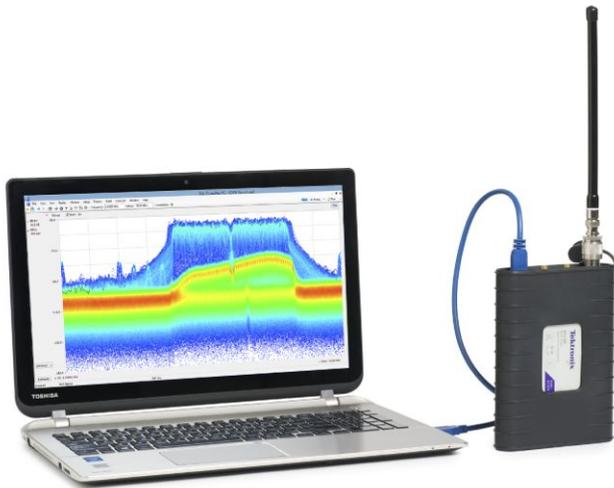


# Spectrum Analyzer

## RSA306 USB Real Time Spectrum Analyzer Datasheet



The RSA306 uses your PC and Tektronix SignalVu<sup>®</sup>-PC RF Signal Analysis Software to provide real time spectrum analysis, streaming capture and deep signal analysis capabilities for signals from 9 kHz to 6.2 GHz, all in a low-cost, highly portable package that is ideal for field, factory, or academic use.

### Key performance specifications

- 9 kHz to 6.2 GHz frequency range covers a broad range of analysis needs
- +20 dBm to -160 dBm measurement range
- Captures interference to ensure that you see problems first time, every time
- Mil-Std 28800 Class 2 environmental, shock and vibration specifications for use in harsh conditions

### Key features

- Full-featured spectrum analysis capability with included Tektronix SignalVu<sup>®</sup>-PC software
- 27 spectrum and signal analysis measurements standard
- Options for mapping, modulation analysis, standards support, pulse measurements, and frequency settling
- Real time Spectrum/Spectrogram display to minimize time spent on transient and interference hunting
- Application programming interface (API) included for Microsoft Windows environments
- MATLAB instrument driver for use with Instrument Control Toolbox
- Streaming capture records long-term events

### Applications

- Academic/education
- Maintenance, installation and repair in the factory or field
- Value-conscious design and manufacturing
- Interference hunting

### The RSA306: a new class of instrument

The RSA306 offers full-featured spectrum analysis and deep signal analysis at a price unmatched by any previous offering. Using the latest in commercial interfaces and available computing power, the RSA306 separates signal acquisition from measurement, dramatically lowering the cost of instrument hardware. Data analysis, storage and replay is performed on your personal computer, tablet or laptop. Managing the PC separately from the acquisition hardware makes processing upgrades easy, and minimizes IT management issues.

### SignalVu-PC software and an API for deep analysis and fast programmatic interaction

The RSA306 operates with SignalVu-PC, a powerful program that is the basis of Tektronix performance signal analyzers. SignalVu-PC offers a deep analysis capability previously unavailable in value-priced solutions. Real-time processing of the DPX spectrum/spectrogram is enabled in your PC, further reducing the cost of hardware. Customers who need programmatic access to the instrument can choose either the SignalVu-PC programmatic interface or use the included application programming interface (API) that provides a rich set of commands and measurements. A MATLAB driver for the API is available, enabling operation with MATLAB and the Instrument Control Toolbox.

## Measurements included in SignalVu-PC base version

Basic functionality of the free SignalVu-PC program is far from basic. The table below summarizes the measurements included in the free SignalVu-PC software.

| General signal analysis                                   |   |
|---|---|
| Spectrum analyzer   | Spans from 100 Hz to 6.2 GHz<br>Three traces plus math and spectrogram trace<br>Five markers with power, relative power, integrated power, power density and dBc/Hz functions |
| DPX Spectrum/Spectrogram                                  | Real time display of spectrum with 100% probability of intercept of 100 $\mu$ sec signals in up to 40 MHz span  |
| Amplitude, frequency, phase vs. time, RF I and Q vs. time | Basic vector analysis functions   |
| Time Overview/Navigator                                   | Enables easy setting of acquisition and analysis times for deep analysis in multiple domains  |
| Spectrogram   | Analyze and re-analyze your signal with a 2-D or 3-D waterfall display  |
| AM/FM listening   | Hear, and record to file, FM and AM signals   |
| Analog modulation analysis                                |   |
| AM, FM, PM analysis                                       | Measures key AM, FM, PM parameters  |
| RF measurements   |   |
| Spurious measurement                                      | User-defined limit lines and regions provide automatic spectrum violation testing across the entire range of the instrument   |
| Spectrum emission mask                                    | User-defined or standards-specific masks  |
| Occupied Bandwidth  | Measures 99% power, - $x$ dB down points  |
| Channel Power and ACLR                                    | Variable channel and adjacent/alternate channel parameters  |
| MCPR  | Sophisticated, flexible multi-channel power measurements  |
| CCDF  | Complementary Cumulative Distribution Function plots the statistical variations in signal level   |

