# Spectrum Analyzer

## RSA500A Series Portable Spectrum Analyzer Datasheet


The RSA500A Series USB spectrum analyzers offer high performance portable spectrum analysis in a rugged battery-powered package.

### Features and benefits

- 9 kHz to 3.0/7.5 GHz frequency range covers a broad range of analysis needs
- 40 MHz acquisition bandwidth enables real time analysis for transient capture and vector analysis
- Standard GPS/GLONASS/Beidou receiver for mapping
- Optional tracking generator for gain/loss, antenna and cable measurements
- Streaming capture can be used to record and play back long term events
- Mil-Std 28800 Class 2 environmental, shock and vibration specifications for use in harsh conditions
- Internal battery for extended field operations
- SignalVu-PC software offers real time signal processing with DPX Spectrum/Spectrogram to minimize time spent on transient and interference hunting
- 100 µsec minimum signal duration with 100% probability of intercept ensure you see problems first time, every time
- Application programming interface included for development of custom programs
- Accessories including tablet PC, calibration kits, adapters and phase-stable cables offer a complete field solution for interference hunting and transmitter maintenance

### Applications

- Spectrum management
- Interference hunting
- Maintenance, installation and repair of radio networks

## The RSA500 Series saves you time and helps you succeed

The RSA500 series was built to bring real-time spectrum analysis to solving the problems of spectrum managers, interference hunters and network maintenance personnel who need to track down hard to find interferers, maintain RF networks and keep records of their efforts. The heart of the system is the USB-based RF spectrum analyzer that captures 40 MHz bandwidths with great fidelity in harsh environments. With 70 dB dynamic range and frequency coverage to 7.5 GHz, all signals of interest can be examined with high confidence in your measurement results. The USB form factor moves the weight of the instrument off of your hands, and replaces it with a lightweight Windows tablet or laptop. Holding a light PC instead of a heavy spectrum analyzer means you can move faster, for longer, and get your work done faster.

The optional tracking generator enables gain/loss measurements for quick tests of filters, duplexers and other network elements, and you can add cable and antenna measurements of VSWR, return loss, distance to fault and cable loss as needed.

## SignalVu-PC software offers rich analysis capability in the field

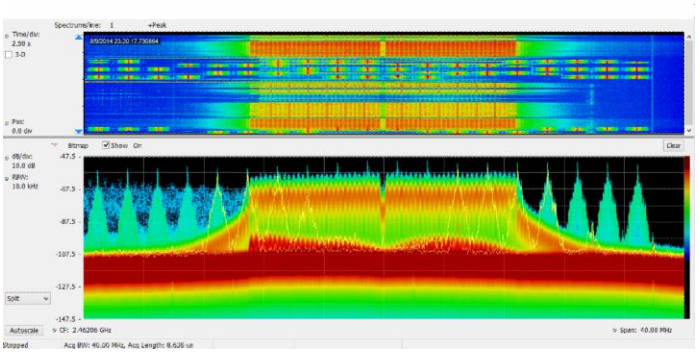
The RSA500 series operates with SignalVu-PC, a powerful program used as the basis of Tek's traditional spectrum analyzers, offering a deep analysis capability previously unavailable in high performance battery-operated solutions. Real-time processing of the DPX spectrum/spectrogram is enabled in your 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 directly. Basic functionality of the free SignalVu-PC program is far from basic. Base version measurements are shown below.

## Measurements and functions included in SignalVu-PC base version

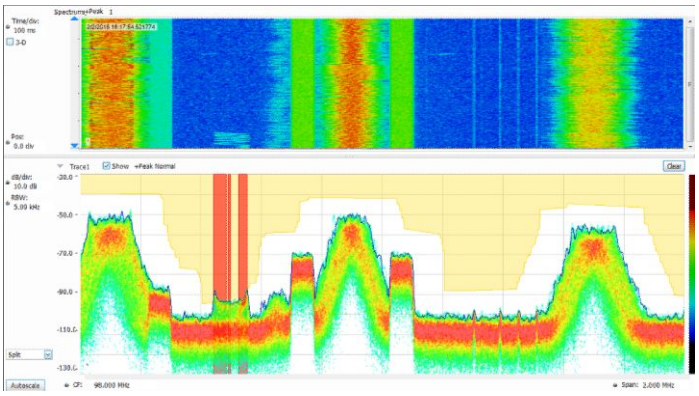
| General signal analysis | Description |
|---|---|
| Spectrum analyzer | Spans from 100 Hz to 7.5 GHz, 3 traces + math and spectrogram trace, 5 markers with power, relative power, integrated power, power density and dBc/Hz functions |
| DPX spectrum/spectrogram | Real time display of spectrum with 100% probability of intercept of 100 usec 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 in 2-D or 3-D waterfall display |
| AM/FM listening | Hear and record to file FM and AM signals |
| Signal recording | Record 40 MHz bandwidth for re-analysis in all domains including real time spectrum analysis (requires application SV56 for Playback) |
| **Analog modulation analysis** | **Description** |
| AM, FM, PM analysis | Measures key AM, FM, PM parameters |
| **RF measurements** | **Description** |
| Spurious measurement | User-defined limit lines and regions provide automatic spectrum violation testing across the entire range of the instrument. |
| Spectrum emission mask | User-set or standards-specific masks. |
| Occupied bandwidth | Measures 99% power, -xdB 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. |
| Signal strength with audio tone | Measures signal strength and displays a spectrum and signal strength bar for interference hunting and signal quality evaluations. |

## The RSA500A combined with SignalVu-PC offers advanced field measurements

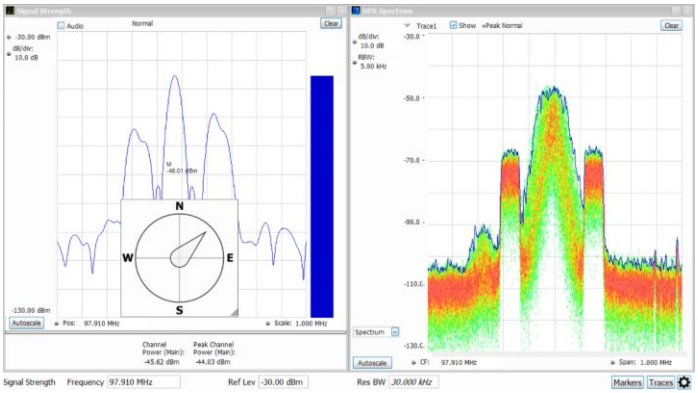
With 40 MHz of real-time bandwidth, the unique DPX spectrum/spectrogram shows you every instance of an interfering or unknown signal, even down to 100 µs in duration. The following image shows a WLAN transmission (green and orange), and the narrow signals that repeat across the screen are a Bluetooth access probe. The spectrogram (upper part of the screen) clearly separates these signals in time to show any signal collisions.



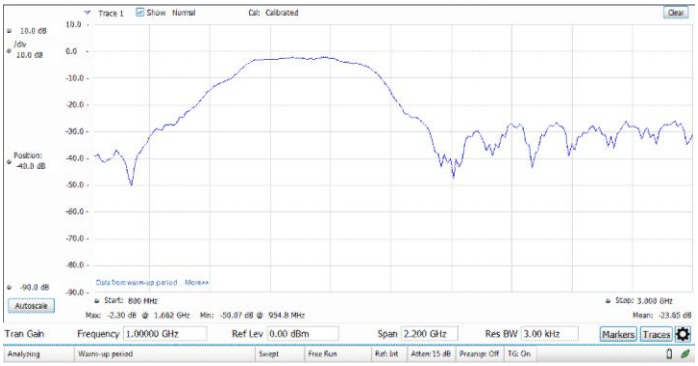
Finding unexpected signals is easy with unattended mask monitoring. A mask can be created on the DPX spectrum display, and actions taken upon every violation, including stop, save a picture, save acquisition, or send an audible alert. In the illustration below, a mask violation has occurred in red on the mask, and a picture of the screen was saved as a result. Mask testing can be used for unattended monitoring and when playing back recorded signals, enabling testing for different violations on the same signals.



Direction finding and signal strength measurements are quick and easy with the standard SignalVu-PC software. In the illustration below, using the available Alaris smart antenna, a compass continuously monitors antenna direction while the signal strength monitor performs measurements and provide audio indication of signal strength. When combined with the MAP option for SignalVu-PC, signal strength and azimuth are automatically placed on the map of your choice.



The tracking generator (Option 04 on the RSA500) is controlled via SignalVu-PC. Here you can enter start-stop frequencies, set number of steps in the span, adjust reference level, and normalize the tracking generator with a calibrate function. A bandpass filter response from 800 MHz to 3 GHz is shown below.



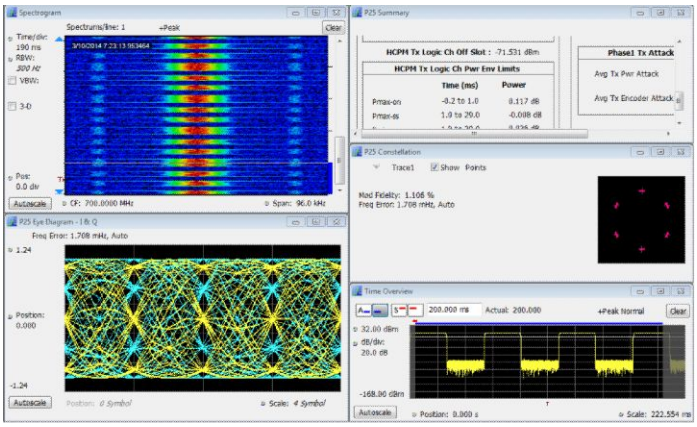
## SignalVu-PC application-specific licenses

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

- General-purpose modulation analysis (27 modulation types including 16/32/64/256 QAM, QPSK, O-QPSK, GMSK, FSK, APSK)
- Buetooth® analysis of Low Energy, Basic Rate and Enhanced Data Rate
- P25 analysis of phase I and phase 2 signals
- WLAN analysis of 802.11a/b/g/j/p, 802.11n, 802.11ac
- LTE™ FDD and TDD Base Station (eNB) Cell ID & RF measurements
- Mapping
- Pulse analysis
- AM/FM/PM/Direct Audio Measurement including SINAD, THD
- Playback of recorded files, including complete analysis in all domains
- Signal classification and survey

See the separate SignalVu-PC data sheet for complete details and ordering information. Selected applications are illustrated below.

