Analysis Software Suite; 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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