## SignalVu-PC application-specific options

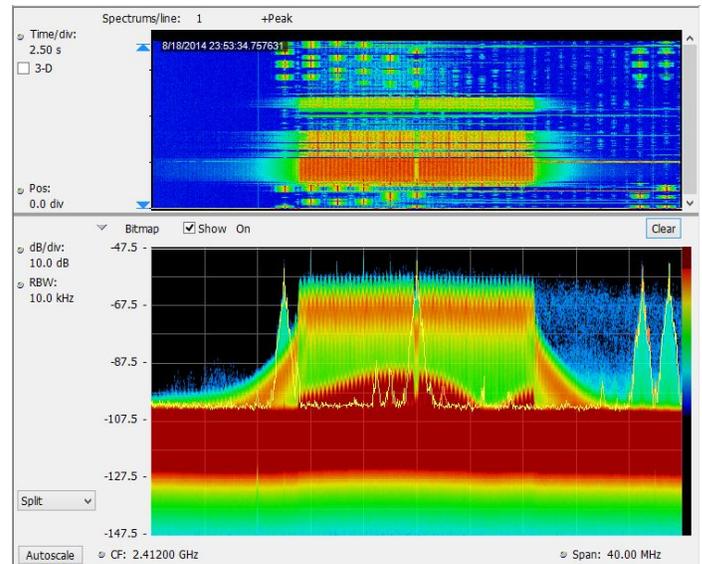
SignalVu-PC offers a wealth of application-oriented measurement and analysis options including:

- General-purpose modulation analysis (27 modulation types including 16/32/64/256 QAM, QPSK, O-QPSK, GMSK, FSK, APSK)
- P25 analysis of phase 1 and phase 2 signals
- WLAN analysis of 802.11a/b/g/j/p, 802.11n, 802.11ac
- Mapping and signal strength
- Pulse analysis
- AM/FM/PM/Direct Audio Measurement including SINAD, THD

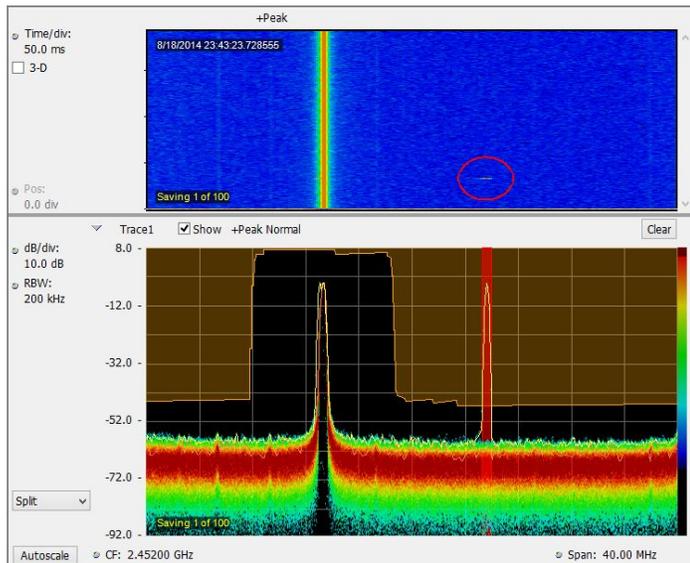
See the separate SignalVu-PC datasheet for complete details and ordering information.

## The RSA306 with SignalVu-PC offers basic and advanced measurements for field and lab

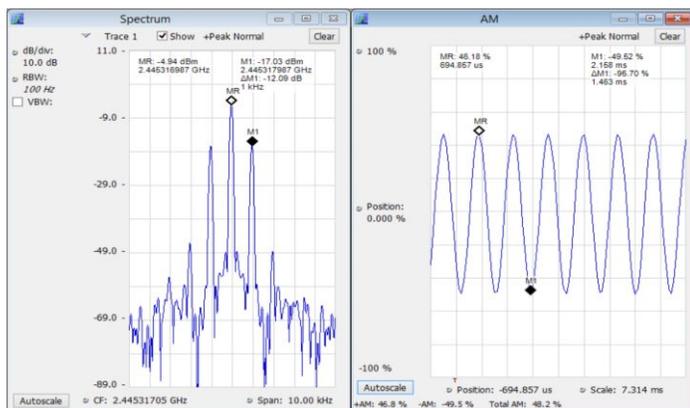
See what you've never seen before: The 40 MHz real time bandwidth of the RSA306 combined with the processing power of SignalVu-PC shows you every signal, even down to 100  $\mu$ s in duration. The following image shows a WLAN transmission (green and orange), and the narrow signals that repeat across the screen are a Bluetooth access probe. The spectrogram (upper part of the screen) clearly separates these signals in time to show any signal collisions.



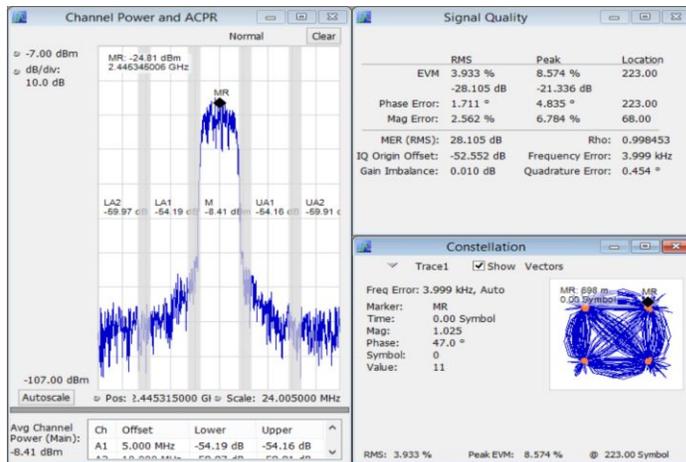
Monitoring has never been easier. Spectrum mask testing captures detail of transients found in the frequency domain, such as intermittent interference. Mask testing can be set to stop acquisition, save acquisition, save a picture, and send an audible alert. The following image shows a spectrum mask (in orange on the spectrum display) created to monitor a band of frequencies for violations. A single transient of 125  $\mu$ s duration has occurred that violated the mask, with the violation shown in red. The transient is clearly seen on the spectrogram above the red violation area (circled).