**APCO 25** – SignalVu-PC application SV26 enables quick, standards-based transmitter health checks on APCO P25 signals. The following image shows a Phase II HCPM signal being monitored for anomalies with the spectrogram while performing transmitter power, modulation and frequency measurements to the TIA-102 standards specification.



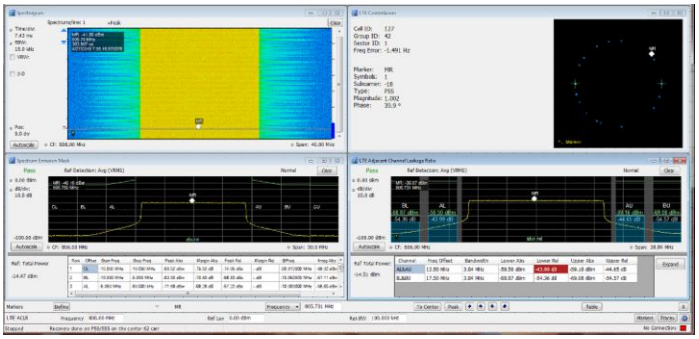
**LTE** – Application SV28 enables the following LTE base station transmitter measurements:

- Cell ID
- Channel power
- Occupied bandwidth
- Adjacent channel leakage ratio (ACLR)
- Spectrum emission mask (SEM)
- Transmitter off power for TDD

The measurements follow the definition in 3GPP TS Version 12.5 and support all base station categories, including picocells and femtocells. Pass/Fail information is reported and all channel bandwidths are supported.

The Cell ID preset displays the Primary Synchronization Signal (PSS) and the Secondary Synchronization Signal (SSS) in a Constellation diagram. It also provides Frequency Error.

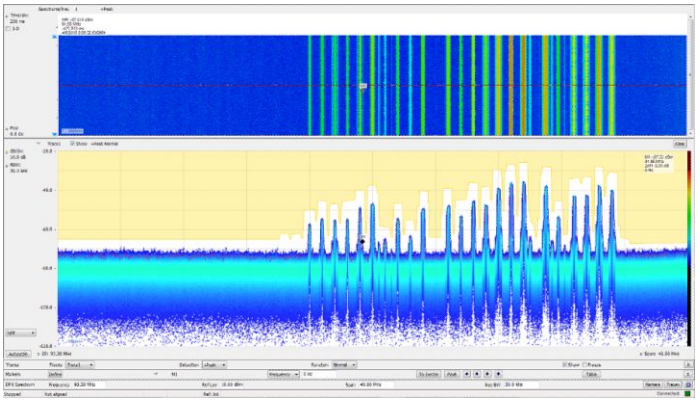
The illustration below shows spectral monitoring with the spectrogram display combined with a Cell ID/Constellation, Spectrum Emission Mask and ACLR measurements.



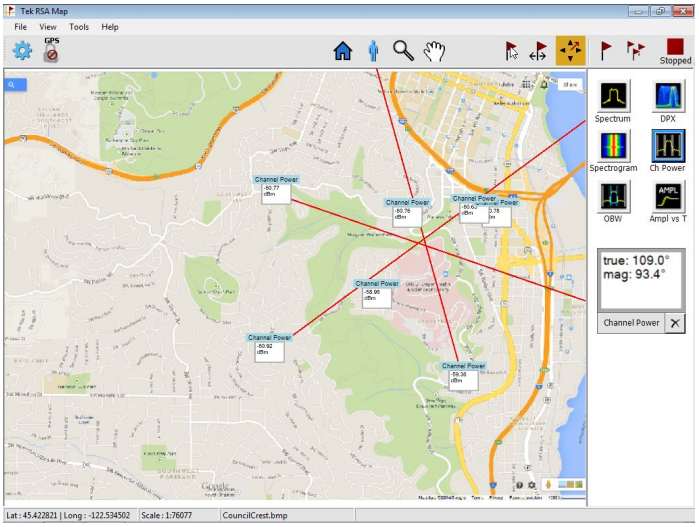
**Playback** – Application SV56, Playback of recorded signals, can reduce hours of watching and waiting for a spectral violation to minutes at your desk reviewing recorded data.

Recording length is limited only by storage media size, and recording is a basic feature included in SignalVu-PC. SignalVu-PC application SV56 (Playback) allows for complete analysis by all SignalVu-PC measurements, including DPX Spectrogram. Minimum signal duration specifications are maintained during playback. AM/FM audio demodulation can be performed. Variable span, resolution bandwidth, analysis length, and bandwidth are all available. Frequency mask testing can be performed on recorded signals, with actions on mask violation including beep, stop, save trace, save picture, and save data. Portions of the playback can be selected and looped for repeat examination of signals of interest. Playback can be skip-free, or time gaps can be inserted to reduce review time.

Clock time of the recording is displayed in the spectrogram markers for correlation to real world events. In the illustration below, the FM band is being replayed, with a mask applied to detect spectral violations, simultaneous with listening to the FM signal at the center frequency of 92.3 MHz.

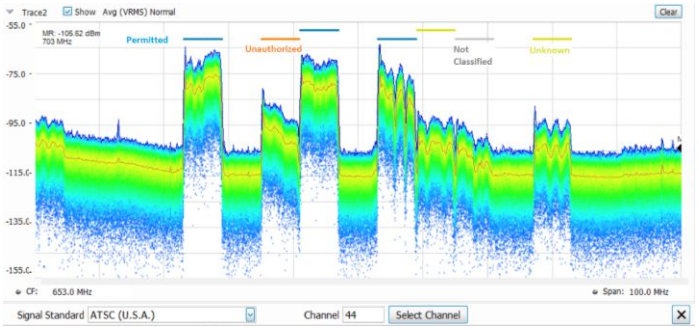


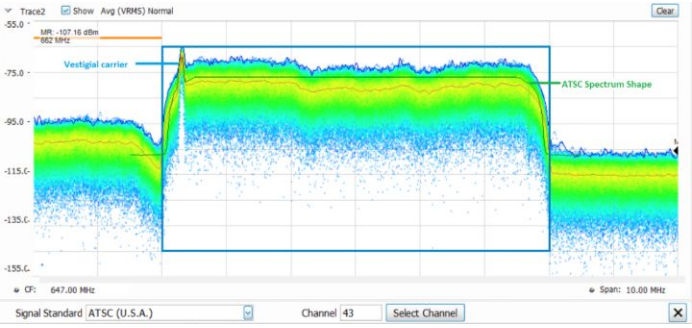
**Mapping** – The SignalVu-PC MAP application enables interference hunting and location analysis. Locate interference with an azimuth function that lets you draw a line or an arrow on a mapped measurement to indicate direction, or use the available Alaris smart antenna with automated azimuth placement.




**Signal survey/classification** – Application SV54 enables expert systems guidance to aid the user in classifying signals. You can quickly create a spectral region of interest, enabling users to identify and sort signals efficiently. The spectral profile mask, when overlaid on top of a trace, provides signal shape guidance while frequency, bandwidth, and channel number are displayed allowing for fast classification. WLAN, GSM, W-CDMA, CDMA, Bluetooth standard and enhanced data rate, LTE FDD and TDD, ATSC and other signals can be quickly and simply identified. Databases can be imported from your H500/RSA2500 signal database library for easy transition to the new software base.

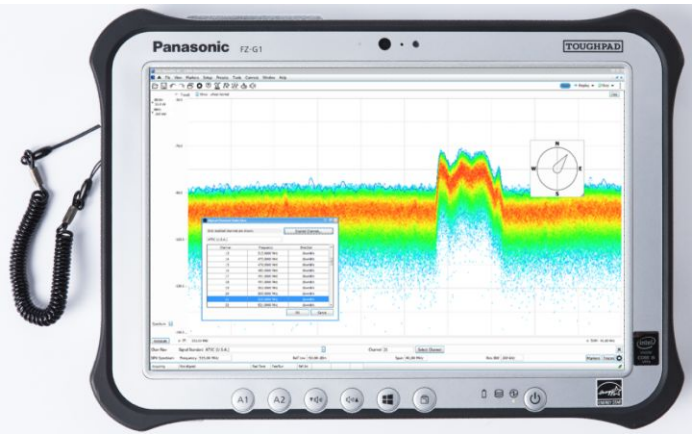
A typical signal survey is show below. The survey is of a portion of the TV broadcast band, and 7 regions have been declared as either Permitted, Unknown, or Unauthorized, as indicated by the color bars for each region. In the detail illustration, a single region has been selected, and since we've declared this to be an ATSC video signal, the spectrum mask for the ATSC signal is shown overlaid in the region. The signal is a close match to the spectrum mask, including the vestigial carrier at the lower side of the signal, characteristic of ATSC broadcasts.






## Instrument controller for USB spectrum analyzers

For field operations, a complete solution requires a Windows Tablet or laptop for instrument operation, record keeping and communication. Tektronix offers the Panasonic FZ-G1 tablet computer as an option to the RSA500 series and as a standalone unit.




When purchased from Tektronix, the FZ-G1 includes pre-loaded SignalVu-PC software, with custom-programmed display settings and front-panel buttons to optimize the SignalVu-PC experience. In addition, Tektronix has tested the FZ-G1 to ensure that the specified real time performance of all USB spectrum analyzers is met with this configuration. Accessories including battery packs, cases and automotive power adapters are also available from Tektronix.

### Key specifications, instrument controller

- Windows 7 operating system (Win8 Pro COA)
- Intel® Core i5-5300U 2.30GHz Processor ( i5-4310U 2.00GHz in China)
- 8GB RAM
- 256 GB Solid State Drive
- 10.1" (25.6 cm) Daylight-readable screen
- 10-point Multi Touch+ Digitizer screen plus included pen interface
- USB 3.0 + HDMI Ports, 2nd USB Port
- Wi-Fi, Bluetooth® and 4G LTE Multi Carrier Mobile Broadband with Satellite GPS
- MIL-STD-810G certified (4' drop, shock, vibration, rain, dust, sand, altitude, freeze/thaw, high/low temperature, temperature shock, humidity, explosive atmosphere)
- IP65 certified sealed all-weather design
- Integrated microphone
- Integrated speaker
- On-screen and button volume and mute controls •
- Integrated battery backup for hot-swap of battery packs
- 3-year Warranty with Business Class Support (provided by Panasonic in your region)

## Smart antenna for interference hunting

Tektronix offers the Alaris DFA-0047 [1] smart antenna with built-in USB compass for direction finding and interference hunting applications. Full details on the antenna are available in the Alaris data sheet available on Tek.com by searching on Alaris. A summary of features and specifications is shown below.

- Frequency Range: 20 MHz – 8.5 GHz
  - 9 kHz-20 MHz extension available(0.3m loop antenna), order DF-A0047-01 [1]
- Trigger control for one-hand operation with functions for:
  - Preamp on/off
  - Band switch
  - Push to measure with SignalVu-PC with MAP option
- Standard armrest extension for ease in long interference hunting sessions
- Transit case available

1 Alaris antenna and Panasonic tablet are available in limited geographies. See ordering information for details.

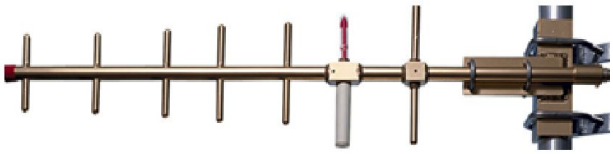
## Calibration kits, phase-stabilized cables, adapters, antennas and other accessories

Tektronix offers a variety of accessories to simplify your shopping for the complete solution for field test. See the ordering information section for further details.

Alaris direction-finding smart antenna.


Calibration Kits for one-port measurements

Phase-stabilized cables from Tekronix for cable and antenna measurements



Antennas for interference hunting

# Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

## Frequency

**Frequency range**

| | |
|---|---|
| **RSA503A** | 9 kHz to 3 GHz |
| **RSA507A** | 9 kHz to 7.5 GHz |

| | |
|---|---|
| **Frequency marker readout accuracy** | ±(RE × MF + 0.001 × Span) Hz<br>RE: Reference Frequency Error<br>MF: Marker Frequency [Hz] |

**Reference frequency accuracy**

| | |
|---|---|
| **Initial accuracy at Cal (30 min warm-up)** | $\pm 1 \times 10^{-6}$ |
| **First year aging, typical** | $\pm 1 \times 10^{-6}$ (1 year) |
| **Cumulative error (Initial accuracy + temperature + aging), typical** | $3 \times 10^{-6}$ (1 year) |
| **Temperature drift** | $\pm 0.9 \times 10^{-6}$ (-10 to 60 °C) |
| **External reference input** | BNC connector, 50 Ω nominal |
| **External reference input frequency** | Every 1 MHz from 1 to 20 MHz plus the following: 1.2288 MHz, 2.048 MHz, 2.4576 MHz, 4.8 MHz, 4.9152 MHz, 9.8304 MHz, 13 MHz, and 19.6608 MHz.<br>The spurious level on the input signal must be less than -80 dBc within 100 kHz offset to avoid on-screen spurious. |
| **External reference input range** | ± 5 ppm |
| **External reference input level** | -10 to +10 dBm |

## RF input

**RF input**

| | |
|---|---|
| **RF Input Impedance** | 50 Ω |
| **RF VSWR (RF Attn = 20 dB), typical** | < 1.2 (10 MHz to 3 GHz)<br>< 1.5 (>3 GHz to 7.5 GHz) |
| **RF VSWR preamp ON, typical** | < 1.5 (10 MHz to 6 GHz, RF ATT=10 dB, preamp on)<br>< 1.7 (> 6 GHz to 7.5 GHz, RF ATT=10 dB, preamp on) |

**Maximum RF input level**

| | |
|---|---|
| **Maximum DC voltage** | ±40 V (RF input) |
| **Maximum safe input power** | +33 dBm (RF input, 10 MHz to 7.5 GHz, RF Attn ≥ 20 dB)<br>+13 dBm (RF input, 9 kHz to 10 MHz)<br>+20 dBm (RF input, RF Attn < 20 dB) |

## RF input

**Maximum safe input power (Preamp On)**

+33 dBm (RF input, 10 MHz to 7.5 GHz, RF Attn ≥ 20 dB)

+13 dBm (RF input, 9 kHz to 10 MHz)

+20 dBm (RF input, RF Attn < 20 dB)

**Maximum measurable input power**

+30 dBm (RF input, ≥10 MHz to Fmax, RF ATT Auto)

+20 dBm (RF input, <10 MHz, RF ATT Auto)

**Input RF attenuator**

0 dB to 51 dB (1 dB step)

## Amplitude and RF

**Amplitude and RF flatness**

**Reference level setting range**

-170 dBm to +40 dBm, 0.1 dB step, (Standard RF input)

**Frequency response at 18 ℃ to 28 ℃ (At 10 dB RF Attenuator Setting)**

**Amplitude accuracy at all center frequencies**

| | 18 ºC to 28 ºC | 18 ºC to 28 ºC, typical (95% confidence) | -10 ºC to 55 ºC, typical |
|---|---|---|---|
| 9 kHz ≤ 3.0 GHz | ±0.8 dB | ±0.2 dB | ±1.0 dB |
| > 3 to 7.5 GHz | ±1.5 dB | ±0.6 dB | ±2.0 dB |

**Amplitude Accuracy at All Center Frequencies - Preamp ON (18 ℃ to 28 ℃ , 10 dB RF Attenuator)**

| Center frequency range | 18 ºC to 28 ºC | 18 ºC to 28 ºC, typical (95% confidence) | 18 ºC to 28 ºC, typical |
|---|---|---|---|
| 100 kHz to ≤3.0 GHz | ±1.0 dB | ±0.5 dB | ±1.0 dB |
| > 3 to 7.5 GHz | ±1.75 dB | ±0.75 dB | ±3.0 dB |

**Preamp gain**

27 dB at 2 GHz

21 dB at 6 GHz (RSA507A)

**Channel response (amplitude and phase deviation), typical**

For these specifications, use a flat top window for maximum CW amplitude verification accuracy with the RF attenuator setting at 10 dB.

| Characteristic | | Description | | |
|---|---|---|---|---|
| Measurement center frequency | Span | Amplitude flatness, typical | Amplitude flatness, RMS, typical | Phase linearity, RMS, typical |
| 9 kHz to 40 MHz | ≤40 MHz [2] | ±1.0 dB | 0.60 dB | |
| >40 MHz to 4.0 GHz | ≤20 MHz | ±0.10 dB | 0.08 dB | 0.3° |
| >4 GHz to 7.5 GHz | ≤20 MHz | ±0.35 dB | 0.20 dB | 0.7° |
| >40 MHz to 4 GHz | ≤40 MHz | ±0.15 dB | 0.08 dB | 0.6° |
| >4 GHz to 7.5 GHz | ≤40 MHz | ±0.40 dB | 0.20 dB | 1.0° |

2 Span extents cannot exceed lower frequency limit of the instrument

## Trigger

| | |
|---|---|
| **Trigger/Sync input, typical** | Voltage range: TTL, 0.0 V to 5.0 V |
| | Trigger level (Schmitt trigger): |
| | Positive-going threshold voltage: 1.6 V min, 2.1 V max |
| | Negative-going threshold voltage: 1.0 V min., 1.35 V max |
| | Impedance: 10 k ohms with schottky clamps to 0 V, +3.4 V |
| **External trigger timing uncertainty** | >20 MHz to 40 MHz acquisition bandwidth: ±250 ns |
| | Uncertainty increases as acquisition bandwidth is decreased. |
| **Power trigger** | |
| **Power trigger, typical** | Range: 0 dB to -50 dB from reference level, for trigger levels > 30 dB above the noise floor. |
| | Type: Rising or falling edge |
| | Trigger re-arm time: ≤ 100 µsec |
| **Power trigger position timing uncertainty** | >20 MHz to 40 MHz acquisition bandwidth: ±250 ns |
| | Uncertainty increases as acquisition bandwidth is decreased. |
| **Power trigger level accuracy** | ±1.5 dB for CW signal at tuned center frequency for trigger levels > 30 dB above the noise floor. |
| | This specification is in addition to the overall amplitude accuracy uncertainty for SA mode. |

## Noise and distortion

| | |
|---|---|
| **3rd Order IM intercept (TOI)** | +12 dBm at 2.130 GHz |
| **3rd Order IM intercept (TOI),** | |
| **Preamp off, typical** | +10 dBm (9 kHz to 25 MHz) |
| | +15 dBm (25 MHz to 3 GHz) |
| | +15 dBm (3 GHz to 4 GHz, RSA507A ) |
| | +10 dBm (4 GHz to 7.5 GHz, RSA507A) |
| **Preamp on, typical** | -20 dBm (9 kHz to 25 MHz) |
| | -15 dBm (25 MHz to 3 GHz) |
| | -15 dBm (3 GHz to 4 GHz, RSA507A ) |
| | -20 dBm (4 GHz to 7.5 GHz, RSA507A) |
| **3rd Order Inter-modulation distortion** | -74 dBc at 2.130 GHz |
| | Each signal level -25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -20 dBm. |

## Noise and distortion

**3rd Order inter-modulation distortion**

**Preamp off, typical**

< -70 dBc (10 kHz to 25 MHz)

< -80 dBc (25 MHz to 3 GHz)

< -80 dBc (3 GHz to 4 GHz)

< -70 dBc (4 GHz to 6 GHz, RSA507A)

< -70 dBc (6 GHz to 7.5 GHz, RSA507A)

Each signal level -25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -20 dBm.