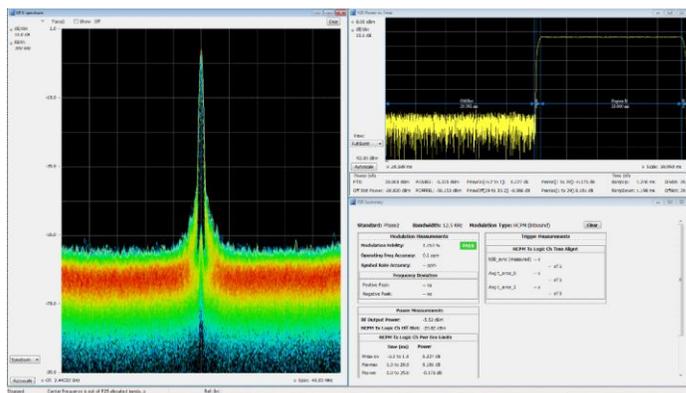
Analysis of AM and FM signals is standard in SignalVu-PC. The following screen shot shows a 1 kHz tone amplitude modulating a carrier to 48.9% total AM. Markers are used on the spectrum display to measure the modulation sideband at 1 kHz offset, 12.28 dB down from the carrier. The same signal is simultaneously viewed in the modulation display, showing AM versus time, with +Peak, -Peak and Total AM measurements. Advanced measurements for analog audio modulation including SINAD, THD and modulation rate are available in Option SVA.



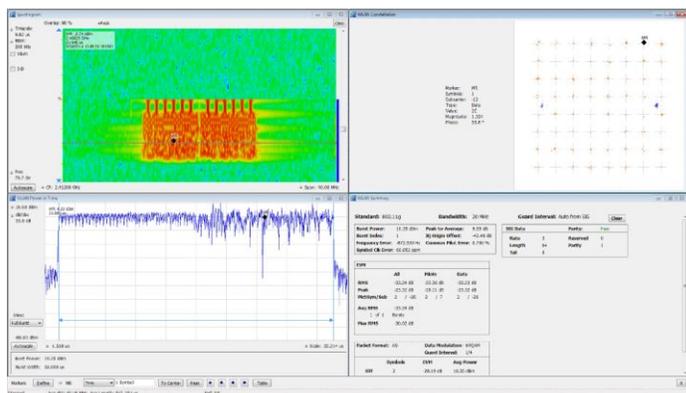
A broad range of analysis options are available on SignalVu-PC. The following screen shot shows the standard Channel Power/ACLR measurement combined with optional modulation analysis to show spectrum measurements plus a constellation display and vector signal quality measurements on a QPSK signal.



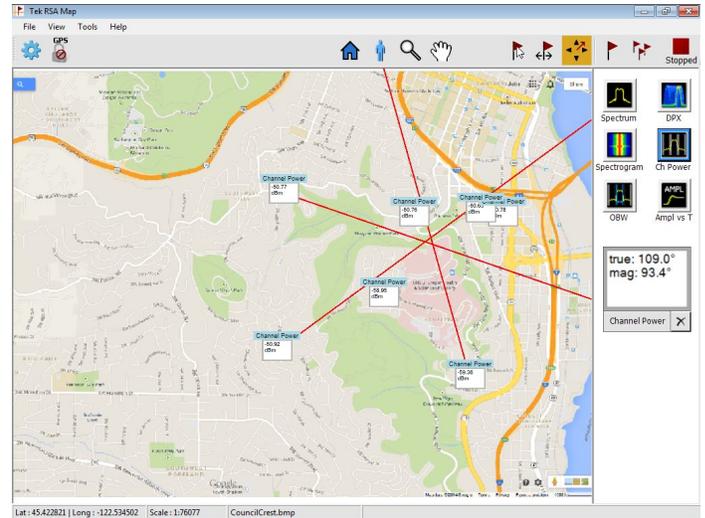
SignalVu-PC Option SV26 enables quick, standards-based transmitter health checks on APCO P25 signals. The following image shows a Phase II signal being monitored for anomalies with the spectrum analyzer while performing transmitter power, modulation and frequency measurements.



Sophisticated WLAN measurements are easy. On the displayed 802.11g signal, the spectrogram shows the initial pilot sequence followed by the main signal burst. The modulation is automatically detected as 64 QAM for the packet and displayed as a constellation. The data summary indicates an EVM of -33.24 dB RMS, and burst power is measured at 10.35 dBm. SignalVu-PC options are available for 802.11a/b/j/g/p, 802.11n and 802.11ac to 40 MHz bandwidth.



SignalVu-PC Option MAP enables interference hunting and signal strength analysis. Locate interference with azimuth direction function. It lets you draw a line or an arrow on a mapped measurement to indicate the direction your antenna was pointing when you take a measurement. You can also create and display measurement labels.



## Specifications

Specifications are valid within the following conditions:

- Operate the instrument in an environment that meets the temperature, altitude, and humidity characteristics listed in these specifications.
- Warm up time is 30 minutes after connecting to the PC and starting the SignalVu application.

### Frequency

**RF input frequency range** 9 kHz to 6.2 GHz

#### Frequency reference accuracy

**Initial** ±3 ppm (18 to 28 °C ambient, after 20 minute warm up, + aging)  
**Aging (typical)** ±3 ppm (1st year), ±1 ppm/year thereafter  
**Over operating temperature range (typical)** ±25 ppm + aging