**Preamp on, typical**

< -70 dBc (9 kHz to 25 MHz)

< -80 dBc (25 MHz to 3 GHz)

< -80 dBc (3 GHz to 4 GHz)

< -70 dBc (4 GHz to 6 GHz, RSA507A)

< -70 dBc (6 GHz to 7.5 GHz, RSA507A)

Each signal level -55 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -50 dBm.

**2nd Harmonic distortion, typical**

**2nd Harmonic distortion**

< -75 dBc (40 MHz to 1.5 GHz)

< -75 dBc (1.5 GHz to 3.75 GHz, RSA507A)

**2nd Harmonic distortion, Preamp on**

< - 60 dBc , 40 MHz to 13.5 GHz, input frequency

**2nd Harmonic distortion intercept (SHI)**

+35 dBm, 40 MHz to 1.5 GHz, input frequency

+35 dBm, 1.5 GHz to 3.75 GHz, input frequency

**2nd Harmonic distortion intercept (SHI), Preamp on**

+15 dBm, 40 MHz to 3.75 GHz, input frequency

**Displayed average noise level (DANL)**

(Normalized to 1 Hz RBW, with log-average detector)

| Frequency range | Preamp on | Preamp on, typical | Preamp off, typical |
|---|---|---|---|
| 500 kHz to 1 MHz | -138 dBm/Hz | -145 dBm/Hz | -130 dBm/Hz |
| 1 MHz to 25 MHz | -153 dBm/Hz | -158 dBm/Hz | -130 dBm/Hz |
| >25 MHz to 1 GHz | -161 dBm/Hz | -164 dBm/Hz | -141 dBm/Hz |
| >1 GHz to 2 GHz | -159 dBm/Hz | -162 dBm/Hz | -141 dBm/Hz |
| >2 GHz to 3 GHz | -156 dBm/Hz | -159 dBm/Hz | -138 dBm/Hz |
| >3 GHz to 4.2 GHz, RSA507A | -153 dBm/Hz | -156 dBm/Hz | -138 dBm/Hz |
| >4.2 GHz to 6 GHz, RSA507A | -159 dBm/Hz | -162 dBm/Hz | -147 dBm/Hz |
| >6 GHz to 7.5 GHz, RSA507A | -155 dBm/Hz | -158 dBm/Hz | -145 dBm/Hz |

## Phase noise

**Phase noise**

| Offset | 1 GHz CF | 1 GHz CF (typical) | 2 GHz CF (typical) | 6 GHz CF, (RSA507A) (typical) | 10 MHz (typical) |
|---|---|---|---|---|---|
| 10 kHz | -94 dBc/Hz | -97 dBc/Hz | -96 dBc/Hz | -94 dBc/Hz | -120 dBc/Hz |
| 100 kHz | -94 dBc/Hz | -98 dBc/Hz | -97 dBc/Hz | -96 dBc/Hz | -124 dBc/Hz |
| 1 MHz | -116 dBc/Hz | -121 dBc/Hz | -120 dBc/Hz | -120 dBc/Hz | -124 dBc/Hz |

## Spurious response

**Residual spurious response (Reference = 30 dBm, RBW = 1 kHz)**

<-75 dBm (500 kHz to 60 MHz), typical

< -85 dBm (>60 MHz to 80 MHz), typical

<-100 dBm (>80 MHz to 7.5 GHz)

**Spurious response with Signal (Image suppression)**

< -65 dBc (10 kHz to < 3 GHz, Ref= -30 dBm, Atten = 10 dB, RF input Level = -30 dBm, RBW = 10 Hz)

< -65 dBc (3 GHz to 7.5 GHz, Ref= -30dBm, Atten = 10 dB, RF input Level = -30 dBm, RBW = 10 Hz)

**Spurious response with signal at CF**

Offset ≥ 1 MHz

| Frequency | Span ≤40 MHz, swept spans >40 MHz | |
|---|---|---|
| | | Typical |
| 1 MHz - 100 MHz | | -75 dBc |
| 100 MHz - 3 GHz | -72 dBc | -75 dBc |
| 3 GHz - 7.5 GHz (RSA507A) | -72 dBc | -75 dBc |

**Spurious response with signal at CF**

150 kHz ≤ offset <1 MHz, Span=1 MHz

| Frequency | Typical |
|---|---|
| 1 MHz - 100 MHz | -70 dBc |
| 100 MHz - 3 GHz | -70 dBc |
| 3 GHz - 7.5 GHz (RSA507A) | -70 dBc [3] |

**Spurious response with signal at other than CF, typical**

| Frequency | Span ≤40 MHz, swept spans >40 MHz |
|---|---|
| 1 MHz – 25 MHz (LF Band) | -73 dBc |
| 25 MHz – 3 GHz | -73 dBc |
| 3 GHz – 7.5 GHz (RSA507A) | -73 dBc |

3 Power supply sidebands, 620-660 kHz: -67 dBc, typical

## Spurious response

| | |
|---|---|
| **Spurious response with signal at half-IF** [4] | |
| **RSA503A, RSA507A** | < -60 dBc, (CF: 30 MHz to 3 GHz, Ref = -30 dBm, Atten = 10 dB, RBW = 10 Hz, Span = 10 kHz)<br>Signal frequency = 2310 MHz, RF input level = -30 dBm |
| **RSA507A** | <-60 dBc, (CF 3 G Hz to 7.5 GHz, Ref= -30 dBm, Atten = 10 dB, RBW=10 Hz, Span=10 kHz)<br>RF input Level = -30 dBm |
| **Local oscillator feed-through to input connector, typical** | < -70 dBm, preamp off.<br>< -90 dBm, preamp on.<br>Attenuator = 10 dB. |

## Acquisition

| | |
|---|---|
| **IF bandwidth** | 40 MHz. |
| **A/D converter** | 14 bits, 112 Ms/s. |
| **Real-Time IF Acquisition Data** | 112 Ms/s, 16-bit integer samples. |

## GPS location

| | |
|---|---|
| **Format** | GPS/GLONASS/BeiDou |
| **GPS antenna power** | 3 V, 100 mA maximum |
| **Time to first fix, maximum** | Lock time ranges from 2 sec (hot) to 40 sec (cold start). -130 dBm input signal power. |
| **Horizontal position accuracy** | GPS: 2.6 m<br>Glonass: 2.6 m<br>BeiDou: 10.2 m<br>GPS + Glonass: 2.6 m<br>GPS + BeiDou: 2.6 m<br>Test conditions: 24 hr. static, -130 dBm, full power |

## Tracking generator (Option 04)

| | |
|---|---|
| **Tracking Generator (Option 04)** | |
| **Frequency range** | 10 MHz to 3 GHz<br>10 MHz to 7.5 GHz |
| **Sweep speed** | 6700 MHz/second, 101 points, 50 kHz RBW (11 mS per point)<br>Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro. |
| **Frequency resolution** | 100 Hz |
| **TG output connector** | N type |
| **VSWR** | < 1.8:1, 10 MHz to 7.5 GHz, -20 dBm output level |
| **Maximum output power** | -3 dBm |

4 This is an input signal at half of the IF frequency.

## Tracking generator (Option 04)

| | |
|---|---|
| **Output power level setting range** | 40 dB |
| **Output power level step size** | 1 dB |
| **Output power level step size accuracy** | ± 0.5 dB |
| **Output level accuracy** | ± 1.5 dB, 10 MHz to 7.5 GHz, -20 dBm output level |
| **Harmonics** | < -22 dBc |
| **Non-harmonic spurious** | < -30 dBc; spurious < 2 GHz from TG output frequency |
| | < -25 dBc; spurious ≥ 2 GHz from TG output frequency |
| **Reverse power without damage** | 40 Vdc, +20 dBm RF |
| **Transmission gain measurement error** | Gain of +20 to -40 dB: ±1 dB |
| **Transmission gain measurement dynamic range** | 70 dB |

## SignalVu-PC standard measurements and performance

**Measurements included**

| | |
|---|---|
| **General signal analysis** | |
| Spectrum analyzer | Spans from 1 kHz to 7.5 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 µsec 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, -xdB 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/RSA507A key characteristics**

| | |
|---|---|
| **Maximum span** | 40 MHz real-time |
| | 9 kHz - 3 GHz swept |
| | 9 kHz - 7.5 GHz swept |
| **Maximum acquisition time** | 1.0 s |

## SignalVu-PC standard measurements and performance

| | |
|---|---|
| **Minimum IQ resolution** | 17.9 ns (acquisition BW = 40 MHz) |
| **Tuning Tables** | Tables that present frequency selection in the form of standards-based channels are available for the following. |
| | Cellular standards families: AMPS, NADC, NMT-450, PDC, GSM, CDMA, CDMA-2000, 1xEV-DO WCDMA, TD-SCDMA, LTE, WiMax |
| | Unlicensed short range: 802.11a/b/j/g/p/n/ac, Bluetooth |
| | Cordless phone: DECT, PHS |
| | Broadcast: AM, FM, ATSC, DVBT/H, NTSC |
| | Mobile radio, pagers, other: GMRS/FRS, iDEN, FLEX, P25, PWT, SMR, WiMax |

**DPX spectrum display**

| | |
|---|---|
| **Spectrum processing rate (RBW = auto, trace length 801)** | ≤10,000/s |
| **DPX bitmap resolution** | 201x801 |
| **Marker information** | Amplitude, frequency, signal density |
| **Minimum signal duration for 100% probability of detection** | 100 µs |
| | Span: 40 MHz, RBW = Auto, Max-hold on |
| | 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 |
| **Span range (continuous processing)** | 1 kHz to 40 MHz |
| **Span range (swept)** | Up to maximum frequency range of instrument |
| **Dwell time per step** | 50 ms to 100 s |
| **Trace processing** | Color-graded bitmap, +Peak, -Peak, average |
| **Trace length** | 801, 2401, 4001, 10401 |
| **RBW range** | 1 kHz to 10 MHz |

**DPX spectrogram display**

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

**Spectrum display**

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

## SignalVu-PC standard measurements and performance

| | |
|---|---|
| **Analog modulation analysis (standard)** | |
| **AM demodulation accuracy, typical** | ±2% |
| | 0 dBm input at center, carrier frequency 1 GHz, 1 kHz/5 kHz input/modulated frequency, 10% to 60% modulation depth |
| | 0 dBm input power level, reference level = 10 dBm, Atten=Auto |
| **FM demodulation accuracy, typical** | ±1% of span |
| | 0 dBm input at center, carrier frequency 1 GHz, 400 Hz/1 kHz input/modulated frequency |
| | 0 dBm input power level, reference level = 10 dBm, Atten=Auto |
| **PM demodulation accuracy, typical** | ±3% of measurement bandwidth |
| | 0 dBm input at center, carrier frequency 1 GHz, 1 kHz/5 kHz input/modulated frequency |
| | 0 dBm input power level, reference level = 10 dBm, Atten=Auto |
| **Spectrum sweep rates vs. resolution bandwidth** | |
| **Full-Span sweep speed** | 5500 MHz/sec (RBW = 1 MHz) |
| | 5300 MHz/sec (RBW = 100 kHz) |
| | 3700 MHz/sec (RBW = 10 kHz) |
| | 950 MHz/sec (RBW = 1 kHz) |
| | Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro. |
| | Spectrum display is only measurement on screen. |

## SignalVu-PC applications performance summary

| | |
|---|---|
| **AM/FM/PM and direct audio measurement (SVAxx-SVPC)** | |
| **Carrier frequency range (for modulation and audio measurements)** | (1/2 × audio analysis bandwidth) to maximum input frequency |
| **Maximum audio frequency span** | 10 MHz |
| **FM measurements (Mod. index >0.1)** | 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 |
| **AM measurements** | 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 |

## SignalVu-PC applications performance summary

**PM measurements**

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

**Audio filters**

Low pass, kHz: 0.3, 3, 15, 30, 80, 300, and user-entered up to 0.9 × audio bandwidth

High pass, Hz: 20, 50, 300, 400, and user-entered up to 0.9 × audio bandwidth

Standard: CCITT, C-Message

De-emphasis (µs): 25, 50, 75, 750, and user-entered

File: User-supplied .TXT or .CSV file of amplitude/frequency pairs. Maximum 1000 pairs

| **Performance characteristics, typical** | **Conditions: Unless otherwise stated, performance is given for:<br>Modulation rate = 5 kHz<br>AM depth: 50%<br>PM deviation 0.628 Radians** | | | |
|---|---|---|---|---|
| | **FM** | **AM** | **PM** | **Conditions** |
| Carrier Power accuracy | Refer to instrument amplitude accuracy | | | |
| Carrier Frequency accuracy | ± 0.5 Hz + (transmitter frequency × ref. freq. error) | Refer to instrument frequency accuracy | ± 0.2 Hz + (transmitter frequency × ref. freq. error) | FM deviation: 5 kHz / 100 kHz |
| Depth of Modulation accuracy | NA | ± 0.2%+(0.01 * measured value) | NA | Rate: 5 kHz<br>Depth: 50% |
| Deviation accuracy | ± (1% × (rate + deviation)+50 Hz) | NA | ± 100% * (0.01 + (measured rate/1 MHz)) | FM deviation: 100 kHz |
| Rate accuracy | ± 0.2 Hz | ± 0.2 Hz | ± 0.2 Hz | FM deviation: 5 kHz / 100 kHz |
| Residual THD | 0.10% | 0.16% | 0.1% | FM Deviation: 5 kHz / 100 kHz<br>Rate: 1 kHz |
| Residual SINAD | 43 dB | 56 dB | 40 dB | FM deviation 5 kHz<br>FM deviation 100 kHz<br>Rate: 1 kHz |

**APCO P25 Measurements (SV26xx-SVPC)**

**Measurements**

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

**Modulation fidelity, typical**

C4FM ≤ 1.0%

HCPM ≤ 0.5%

HDQPSK ≤ 0.25%

Input signal level is optimized for best modulation fidelity.

## SignalVu-PC applications performance summary

### Bluetooth Measurements (SV27xx-SVPC)

| | |
|---|---|
| **Modulation formats** | Basic Rate, Bluetooth Low Energy, Enhanced Data Rate - Revision 4.1.1<br>Packet types: DH1, DH3, DH5 (BR), Reference (LE) |
| **Measurements** | Peak Power, Average Power, Adjacent Channel Power or InBand Emission mask, -20 dB Bandwidth, Frequency Error, Modulation Characteristics including ΔF1avg (11110000), ΔF2avg (10101010), ΔF2 > 115 kHz, ΔF2/ΔF1 ratio, frequency deviation vs. time with packet and octet level measurement information, Carrier Frequency f0, Frequency Offset (Preamble and Payload), Max Frequency Offset, Frequency Drift $f_1$-$f_0$, Max Drift Rate $f_n$-$f_0$ and $f_n$-$f_{n-5}$, Center Frequency Offset Table and Frequency Drift table, color-coded Symbol table, Packet header decoding information, eye diagram, constellation diagram |
| **Output power, In-band emissions and ACP** | Level uncertainty: refer to instrument amplitude and flatness specification<br>Measurement range: signal level > –70 dBm |
| **Modulation characteristics** | Deviation range: ±280 kHz<br>Deviation uncertainty (at 0 dBm)<br><2 kHz [5] + instrument frequency uncertainty (basic rate)<br><3 kHz [5] + instrument frequency uncertainty (low energy)<br>Measurement range: Nominal channel frequency ±100 kHz |
| **Initial Carrier Frequency Tolerance (ICFT)** | Measurement uncertainty (at 0 dBm): <1 kHz + instrument frequency uncertainty<br>Measurement range: Nominal channel frequency ±100 kHz |
| **Carrier Frequency Drift** | Measurement uncertainty: <1 kHz + instrument frequency uncertainty<br>Measurement range: Nominal channel frequency ±100 kHz |

### General purpose digital modulation analysis (SVMxx-SVPC)

| | |
|---|---|
| **Modulation formats** | BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 256QAM, PI/2DBPSK, DQPSK, PI/4DQPSK, D8PSK, D16PSK, SBPSK, OQPSK, SOQPSK, MSK, GFSK, CPM, 2FSK, 4FSK, 8FSK, 16FSK, C4FM |
| **Analysis period** | Up to 81,000 samples |
| **Measurement filter** | Root Raised Cosine, Raised Cosine, Gaussian, Rectangular, IS-95 TX_MEA, IS-95 Base TXEQ_MEA, None |
| **Reference Filter** | Gaussian, Raised Cosine, Rectangular, IS-95 REF, None |
| **Filter rolloff factor** | α : 0.001 to 1, in 0.001 steps |
| **Measurements** | 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 |
| **Symbol rate range** | 1 k symbols/s to 40 M symbols/s<br>Modulated signal must be contained entirely within the acquisition bandwidth |
| **Adaptive equalizer** | Linear, Decision-Directed, Feed-Forward (FIR) equalizer with coefficient adaptation and adjustable convergence rate. Supports modulation types BPSK, QPSK, OQPSK, π/2-DBPSK, π/4-DQPSK, 8-PSK, 8-DSPK, 16-DPSK, 16/32/64/128/256-QAM |

5 At nominal power level of 0 dBm

## SignalVu-PC applications performance summary

| | |
|---|---|
| **QPSK Residual EVM (center frequency = 2 GHz), typical** | 0.6 % (100 kHz symbol rate)<br>0.8 % (1 MHz symbol rate)<br>0.8 % (10 MHz symbol rate)<br>0.8 % (30 MHz symbol rate)<br>400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude |
| **256 QAM Residual EVM (center frequency = 2 GHz), typical** | 0.6 % (10 MHz symbol rate)<br>0.7 % (30 MHz symbol rate)<br>400 symbols measurement length, 20 Averages, normalization reference = maximum symbol magnitude |

**LTE Downlink RF measurements (SV28xx-SVPC)**

| | |
|---|---|
| **Standard Supported** | 3GPP TS 36.141 Version 12.5 |
| **Frame Format supported** | FDD and TDD |
| **Measurements and Displays Supported** | Adjacent Channel Leakage Ratio (ACLR), Spectrum Emission Mask (SEM), Channel Power, Occupied Bandwidth, Power vs. Time showing Transmitter OFF power for TDD signals and LTE constellation diagram for Primary Synchronization Signal, Secondary Synchronization Signal with Cell ID, Group ID, Sector ID and Frequency Error. |
| **ACLR with E-UTRA bands (typical, with noise correction)** | 1st Adjacent Channel 60 dB (RSA507A)<br>2nd Adjacent Channel 62 dB (RSA507A) |