#### External frequency reference input

**Input frequency range** 10 MHz ±10 Hz  
**Input level range** -10 dBm to +10 dBm sinusoid  
**Impedance** 50 Ω

#### Center frequency resolution

**Block IQ samples** 1 Hz  
**Streamed ADC samples** 500 kHz

## Amplitude

|  |  |                                   |  |                                  |
|--|--|-----------------------------------|--|----------------------------------|
| RF input impedance   | 50 Ω   |                                   |  |                                  |
| RF input VSWR  | ≤ 1.8:1 (10 MHz to 6200 MHz, reference level ≥ +10 dBm, typical)   |                                   |  |                                  |
| <b>Maximum RF input level without damage</b>   |  |                                   |  |                                  |
| DC voltage   | ±40 V <sub>DC</sub>  |                                   |  |                                  |
| Reference level ≥ -10 dBm  | +23 dBm (continuous or peak)   |                                   |  |                                  |
| Reference level < -10 dBm  | +15 dBm (continuous or peak)   |                                   |  |                                  |
| <b>Maximum RF input operating level</b> The maximum level at the RF input for which the instrument will meet its measurement specifications. |  |                                   |  |                                  |
| Center frequency < 22 MHz (low-frequency path)   | +15 dBm  |                                   |  |                                  |
| Center frequency ≥ 22 MHz (RF path)  | +20 dBm  |                                   |  |                                  |
| Amplitude accuracy at all center frequencies   | <b>Center frequency</b>  | <b>Warranted (18 °C to 28 °C)</b> | <b>Typical (95% confidence) (18 °C to 28 °C)</b> | <b>Typical (-10 °C to 55 °C)</b> |
|  | 9 kHz - < 3 GHz  | ±2.0 dB                           | ±1.25 dB   | ±3 dB                            |
|  | ≥ 3 GHz - 6.2 GHz  | ±2.75 dB                          | ±2.0 dB  | ±3 dB                            |
|  | Reference level +20 dBm to -30 dBm, alignment run prior to testing.<br>Applies to corrected IQ data, with signal to noise ratios > 40 dB.<br>Accuracy may degrade up to ±0.6 dB after storage at maximum storage temperature, recovers within 24 hours |                                   |  |                                  |

## Intermediate frequency and acquisition system

|  |   |
|--|---|
| IF bandwidth                                       | 40 MHz  |
| ADC sample rate and bit width                      | 112 Ms/s, 14 bits   |
| Real-time IF acquisition data (uncorrected)        | 112 Ms/s, 16-bit integer real samples<br>40 MHz BW, 28 ±0.25 MHz Digital IF, uncorrected. Corrected values are stored with saved files<br>Block streaming data at an average rate of 224 MB/s         |
| <b>Block baseband acquisition data (corrected)</b> |   |
| Sample rates                                       | ≤ 56 / (2 <sup>N</sup> ) Ms/s, 32-bit float complex samples, N ≥ 0  |
| Bandwidths   | ≤ 40 / (2 <sup>N</sup> ) MHz, 0 Hz Digital IF, where N = the decimation value applied to data to achieve desired acquisition bandwidth  |
| Channel amplitude flatness                         | ±1.0 dB, 18 °C to 28 °C<br>±2.0 dB, -10 °C to 55 °C, typical<br>Reference level +10 dBm to -30 dBm, alignment run before testing<br>Applies to corrected IQ data, with signal to noise ratios > 40 dB |

## Trigger

### Trigger/sync input

|  |                               |
|--|-------------------------------|
| <b>Voltage range</b>                                   | TTL, 0.0 V – 5.0 V            |
| <b>Trigger level, positive-going threshold voltage</b> | 1.6 V minimum; 2.1 V maximum  |
| <b>Trigger level, negative-going threshold voltage</b> | 1.0 V minimum; 1.35 V maximum |
| <b>Impedance</b>                                       | 10 k $\Omega$                 |

### IF power trigger

|                        |   |
|------------------------|---|
| <b>Threshold range</b> | 0 dB to -50 dB from Reference Level, for trigger levels > 30 dB above the noise floor, 1 dB steps |
| <b>Type</b>            | Rising or falling edge  |

## Noise and distortion

### Displayed Average Noise Level (DANL)

Reference level = -50 dBm, input terminated with 50  $\Omega$  load, log-average detection (10 averages)

| Center frequency        | Frequency range     | DANL (dBm/Hz) | DANL (dBm/Hz), typical |
|-------------------------|---------------------|---------------|------------------------|
| < 22 MHz (LF path)      | 100 kHz - 42 MHz    | -130          | -133                   |
| $\geq$ 22 MHz (RF path) | 2 MHz - 5 MHz       | -145          | -148                   |
|                         | > 5 MHz - 1.0 GHz   | -160          | -163                   |
|                         | > 1.0 GHz - 2.0 GHz | -158          | -161                   |
|                         | > 2.0 GHz - 4.0 GHz | -155          | -158                   |
|                         | > 4.0 GHz - 6.2 GHz | -150          | -153                   |

### Phase noise

Phase noise measured with 1 GHz CW signal at 0 dBm

The following table entries are in dBc/Hz units

| Offset  | Center frequency |                  |                 |                   |                 |
|---------|------------------|------------------|-----------------|-------------------|-----------------|
|         | 1 GHz            | 10 MHz (typical) | 1 GHz (typical) | 2.5 GHz (typical) | 6 GHz (typical) |
| 1 kHz   | -80              | -108             | -88             | -75               | -70             |
| 10 kHz  | -84              | -118             | -87             | -80               | -75             |
| 100 kHz | -90              | -120             | -92             | -90               | -85             |
| 1 MHz   | -110             | -122             | -120            | -110              | -105            |

### Residual spurious response

< -85 dBm (Reference level  $\leq$  -50 dBm, RF input terminated with 50  $\Omega$ )

Exceptions: < -78 dBm: Harmonics of 112 MHz in the range 1680-2688 MHz; 4750, 4905-4965 MHz

### Input related spurious response (SFDR)

< -50 dBc (with auto settings on and signals 10 dB below reference level of -30 dBm)

Exceptions, typical:

IF feedthrough:  $\leq$  -30 dBc for 2340 MHz - 2420 MHz

Image:  $\leq$  -30 dBc for 4570 MHz - 4760 MHz

RFx2LO:  $\leq$  -40 dBc for 1850-1960, 3700-3880 MHz; -45 dBc for 3890 – 3910 MHz