**Mapping (MAPxx-SVPC)**

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

**Pulse measurements (SVPxx-SVPC)**

| | |
|---|---|
| **Measurements (nominal)** | 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 |
| **Minimum pulse width for detection** | 150 ns |
| **Average ON power at 18 °C to 28 °C, typical** | ±0.3 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 |
| **Duty factor, typical** | ±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 |
| **Average transmitted power, typical** | ±0.5 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 |
| **Peak pulse power, typical** | ±1.2 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 |
| **Pulse width, typical** | ±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 |

## SignalVu-PC applications performance summary

**WLAN Measurements, 802.11a/b/g/j/p (SV23xx-SVPC)**

| | |
|---|---|
| **Measurements** | 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) |
| **Residual EVM - 802.11a/g/j /p (OFDM), 64-QAM, typical** | 2.4 GHz, 20 MHz BW: -39 dB<br>5.8 GHz, 20 MHz BW: -38 dB<br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each |
| **Residual EVM - 802.11b, CCK-11, typical** | 2.4 GHz, 11 Mbps: 1.3 %<br>Input signal level optimized for best EVM, average of 1,000 chips, BT = .61 |

**WLAN Measurements 802.11n (SV24xx-SVPC)**

| | |
|---|---|
| **Measurements** | 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) |
| **EVM performance - 802.11n, 64-QAM, typical** | 2.4 GHz, 40 MHz BW: -38 dB<br>5.8 GHz, 40 MHz BW: -38 dB<br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each |

**WLAN Measurements 802.11ac (SV25xx-SVPC)**

| | |
|---|---|
| **Measurements** | 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) |
| **EVM performance - 802.11ac, 256-QAM, typical** | 5.8 GHz, 40 MHz BW : -38 dB<br>Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each |

## Input and output ports

**Inputs, outputs, and inferfaces**

| | |
|---|---|
| **RF input** | N type, female |
| **External frequency reference input** | BNC, female |
| **Trigger/Sync input** | BNC, female |
| **Tracking Generator Source Output** | N type, female |
| **GPS Antenna** | SMA, female |
| **USB Device Port** | USB 3.0 – Type A |

## Input and output ports

| | |
|---|---|
| **USB Status LED** | LED, dual color red/green |
| | LED states: |
| | Steady Red: USB power applied, or resetting |
| | Steady Green: Initialized, ready for use |
| | Blinking Green: Transferring data to host |
| **Battery Status LED** | LED, green |
| | LED states: |
| | Blinking Green: External power connected, charging battery |
| | Off – no external power connected or battery fully charged |

## Installation requirements

| | |
|---|---|
| **Maximum power dissipation (fully loaded)** | 15 W maximum. Maximum line current is 0.2 A at 90 V line. |
| **Surge current** | 2 A peak maximum, at 25 °C (77 °F) for ≤ 5 line cycles, after the product has been turned off for at least 30 seconds. |
| **Cooling clearance** | Bottom, top |
| | 25.4 mm ( 1.0 in.) |
| | Sides |
| | 25.4 mm (1.0 in.) |
| | Rear: 25.4 mm (1.0 in.) |
| **External DC input** | |
| **Voltage** | 18 V |
| **Voltage range limits** | Operation: +12.0 V to +19.95 V |
| | Battery Charging: +17.5 V to +19.95 V |
| **Connector type** | 2.5mm male |
| | Center conductor: positive |
| | Outer conductor: negative |
| **AC Adapter Output** | 18 V ± 5%, 5 A (90 W max) |
| | Center conductor: positive |
| | Outer conductor: negative |
| **Battery** | |
| **Nominal voltage** | 14.4 V |
| **Nominal capacity** | 6140 mAh |
| **Battery technology** | Li-Ion, Smart Battery compatible with SMBus interface. |
| **Battery operational life** | 4 hours of continuous operation per battery |
| **Battery operating temperature** | Operating (discharge) [6]: -10 °C to +45 °C (14 °F to 113 °F) [7] Charging: 0 °C to 45 °C (32 °F to 113 °F) |
| **Battery storage life** | 2 years at +20 °C (68 °F) nominal Max storage duration between recharge: 10 months @ +20 °C (68 °F) |

6 Operation at -10 °C may require turning on the unit at room temperature first.

7 Varies per discharge current and heat dissipation characteristics; actual limit may be lower.

## Physical characteristics

### Physical characteristics

| | |
|---|---|
| **Width** | 299.1 mm (11.78 in) |
| **Height** | 67.3 mm (2.65 in) |
| **Length** | 271.3 mm (10.68 in) |
| **Net weight** | 2.54 kg (5.6 pounds) without battery 2.99 kg (6.6 pounds) with battery |

## Environmental and safety

### Temperature

| | |
|---|---|
| **Without battery installed** | Operating: -10 °C to +55 °C (+14 °F to +131 °F) |
| | Non-operating: -51 °C to +71 °C (-60 °F to +160 °F) |
| **With battery installed** | Operating (discharge)[6] : -10 °C to +45 °C (+14 °F to +113 °F)[7] |
| | Charging: 0 °C to 45 °C (32 °F to +113 °F) |

### Humidity

| | |
|---|---|
| **Without battery Installed** | MIL-PRF-28800F Class 2 |
| | Operating: |
| | 5% to 95±5%RH (relative humidity) in the temperature range of +10 °C to 30 °C (+50 °F to 86 °F) |
| | 5% to 75±5% RH above +30 °C to 40 °C (+86 °F to 104 °F) |
| | 5% to 45±5% RH above +40 °C up to +55 °C (+86 °F to +131 °F) |
| | <10 °C (+50 °F) humidity is uncontrolled; non-condensing |
| **With battery Installed** | Operating: |
| | 5% to 95% RH (relative humidity) in the temperature range of +10 °C to 30 °C (+14 °F to +86 °F) |
| | 5% to 45% RH above +30 °C to 50 °C (+86 °F to 122 °F) |
| | <10 °C (+50 °F) humidity is uncontrolled; non-condensing |

### Altitude

| | |
|---|---|
| **Operating** | Up to 5000 m (16,404 ft.) |
| **Non-operating** | Up to 15240 m (50,000 ft.) |

### Exposure

| | |
|---|---|
| **Splash-Proof test, operating and non-operating** | No potential of shock hazard after exposure to non-operating Splash Proof Test per IEC529, level IP52 |
| **Dust resistance test, operating and non-operating** | Test method per IEC529, level IP52, test conditions 13.4 and 13.5. |
| **Salt exposure test, structural parts** | Standard MIL-STD-810, Method 509.1, Procedure 1 |

## Dynamics

**Vibration**

| | |
|---|---|
| **Operating** | Tektronix Class 2 Random Vibration Test at 2.66 GRMS: 5-500 Hz, 3 Axes at 10 min/axis |
| **Non-Operating** | MIL-PRF-28800F Class 2 |
| | 0.030 $g^2$/Hz., 10 500 Hz, 30 minutes per axis, 3 axes (90 minutes total) |

**Shock**

| | |
|---|---|
| **Operating** | Test method per Military Standard MIL-PRF-28800F 1-4 |
| **Non-Operating** | Exceeds the requirements of Military Standard MIL-PRF-28800F |

**Handling and transit**

| | |
|---|---|
| **Bench handling, operating** | MIL-PRF-28800F Class 2 |
| **Transit drop, non-operating** | MIL-PRF-28800F Class 2 |
| **Free-Fall drop, non-operating** | 32 inches |

# Ordering information

## Models

RSA500A Series

**RSA500A Series**

USB Real-Time Spectrum Analyzer, 40 MHz acquisition bandwidth

The RSA500 requires a PC with Windows 7, Windows 8/8.1, or Windows 10, 64-bit operating system. A USB 3.0 connection is required for operation of the RSA500. 8 GB RAM and 20 GB free drive space is required for installation of SignalVu-PC. For full performance of the real time features of the RSA500, an Intel Core i7 4th generation processor 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.

**Includes:** USB 3.0 cable (2 M), A-A connection, screw lock, shoulder strap, carrying case (with room for unit, tablet, accessories), quick-start manual (printed), connector covers, WFM200BA Li-Ion rechargeable battery pack, WFM200BA Li-Ion battery pack instructions (printed), AC power adapter, power cord (see power plug options), USB memory device with SignalVu-PC, API and documentation files.

| Item | Description |
|---|---|
| RSA503A | USB real time spectrum analyzer, 9 kHz – 3.0 GHz, 40 MHz acquisition bandwidth |
| Option 04 | Tracking generator, 10 MHz – 3.0 GHz |
| Option CTRL-G1-B | Portable controller, Brazil power, see country list for availability |
| Option CTRL-G1-C | Portable controller, China power, see country list for availability |
| Option CTRL-G1-E | Portable controller, Europe power, see country list for availability |
| Option CTRL-G1-I | Portable controller, India power, see country list for availability |
| Option CTRL-G1-N | Portable controller, North America power, see country list for availability |
| Option CTRL-G1-U | Portable controller, UK power, see country list for availability |
| RSA507A | USB real time spectrum analyzer, 9 kHz – 7.5 GHz, 40 MHz acquisition bandwidth |
| Option 04 | Tracking generator, 10 MHz – 7.5 GHz |
| Option CTRL-G1-B | Portable controller, Brazil power, see country list for availability |
| Option CTRL-G1-C | Portable controller, China power, see country list for availability |
| Option CTRL-G1-E | Portable controller, Europe power, see country list for availability |
| Option CTRL-G1-I | Portable controller, India power, see country list for availability |
| Option CTRL-G1-N | Portable controller, North America power, see country list for availability |
| Option CTRL-G1-U | Portable controller, UK power, see country list for availability |
| RSA500TRANSIT | Hard-sided transit case, RSA500 series real time spectrum analyzer with room for tablet and accessories |

# Options

## RSA500A power plug options

| | |
|---|---|
| **Opt. A0** | North America power plug (115 V, 60 Hz) |
| **Opt. A1** | Universal Euro power plug (220 V, 50 Hz) |
| **Opt. A2** | United Kingdom power plug (240 V, 50 Hz) |
| **Opt. A3** | Australia power plug (240 V, 50 Hz) |
| **Opt. A4** | North America power plug (240 V, 50 Hz) |
| **Opt. A5** | Switzerland power plug (220 V, 50 Hz) |
| **Opt. A6** | Japan power plug (100 V, 50/60 Hz) |
| **Opt. A10** | China power plug (50 Hz) |
| **Opt. A11** | India power plug (50 Hz) |
| **Opt. A12** | Brazil power plug (60 Hz) |
| **Opt. A99** | No power cord |

## Language options for the RSA500

| | |
|---|---|
| **Opt. L0** | English manual |
| **Opt. L1** | French manual |
| **Opt. L2** | Italian manual |
| **Opt. L3** | German manual |
| **Opt. L4** | Spanish manual |
| **Opt. L5** | Japanese manual |
| **Opt. L6** | Portuguese manual |
| **Opt. L7** | Simplified Chinese manual |
| **Opt. L8** | Traditional Chinese manual |
| **Opt. L9** | Korean manual |
| **Opt. L10** | Russian manual |

## RSA500A service options [8]

| | |
|---|---|
| **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. R5** | Repair Service 5 Years (including warranty) |

8 Not available on tablet options.

## Warranty

- RSA500 series warranty: 3 years.
- FZ-G1 tablet: 3-year warranty with Business Class Support (provided by Panasonic in region of purchase).
- Alaris DF-A0047 antenna: 1-year warranty, provided by Alaris in South Africa. Service and calibration provided by Alaris.

## Tablet

**Tablets ordered as standalone**

When ordered standalone, the Panasonic FZ-G1 has the nomenclature below. See the RSA500 option list if you'd like to order the controller as an option to the RSA500. The FZ-G1 is available in limited geographies from Tektronix as shown in the ordering information below.

| Item | Description | Regional availability |
|---|---|---|
| FZ-G1-N | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord. | Canada, Columbia, Ecuador, Mexico, Philippines, Singapore, United States |
| FZ-G1-C | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, digitizer pen and tether, battery charger with power cord | China |
| FZ-G1-I | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord | India |
| FZ-G1-E | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord. | Austria, Baltic States, Belgium, Bosnia, Bulgaria, Chile, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Indonesia, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Africa, Spain, Sweden, Thailand, Turkey |
| FZ-G1-U | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord. | Egypt, Kenya, Malaysia, United Kingdom |
| FZ-G1-B | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord | Brazil |
| FZ-G1-J | Controller for USB Spectrum Analyzers, Panasonic ToughPad FZ-G1. Includes tablet, battery, digitizer pen and tether, battery charger with power cord | Japan |

**Panasonic FZ-G1 accessories**

| Item | Description |
|---|---|
| FZ-VZSU84U [9] | Li-ion battery, standard capacity |
| FZ-VZSU88U [9] | Long-life battery pack for Panasonic ToughPad FZ-G1 |
| FZ-BNDLG1BATCHRG | Single battery charger bundle for FZ-G1. 1 charger and 1 adapter |
| CF-LNDDC120 | Lind 120 W 12-32 Volt input vehicle adapter for Toughbook and ToughPad |
| TBCG1AONL-P | Panasonic Toughmate always on case for FZ-G1 |
| TBCG1XSTP-P | Infocase Toughmate X-strap for Panasonic FZ-G1 |

9 Not available in China, Hong Kong, Macau or Mongolia

# Licenses

## SignalVu-PC application-specific modules

| Application license | Description |
|---|---|
| SVANL-SVPC | AM/FM/PM/Direct Audio Analysis - Node Locked License |
| SVAFL-SVPC | AM/FM/PM/Direct Audio Analysis - Floating License |
| SVTNL-SVPC | Settling Time (frequency and phase) measurements - Node Locked License |
| SVTFL-SVPC | Settling Time (frequency and phase) measurements - Floating License |
| SVMNL-SVPC | General Purpose Modulation Analysis to work with analyzer of acquisition bandwidth <= 40 MHz or MDO - Node Locked License |
| SVMFL-SVPC | General Purpose Modulation Analysis to work with analyzer of acquisition bandwidth <= 40 MHz or MDO- Floating License |
| SVPNL-SVPC | Pulse Analysis to work with analyzer of acquisition bandwidth <= 40 MHz or MDO - Node Locked License |
| SVPFL-SVPC | Pulse Analysis to work with analyzer of acquisition bandwidth <= 40 MHz or MDO- Floating License |
| SVONL-SVPC | Flexible OFDM Analysis - Node Locked License |
| SVOFL-SVPC | Flexible OFDM Analysis - Floating License |
| SV23NL-SVPC | WLAN 802.11a/b/g/j/p measurement - Node Locked License |
| SV23FL-SVPC | WLAN 802.11a/b/g/j/p measurement - Floating License |
| SV24NL-SVPC | WLAN 802.11n measurement (requires SV23) - Node Locked License |
| SV24FL-SVPC | WLAN 802.11n measurement (requires SV23) - Floating License |
| SV25NL-SVPC | WLAN 802.11ac measurement to work with analyzer of acquisition bandwidth <= 40 MHz (requires SV23 and SV24) or MDO - Node Locked License |
| SV25FL-SVPC | WLAN 802.11ac measurement to work with analyzer of acquisition bandwidth <= 40 MHz (requires SV23 and SV24) or MDO - Floating License |
| SV26NL-SVPC | APCO P25 measurement - Node Locked License |
| SV26FL-SVPC | APCO P25 measurement - Floating License |
| SV27NL-SVPC | Bluetooth measurement to work with analyzer of acquisition bandwidth <= 40 MHz or MDO - Node Locked License |
| SV27FL-SVPC | Bluetooth measurement to work with analyzer of acquisition bandwidth <= 40 MHz or MDO- Floating License |
| MAPNL-SVPC | Mapping - Node Locked License |
| MAPFL-SVPC | Mapping - Floating License |
| SV56NL-SVPC | Playback of recorded files - Node Locked License |
| SV56FL-SVPC | Playback of recorded files - Floating License |
| CONNL-SVPC | SignalVu-PC live link to the MDO4000B series mixed-domain oscilloscopes - Node Locked License |
| CONFL-SVPC | SignalVu-PC live link to the MDO4000B series mixed-domain oscilloscopes - Floating License |
| SV2CNL-SVPC | WLAN 802.11a/b/g/j/p/n/ac and live link to MDO4000B to work with analyzer of acquisition bandwidth <= 40 MHz - Node Locked License |
| SV2CFL-SVPC | WLAN 802.11a/b/g/j/p/n/ac and live link to MDO4000B to work with analyzer of acquisition bandwidth <= 40 MHz - Floating License |
| SV28NL-SVPC | LTE Downlink RF measurement to work with analyzer of acquisition bandwidth <= 40 MHz or MDO - Node Locked License |
| SV28FL-SVPC | LTE Downlink RF measurement to work with analyzer of acquisition bandwidth <= 40 MHz or MDO - Floating License |
| SV54NL-SVPC | Signal survey and classification - Node Locked License |
| SV54FL-SVPC | Signal survey and classification - Floating License |
| SV60NL-SVPC | Return loss, distance to fault, VSWR, cable loss - Node Locked License (requires Option 04 on RSA500A/600A, available June 2016) |
| SV60FL-SVPC | Return loss, distance to fault, VSWR, cable loss - Floating License (requires Option 04 on RSA500A/600A, available June 2016) |
| EDUFL-SVPC | Education-only version of all modules for SignalVu-PC - Floating License |

## Recommended accessories

Tektronix offers a wide variety of adapters, attenuators, cables, impedance converters, antennas and other accessories for the RSA500 series.