2RFx2LO:  $\leq$  -45 dBc for 2140, 4270 MHz

### Residual FM

< 10 Hz<sub>p-p</sub> (95% confidence)

## Noise and distortion

|  |   |
|--|---|
| <b>3<sup>RD</sup> order IM distortion</b>              | Two input CW signals, 1 MHz separation, each input signal level 5 dB below the reference level setting at the RF input<br>Reference level at -15 dBm disables Preamp; reference level at -30 dBm enables Preamp               |
| <b>Center frequency 2130 MHz</b>                       | ≤ -60 dBc at reference level -15 dBm<br>(≤ -60 dBc at reference level -30 dBm, typical)   |
| <b>40 MHz to 6.2 GHz, typical</b>                      | < -58 dBc at reference level = -10 dBm<br>< -50 dBc at reference level = -50 dBm  |
| <hr/>  |   |
| <b>3<sup>RD</sup> order intercept (TOI)</b>            |   |
| <b>Center frequency 2130 MHz</b>                       | ≥ +10 dBm at reference level -15 dBm<br>(≥ -5 dBm at reference level -30 dBm, typical)  |
| <b>40 MHz to 6.2 GHz, typical</b>                      | +14 dBm at reference level -10 dBm<br>-30 dBm at reference level -50 dBm  |
| <hr/>  |   |
| <b>2<sup>ND</sup> harmonic distortion, typical</b>     | < -55 dBc, 10 MHz to 300 MHz, reference level = 0 dBm<br>< -60 dBc, 300 MHz to 3.1 GHz, reference level = 0 dBm<br>< -50 dBc, 10 MHz to 3.1 GHz, reference level = -40 dBm<br>Exception: < -45 dBc in the range 1850-2330 MHz |
| <hr/>  |   |
| <b>2<sup>ND</sup> harmonic intercept (SHI)</b>         | +55 dBm, 10 MHz to 300 MHz, reference level = 0 dBm<br>+60 dBm, 300 MHz to 3.1 GHz, reference level = 0 dBm<br>+10 dBm, 10 MHz to 3.1 GHz, reference level = -40 dBm<br>Exception: < +5 dBm in the range 1850-2330 MHz        |
| <hr/>  |   |
| <b>Local oscillator feedthrough to input connector</b> | < -75 dBm at reference level = -30 dBm  |

## Audio Output

Audio output (from SignalVu-PC or application programming interface)

|                                     |                                  |
|-------------------------------------|----------------------------------|
| <b>Types</b>                        | AM, FM                           |
| <b>IF bandwidth range</b>           | Five selections, 8 kHz – 200 kHz |
| <b>Audio output frequency range</b> | 50 Hz – 10 kHz                   |
| <b>PC audio output</b>              | 16 bits at 32 ks/s               |
| <b>Audio file output format</b>     | .wav format, 16 bit, 32 ks/s     |

## SignalVu-PC base performance summary

Selected SignalVu-PC features when used with the RSA306. See the SignalVu-PC datasheet for more information on the application features.

### SignalVu-PC/RSA306 key characteristics

|                                 |   |
|---------------------------------|---|
| <b>Maximum span</b>             | 40 MHz real-time<br>9 kHz - 6.2 GHz swept |
| <b>Maximum acquisition time</b> | 1.0 s                                     |
| <b>Minimum IQ resolution</b>    | 17.9 ns (acquisition BW = 40 MHz)         |

### Spectrum display

|                              |   |
|------------------------------|---|
| <b>Traces</b>                | Three traces + 1 math trace + 1 trace from spectrogram for spectrum display |
| <b>Trace functions</b>       | Normal, Average (VRMS), Max Hold, Min Hold, Average of Logs                 |
| <b>Detector</b>              | Average (VRMS), Average, CISPR peak, +Peak, -Peak, Sample                   |
| <b>Spectrum trace length</b> | 801, 2401, 4001, 8001, 10401, 16001, 32001, and 64001 points                |
| <b>RBW range</b>             | 10 Hz to 10 MHz   |

### Spectrum sweep rates vs. resolution bandwidth

|                                |   |
|--------------------------------|---|
| <b>Sweep Time, RBW= Auto</b>   | 1700 MHz/s tuning rate<br>After application preset: Spectrum Analysis |
| <b>Sweep Time, RBW= 10 kHz</b> | 1400 MHz/s tuning rate<br>After application preset: Spectrum Analysis |

### DPX spectrum display

|  |  |
|--|--|
| <b>Spectrum processing rate (RBW = auto, trace length 801)</b>   | 10,000/s   |
| <b>DPX bitmap resolution</b>                                     | 201x801  |
| <b>Marker information</b>  | Amplitude, frequency, signal density   |
| <b>Minimum signal duration for 100% probability of detection</b> | 100 $\mu$ s<br>Span: 40 MHz, RBW = Auto, Max-hold on<br><br>Due to the non-deterministic execution time of programs running under the Microsoft Windows OS, this specification may not be met when the host PC is heavily loaded with other processing tasks |
| <b>Span range (continuous processing)</b>                        | 1 kHz to 40 MHz  |
| <b>Span range (swept)</b>  | Up to maximum frequency range of instrument  |
| <b>Dwell time per step</b>                                       | 50 ms to 100 s   |
| <b>Trace processing</b>  | Color-graded bitmap, +Peak, -Peak, average   |
| <b>Trace length</b>  | 801, 2401, 4001, 10401   |
| <b>RBW range</b>   | 1 kHz to 10 MHz  |

### DPX Spectrogram display

|                                   |   |
|-----------------------------------|---|
| <b>Trace detection</b>            | +Peak, -Peak, Average( $V_{RMS}$ )                                  |
| <b>Trace length, memory depth</b> | 801 (60,000 traces)<br>2401 (20,000 traces)<br>4001 (12,000 traces) |
| <b>Time resolution per line</b>   | 50 ms to 6400 s, user selectable                                    |

## SignalVu-PC base performance summary

### Analog modulation analysis (standard)

|  |  |
|--|--|
| <b>AM demodulation accuracy, typical</b> | ±2%<br>0 dBm input at center, carrier frequency 1 GHz, 1kHz/5kHz input/modulated frequency, 10% to 60% modulation depth<br>0 dBm input power level, reference level = 10 dBm |
| <b>FM demodulation accuracy, typical</b> | ±3%<br>0 dBm input at center, carrier frequency 1 GHz, 400Hz/1kHz input/modulated frequency<br>0 dBm input power level, reference level = 10 dBm                             |
| <b>PM demodulation accuracy, typical</b> | ±1% of measurement bandwidth<br>0 dBm input at center, carrier frequency 1 GHz, 1kHz/5kHz input/modulated frequency<br>0 dBm input power level, reference level = 10 dBm     |

## SignalVu-PC options

### AM/FM/PM and direct audio measurement (Option SVA)

|  |   |
|--|---|
| <b>Carrier frequency range (for modulation and audio measurements)</b> | (1/2 × audio analysis bandwidth) to maximum input frequency   |
| <b>Maximum audio frequency span</b>                                    | 10 MHz  |
| <b>FM measurements (Mod. index &gt;0.1)</b>                            | Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise   |
| <b>AM measurements</b>   | Carrier Power, Audio Frequency, Modulation Depth (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise   |
| <b>PM measurements</b>   | Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise   |
| <b>Direct audio measurements</b>                                       | Signal power, Audio frequency (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation distortion, S/N, Total harmonic distortion, Total non-harmonic distortion, Hum and Noise  |
| <b>Audio filters</b>   | Low pass: 0.3, 3, 15, 30, 80, 300, and user-entered up to 0.9 × audio bandwidth<br>High pass: 20, 50, 300, 400, and user-entered up to 0.9 × audio bandwidth<br>Standard: CCITT, C-Message<br>De-emphasis (µs): 25, 50, 75, 750, and user-entered<br>File: User-supplied .TXT or .CSV file of amplitude/frequency pairs. Maximum 1000 pairs |

### Pulse measurements (Option SVP)

|  |   |
|--|---|
| <b>Measurements (nominal)</b>                      | Average On Power, Peak Power, Average Transmitted Power, Pulse Width, Rise Time, Fall Time, Repetition Interval(seconds), Repetition Interval (Hz), Duty Factor (%), Duty Factor (ratio), Ripple, Droop, Pulse-Pulse Frequency Difference, Pulse-Pulse Phase Difference, RMS Frequency Error, Max Frequency Error, RMS Phase Error, Max Phase Error, Frequency Deviation, Phase Deviation, Time Stamp, Delta Frequency, Impulse Response, Overshoot |
| <b>Minimum pulse width for detection</b>           | 150 ns  |
| <b>Average ON power at 18 °C to 28 °C, typical</b> | ±1.0 dB + absolute amplitude accuracy<br>For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB  |
| <b>Duty factor, typical</b>                        | ±0.2% of reading<br>For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB   |
| <b>Average transmitted power, typical</b>          | ±1.0 dB + absolute amplitude accuracy<br>For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB  |

## SignalVu-PC options

|                                  |  |
|----------------------------------|--|
| <b>Peak pulse power, typical</b> | ±1.5 dB + absolute amplitude accuracy<br>For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB |
| <b>Pulse width, typical</b>      | ±0.25% of reading<br>For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥ 30 dB                     |

### General purpose digital modulation analysis (Option SVM)

|   |  |
|---|--|
| <b>Modulation formats</b>                                       | BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, PI/2DBPSK, DQPSK, PI/4DQPSK, D8PSK, D16PSK, SBPSK, OQPSK, SOQPSK, 16-APSK, 32-APSK, MSK, GFSK, CPM, 2FSK, 4FSK, 8FSK, 16FSK, C4FM   |
| <b>Analysis period</b>  | Up to 81,000 samples   |
| <b>Measurement filter</b>                                       | Root Raised Cosine, Raised Cosine, Gaussian, Rectangular, IS-95 TX_MEA, IS-95 Base TXEQ_MEA, None  |
| <b>Reference Filter</b>   | Gaussian, Raised Cosine, Rectangular, IS-95 REF, None  |
| <b>Filter rolloff factor</b>                                    | $\alpha$ : 0.001 to 1, in 0.001 steps  |
| <b>Measurements</b>   | Constellation, Demod I&Q vs. Time, Error Vector Magnitude (EVM) vs. Time, Eye Diagram, Frequency Deviation vs. Time, Magnitude Error vs. Time, Phase Error vs. Time, Signal Quality, Symbol Table, Trellis Diagram   |
| <b>Symbol rate range</b>  | 1 k symbols/s to 40 M symbols/s<br><br>Modulated signal must be contained entirely within the acquisition bandwidth  |
| <b>Adaptive equalizer</b>                                       | Linear, Decision-Directed, Feed-Forward (FIR) equalizer with coefficient adaptation and adjustable convergence rate. Supports modulation types BPSK, QPSK, OQPSK, $\pi/2$ -DBPSK, $\pi/4$ -DQPSK, 8-PSK, 8-DSPK, 16-DPSK, 16/32/64/128/256-QAM, 16/32-APSK |
| <b>QPSK Residual EVM (center frequency = 2 GHz), typical</b>    | 1.1 % (100 kHz symbol rate)<br>1.1 % (1 MHz symbol rate)<br>1.2 % (10 MHz symbol rate)<br>2.5 % (30 MHz symbol rate)<br><br>400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude                                |
| <b>256 QAM Residual EVM (center frequency = 2 GHz), typical</b> | 0.8 % (10 MHz symbol rate)<br>1.5 % (30 MHz symbol rate)<br><br>400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude  |