| | |
|---|---|
| **General purpose RF cables** | |
| **012-1738-00** | Cable,50 Ω, 40 inch,type-N(m) to type-N(M) |
| **012-0482-00** | Cable, 50 Ω, BNC (m) 3 foot (91 cm) |
| **174-4977-00** | Cable, 50 Ω, straight type-N (m) and angled type-N (m) connector, 1.6 foot (50 cm) |
| **174-5002-00** | Cable, 50 Ω, type-N (m) to type-N (m) connector, 3 foot (91 cm) |
| **Adapters** | |
| **103-0045-00** | Adapter, coaxial, 50 Ω type-N(m) to type-BNC(f) |
| **013-0410-00** | Adapter, coaxial, 50 Ω type-N (f) to type-N (f) |
| **013-0411-00** | Adapter, coaxial, 50 Ω type-N (m) to type-N (f) |
| **013-0412-00** | Adapter, coaxial, 50 Ω, type-N(m) to type-N(m) |
| **013-0402-00** | Adapter, coaxial, 50 Ω type-N (m) to type-N 7/16(m) |
| **013-0404-00** | Adapter, coaxial, 50 Ω type-N(m) to type-7/16 (f) |
| **013-0403-00** | Adapter, coaxial, 50 Ω type-N(m) to type DIN 9.5(m) |
| **013-0405-00** | Adapter, coaxial, 50 Ω type-N(m) to type-DIN 9.5(f) |
| **013-0406-00** | Adapter, coaxial, 50 Ω type-N(m) to type-SMA(f) |
| **013-0407-00** | Adapter, coaxial, 50 Ω type-N(m) to type-SMA(m) |
| **013-0408-00** | Adapter, coaxial, 50 Ω type-N(m) to type-TNC(f) |
| **013-0409-00** | Adapter, coaxial, 50 Ω type-N(m) to type-TNC(m) |
| **Attenuators and 50/75 Ω pads** | |
| **013-0422-00** | Pad, 50/75 Ω, minimum loss, type-N(m) 50 Ω to type-BNC(f) 75 Ω |
| **013-0413-00** | Pad, 50/75 Ω, minimum loss, type-N(m) 50 Ω to type-BNC(m) 75 Ω |
| **013-0415-00** | Pad, 50/75 Ω, minimum loss, type-N(m) 50 Ω to type-F(m) 75 Ω |
| **015-0787-00** | Pad, 50/75 Ω, minimum loss, type-N(m) 50 Ω to type-F(f) 75 Ω |
| **015-0788-00** | Pad, 50/75 Ω, minimum loss, type-N(m) 50 Ω to type-N(f) 75 Ω |
| **011-0222-00** | Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(f) to type-N(f) |
| **011-0223-00** | Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(m) to type-N(f) |
| **011-0224-00** | Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(m) to type-N(m) |
| **011-0228-00** | Attenuator, fixed, 3 dB, 2 W, DC-18 GHz, type-N(m) to type-N(f) |
| **011-0225-00** | Attenuator, fixed, 40 dB, 100 W, DC-3 GHz, type-N(m) to type-N(f) |
| **011-0226-00** | Attenuator, fixed, 40 dB, 50 W, DC-8.5 GHz, type-N(m) to type-N(f) |
| **Antennas** | |
| **119-6609-00** | Whip antenna, BNC, wideband untuned, with center of sensitivity approximately 136 MHz, passband 5-1080 MHz. 9 inches length. |
| **DF-A0047** | Directional antenna, 20-8500 MHz, with electronic compass and preamp [10] |
| **DF-A0047-01** | Frequency range extension for DF-A0047 directional antenna, 9 kHz-20 MHz [10] |

| | |
|---|---|
| **DF-A0047-C1** | DF-A0047 antenna and DF-A0047-01 extension [10] |
| **016-2107-00** | Transit case for DF-A0047 and DF-A0047-01 [10] |
| **119-6594-00** | Yagi antenna, 825-896 MHz forward gain (over half-wave dipole): 10 dB |
| **119-6595-00** | Yagi antenna, 895-960 MHz forward gain (over half-wave dipole): 10 dB |
| **119-6596-00** | Yagi antenna, 1850-1990 MHz forward gain (over half-wave dipole): 9.3 dB |
| **119-6597-00** | Beam antenna, 1850 to 1990 MHz |
| **119-6970-00** | Magnetic mount antenna, 824 MHz to 2170 MHz (requires adapter 103-0449-00) |
| **Filters, probes, demonstration board** | |
| **119-7246-00** | Pre-filter, general purpose, 824 MHz to 2500 MHz, type-N (f) connector |
| **119-7426** | Pre-filter, general purpose, 2400 MHz to 6200 MHz, type-N (f) connector |
| **119-4146-00** | EMCO E/H-field probes |
| **E/H field probes, lower cost alternative** | Available from Beehive http://beehive-electronics.com/ |
| **RSA-DKIT** | RSA Version 3 demo board with N-BNC adapter, case, antenna, instructions |
| **011-0227-00** | Bias-T, type N(m) RF, type N(f) RF+DC, BNC(f) Bias, 1 W, 0.5 A, 2.5 MHz-6 GHz |

## Tracking generator accessories

A variety of calibration kits and phase-stabilized cables are available for the RSA500 tracking generator when used with the optional cable and antenna measurements software.

| | |
|---|---|
| **CALOSLNM** | Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, Type-N(m), 50 ohm |
| **CALOSLNF** | Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, Type-N(f), 50 ohm |
| **CALOSLNF** | Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, 7/16 DIN(m) |
| **CALOSL716F** | Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, 7/16 DIN(f) |
| **CALSOLT35F** | Calibration kit, 4-in-1 3.5 mm (f) short, open, load, through, 13 GHz |
| **CALSOLT35M** | Calibration kit, 4-in-1 3.5 mm (m) short, open, load, through, 13 GHz |
| **CALSOLTNF** | Calibration kit, 4-in-1 type-N (f) short, open, load, through, 9 GHz |
| **CALSOLTNM** | Calibration kit, 4-in-1 type-N (m) short, open, load, through, 9 GHz |
| **CALSOLT716F** | Calibration kit, 4-in-1 7/16 (f) short, open, load, through, 6 GHz |
| **CALSOLT716M** | Calibration kit, 4-in-1 7/16 (m) short, open, load, through, 6 GHz |
| **012-1745-00** | Cable, rugged, phase-stable, type-N (m) to type-N (f), 5 ft or 1.5 m |
| **012-1746-00** | Cable, rugged, phase-stable, type-N(m) to type-N(f), 3.28 ft or 1 m |
| **012-1747-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(f), 60 cm (23.6 in.) |
| **012-1748-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(f), 3.28 ft or 1 m |
| **012-1749-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(f), 5 ft or 1.5 m |
| **012-1750-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(m), 3.28 ft or 1 m |
| **012-1751-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(m), 5 ft or 1.5 m |

10 Not available in China, Japan, New Zealand, Australia, Korea, Russia, Belarus, Kazakhstan

| | |
|---|---|
| **012-1752-00** | Cable, rugged, phase-stable, type-N(m) to 7/16(m), 60 cm (23.6 in.) |
| **012-1753-00** | Cable, rugged, phase-stable, type-N(m) to DIN 9.5(f), 60 cm (23.6 in.) |
| **012-1754-00** | Cable, rugged, Phase-stable, type-N(m) to DIN 9.5(f), 3.28 ft or 1 m |
| **012-1755-00** | Cable, rugged, phase-stable, type-N(m) to DIN 9.5(f), 5 ft or 1.5 m |
| **012-1756-00** | Cable, rugged, phase-stable, type-N(m) to DIN 9.5(m), 3.28 ft or 1 m |
| **012-1757-00** | Cable, rugged, phase-stable, type-N(m) to DIN 9.5(m), 5 ft or 1.5 m |
| **012-1758-00** | Cable, rugged, phase-stable, type-N(m) to DIN 9.5(m), 60 cm (23.6 in.) |
| **012-1759-00** | Cable, rugged, phase-stable, type-N(m) to TNC(f), 3.28 ft or 1 m |
| **012-1760-00** | Cable, rugged, phase-stable, type-N(m) to TNC(f), 5 ft or 1.5 m |
| **012-1761-00** | Cable, rugged, phase-stable, type-N(m) to TNC(f), 60 cm (23.6 in.) |
| **012-1762-00** | Cable, rugged, phase-stable, type-N(m) to TNC(m), 60 cm (23.6 in.) |
| **012-1763-00** | Cable, rugged, phase-stable, type-N(m) to TNC(m), 3.28 ft or 1 m |
| **012-1764-00** | Cable, rugged, phase-stable, type-N(m) to TNC(m), 5 ft or 1.5 m |
| **012-1765-00** | Cable, rugged, phase-stable, type-N(m) to type-N(f), 60 cm (23.6 in.) |
| **012-1766-00** | Cable, rugged, phase-stable, type-N(m) to type-N(f), 3.28 ft or 1 m |
| **012-1767-00** | Cable, rugged, phase-stable, type-N(m) to type-N(m), 3.28 ft or 1 m |
| **012-1768-00** | Cable, rugged, phase-stable, type-N(m) to type-N(m), 60 cm (23.6 in.) |
| **012-1769-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(f), 60 cm (23.6 in.) |
| **012-1770-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(f), 3.28 ft or 1 m |
| **012-1771-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(f), 5 ft or 1.5 m |
| **012-1772-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(m) 60 cm (23.6 in.) |
| **012-1773-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(m), 3.28 ft or 1 m |
| **012-1774-00** | Cable, rugged, phase-stable, type-N(m) to type-SMA(m), 5 ft or 1.5 m |

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

GPIB IEEE-488

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.


Servicios de Calibracion y Metrologia, S.A. de C.V.
Av. de la esperanza #916, Col. La Hacienda Apodaca, N.L. 66636
Tel: (81) 11600085, (81)86614542, email: webmaster@scmmx.com

**ASEAN / Australasia** (65) 6356 3900
**Belgium** 00800 2255 4835*
**Central East Europe and the Baltics** +41 52 675 3777
**Finland** +41 52 675 3777
**Hong Kong** 400 820 5835
**Japan** 81 (3) 6714 3086
**Middle East, Asia, and North Africa** +41 52 675 3777
**People's Republic of China** 400 820 5835
**Republic of Korea** +822 6917 5084, 822 6917 5080
**Spain** 00800 2255 4835*
**Taiwan** 886 (2) 2656 6688

**Austria** 00800 2255 4835*
**Brazil** +55 (11) 3759 7627
**Central Europe & Greece** +41 52 675 3777
**France** 00800 2255 4835*
**India** 000 800 650 1835
**Luxembourg** +41 52 675 3777
**The Netherlands** 00800 2255 4835*
**Poland** +41 52 675 3777
**Russia & CIS** +7 (495) 6647564
**Sweden** 00800 2255 4835*
**United Kingdom & Ireland** 00800 2255 4835*

**Balkans, Israel, South Africa and other ISE Countries** +41 52 675 3777
**Canada** 1 800 833 9200
**Denmark** +45 80 88 1401
**Germany** 00800 2255 4835*
**Italy** 00800 2255 4835*
**Mexico, Central/South America & Caribbean** 52 (55) 56 04 50 90
**Norway** 800 16098
**Portugal** 80 08 12370
**South Africa** +41 52 675 3777
**Switzerland** 00800 2255 4835*
**USA** 1 800 833 9200

* European toll-free number. If not accessible, call: +41 52 675 3777

**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.



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