### WLAN Measurements, 802.11a/b/g/j/p (Option SV23)

|  |  |
|--|--|
| <b>Measurements</b>  | WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectral flatness vs. symbol (or time), vs. subcarrier (or frequency) |
| <b>Residual EVM - 802.11a/g/j /p (OFDM), 64-QAM, typical</b> | 2.4 GHz, 20 MHz BW: -38 dB<br>5.8 GHz, 20 MHz BW: -38 dB<br><br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each  |
| <b>Residual EVM - 802.11b, CCK-11, typical</b>               | 2.4 GHz, 11 Mbps: 2.0 %<br><br>Input signal level optimized for best EVM, average of 1,000 chips, BT = .61   |

## SignalVu-PC options

### WLAN Measurements 802.11n (Option SV24)

|   |  |
|---|--|
| <b>Measurements</b>                               | WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectral flatness vs. symbol (or time), vs. subcarrier (or frequency) |
| <b>EVM performance - 802.11n, 64-QAM, typical</b> | 2.4 GHz, 40 MHz BW: -35 dB<br>5.8 GHz, 40 MHz BW: -35 dB<br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each  |

### WLAN Measurements 802.11ac (Option SV25)

|   |  |
|---|--|
| <b>Measurements</b>                                 | WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectral flatness vs. symbol (or time), vs. subcarrier (or frequency) |
| <b>EVM performance - 802.11ac, 256-QAM, typical</b> | 5.8 GHz, 40 MHz BW : -35 dB<br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each   |

### APCO P25 Measurements (Option SV26)

|                                     |  |
|-------------------------------------|--|
| <b>Measurements</b>                 | RF output power, operating frequency accuracy, modulation emission spectrum, unwanted emissions spurious, adjacent channel power ratio, frequency deviation, modulation fidelity, frequency error, eye diagram, symbol table, symbol rate accuracy, transmitter power and encoder attack time, transmitter throughput delay, frequency deviation vs. time, power vs. time, transient frequency behavior, HCPM transmitter logical channel peak adjacent channel power ratio, HCPM transmitter logical channel off slot power, HCPM transmitter logical channel power envelope, HCPM transmitter logical channel time alignment, cross-correlated markers |
| <b>Modulation fidelity, typical</b> | C4FM = 1.3%<br>HCPM = 0.8%<br>HDQPSK = 2.5%<br>Input signal level is optimized for best modulation fidelity.   |

### Mapping

|   |  |
|---|--|
| <b>Supported map types</b>                              | Pitney Bowes MapInfo (*.mif), Bitmap (*.bmp) |
| <b>Saved measurement results</b>                        | Measurement data files (exported results)    |
| <b>Map file used for the measurements</b>               | Google Earth KMZ file                        |
| <b>Recallable results files (trace and setup files)</b> | MapInfo-compatible MIF/MID files             |

### RF signal strength

|                                  |  |
|----------------------------------|--|
| <b>Signal strength indicator</b> | Located at right side of display                     |
| <b>Measurement bandwidth</b>     | Up to 40 MHz, dependent on span and RBW setting      |
| <b>Tone type</b>                 | Variable frequency based on received signal strength |

## Inputs, outputs, interfaces

|                                    |                           |
|------------------------------------|---------------------------|
| RF input                           | Type N, female            |
| External frequency reference input | SMA, female               |
| Trigger/sync input                 | SMA, female               |
| Status indicator                   | LED, dual color red/green |
| USB device port                    | USB 3.0 - Micro-B         |

## Physical characteristics

|                   |                   |
|-------------------|-------------------|
| <b>Dimensions</b> |                   |
| Height            | 30.5 mm (1.2 in)  |
| Width             | 190.5 mm (7.5 in) |
| Depth             | 127 mm (5 in)     |
| Weight            | 0.59 kg (1.3 lbs) |

## Regulatory

|                         |   |
|-------------------------|---|
| Safety                  | UL61010-1, CAN/CSA-22.2 No.61010-1, EN61010-1, IEC61010-1 |
| Regional certifications | Europe: EN61326<br>Australia/New Zealand: AS/NZS 2064     |
| EMC emissions           | EN61000-3-2, EN61000-3-3, EN61326-2-1                     |
| EMC immunity            | EN61326-1/2, IEC61000-4-2/3/4/5/6/8/11                    |

## Environmental performance

|                                |  |
|--------------------------------|--|
| <b>Temperature</b>             |  |
| Operating                      | -10 °C to +55 °C (+14 °F to +131 °F)   |
| Nonoperating                   | -51 °C to +71 °C (-60 °F to +160 °F)   |
| Humidity (operating)           | 5% to 75% ±5% relative humidity (RH) from +30 °C to +40 °C (+86 °F to 104 °F)<br>5% to 45% RH above +40 °C to +55 °C (+86 °F to +131 °F) |
| <b>Altitude</b>                |  |
| Operating                      | Up to 9,144 meters (30,000 feet)   |
| Nonoperating                   | 15,240 meters (50,000 feet)  |
| <b>Dynamics</b>                |  |
| Random vibration, nonoperating | 0.030 g <sup>2/Hz</sup> , 10-500 Hz, 30 minutes per axis, three axes (90 minutes total)  |
| Mechanical shock, operating    | Half-sine mechanical shocks, 30 g peak amplitude, 11 µs duration, three drops in each direction of each axis (18 total)                  |

## Environmental performance

### Handling and transit

|                                   |  |
|-----------------------------------|--|
| <b>Bench handling, operating</b>  | Per MIL-PRF-28800F Class 2 operating: Rotational-edge-drops of appropriate edges on appropriate sides of the equipment   |
| <b>Transit drop, nonoperating</b> | Per MIL-PRF-28800F Class 2 nonoperating: Transit drops onto six faces and four corners of the equipment, from a height of 30 cm (11.8 in.) for a total of 10 impacts |

## Ordering information

### Models

|               |   |
|---------------|---|
| <b>RSA306</b> | USB real time spectrum analyzer, 9 kHz - 6.2 GHz, 40 MHz acquisition bandwidth, one-year warranty   |
|               | A USB 3.0 PC is required for operation of the RSA306. For full performance of the real time features of the RSA306, an Intel i7 4th generation quad-core processor and 8 GB RAM is required. Processors of lower performance can be used, with reduced real time performance. Storage of streaming data requires that the PC be equipped with a drive capable of streaming storage rates of 300 MB/sec. |

### Standard accessories

|                    |  |
|--------------------|--|
| <b>174-6584-xx</b> | USB 3.0 cable (1 M)                          |
| <b>063-4543-xx</b> | SignalVu-PC software, documentation, USB key |
| <b>071-3323-xx</b> | Printed safety/installation manual (English) |

### Warranty

|                 |        |
|-----------------|--------|
| <b>Warranty</b> | 1 year |
|-----------------|--------|

### SignalVu-PC application-specific options

The base software is free, included with the instrument, and is also available to download from [www.tek.com](http://www.tek.com). Option keys are sent by email which you then enter into the application. The following options add functionality and value to your measurement solution.

|                                    |  |
|------------------------------------|--|
| <b>Option SVA</b>                  | AM/FM/PM/Direct Audio Analysis   |
| <b>Option SVT</b>                  | Settling Time (frequency and phase) measurement  |
| <b>Option SVM</b>                  | General purpose modulation analysis  |
| <b>Option SVP</b>                  | Advanced Signal Analysis (including pulse measurements)  |
| <b>Option SVO</b>                  | Flexible OFDM Analysis   |
| <b>Option SV23</b>                 | WLAN 802.11a/b/g/j/p measurement application   |
| <b>Option SV24</b>                 | WLAN 802.11n measurement application (requires option SV23)  |
| <b>Option SV25</b>                 | WLAN 802.11ac measurement application (requires option SV24). Limited to 40 MHz bandwidth on RSA306          |
| <b>Option SV26</b>                 | APCO P25 measurement application   |
| <b>Option MAP</b>                  | Mapping and signal strength  |
| <b>Option CON</b>                  | SignalVu-PC live link to the MDO4000B series mixed-domain oscilloscopes                                      |
| <b>Option SIGNALVU-PC-SVE SV2C</b> | Live Link to MDO4000B and WLAN 802.11a/b/g/j/p/n/ac measurements (includes options CON, SV23, SV24 and SV25) |

## Service options

|         |  |
|---------|--|
| Opt. C3 | Calibration Service 3 Years                    |
| Opt. C5 | Calibration Service 5 Years                    |
| Opt. D1 | Calibration Data Report                        |
| Opt. D3 | Calibration Data Report 3 Years (with Opt. C3) |
| Opt. D5 | Calibration Data Report 5 Years (with Opt. C5) |
| Opt. R3 | Repair Service 3 Years (including warranty)    |
| Opt. R5 | Repair Service 5 Years (including warranty)    |

## Recommended accessories

|  |   |
|--|---|
| RSA300CASE                               | Soft case with shoulder-strap   |
| RSA300TRANSIT                            | Hard-sided transit case for RSA300 with room for USB cable and small accessories. Pelican model Stormcase iM2100  |
| RSA306RACK                               | Rackmount with slots for two RSA306. 19 inch rack with cover for unused slot  |
| 119-6609-xx                              | BNC whip antenna  |
| 103-0045-xx                              | N-BNC adapter   |
| 119-6594-xx                              | Beam antenna, 824 MHz to 896 MHz  |
| 119-6595-xx                              | Beam antenna, 896 MHz to 960 MHz  |
| 119-6596-xx                              | Beam antenna, 1710 MHz to 1880 MHz  |
| 119-6597-xx                              | Beam antenna, 1850 MHz to 1990 MHz  |
| 119-6970-xx                              | Magnetic mount antenna, 824 MHz to 2170 MHz (requires adapter 103-0449-00)  |
| 119-7246-xx                              | Pre-filter, general purpose, 824 MHz to 2500 MHz, Type-N (f) connector  |
| 119-7426-xx                              | Pre-filter, general purpose, 2400 MHz to 6200 MHz, Type-N (f) connector   |
| 012-0482-xx                              | Cable, 50 $\Omega$ , BNC (m) 3 foot (91 cm)   |
| 174-4977-xx                              | Cable, 50 $\Omega$ , straight Type-N (m) and angled Type-N (m) connector, 1.6 foot (50 cm)  |
| 174-5002-xx                              | Cable, 50 $\Omega$ , Type-N (m) to Type-N (m) connector, 3 foot (91 cm)   |
| 119-4146-xx                              | EMCO E/H-field probes   |
| 10 dB 2W pad, SMA M-F                    | Available from Pasternack <a href="http://www.pasternack.com/10db-fixed-sma-male-sma-female-2-watts-attenuator-pe7045-10-p.aspx">http://www.pasternack.com/10db-fixed-sma-male-sma-female-2-watts-attenuator-pe7045-10-p.aspx</a> |
| E/H field probes, lower cost alternative | Available from Beehive <a href="http://beehive-electronics.com/">www. http://beehive-electronics.com/</a>   |



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Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.



Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.



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Updated 10 April 2013

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03 Oct 2014

37W-30767-0

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