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 3.0/7.5/13.6/18.0 GHz frequency range covers a broad range of analysis needs
- 40 MHz acquisition bandwidth enables real time analysis for transient capture and vector analysis
- High speed full-span sweeps (70 GHz/s) for fast setup and discovery
- Standard GPS/GLONASS/Beidou receiver for mapping
- Optional tracking generator for gain/loss, antenna and cable measurements
- DataVu-PC software enables multi-unit recording in variable bandwidths
- 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
- Time qualified triggers enable capture of events at desired pulse widths, ideal for capturing dynamic test environments
- Frequency mask triggers facilitate the definition of a spectrum mask to capture events or signal anomalies based on their frequency and amplitude
- DPX density trigger allows you to analyze and measure infrequent or elusive RF events by defining a spectrum measurement box, based on how frequently the instrument detects RF power within this box it can trigger to capture the signal
- EMC/EMI pre-compliance and troubleshooting - CISPR detectors, predefined standards, limit lines, easy accessory setup, ambient capture, failure analysis, and report generation
- 15 µs minimum signal duration with 100% probability of intercept ensure you see problems first time, every time
- Signal analysis performance improves by pairing the USB RSA500A with more powerful host computers
- Application programming interface included for development of custom programs

Applications

- General-purpose spectrum analysis
- Radio network installation and maintenance
- Spectrum monitoring
- Spectrum management
- Interference hunting
- EMI/EMC compliance testing and troubleshooting
- Spectrum operations
- Radiation hazard (RADHAZ) testing
- Emissions control (EMCON) monitoring
- Signal intelligence (SIGINT) monitoring

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 real-time bandwidths with great fidelity in harsh environments. With 70 dB spurious free dynamic range and frequency coverage to 18.0 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

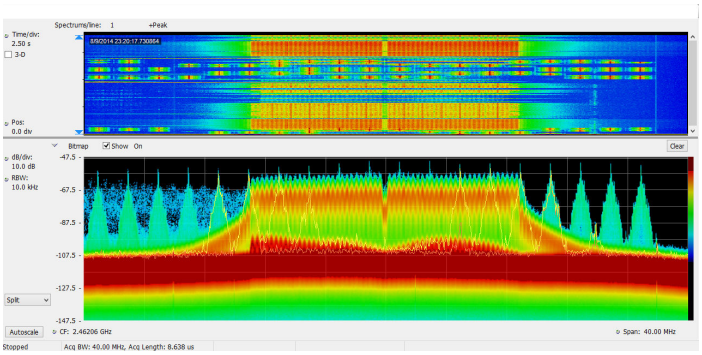
can add cable and antenna measurements of VSWR, return loss, distance to fault and cable loss as needed.

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. SignalVu-PC offers 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.

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 15 µs in duration. The following image shows a WLAN transmission (green and orange), and the narrow signals that repeat across the screen are the Bluetooth access probe. The spectrogram (upper part of the screen) clearly separates these signals in time to show any signal collisions.

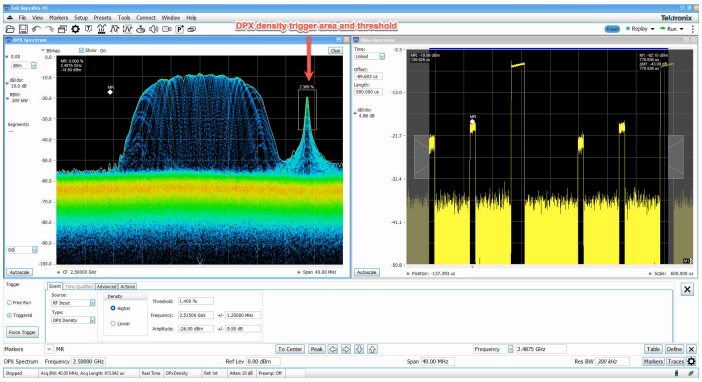


Advanced triggers

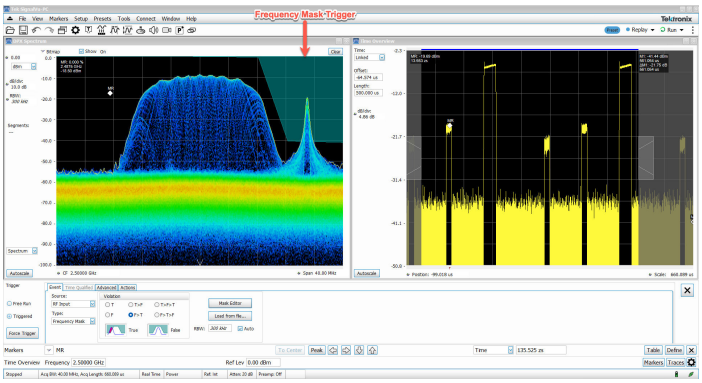
SignalVu's advanced triggers simplify the task of acquiring pulsed, transient, or unexpected RF signals, and elusive over-the-air RF signals in the field. Use the time qualified trigger to specify the duration of a pulse or signal event to trigger an acquisition.

Enable the DPX density trigger to activate a capture only when a signal appears in a certain spectrum area with a specific amount of power and duration.

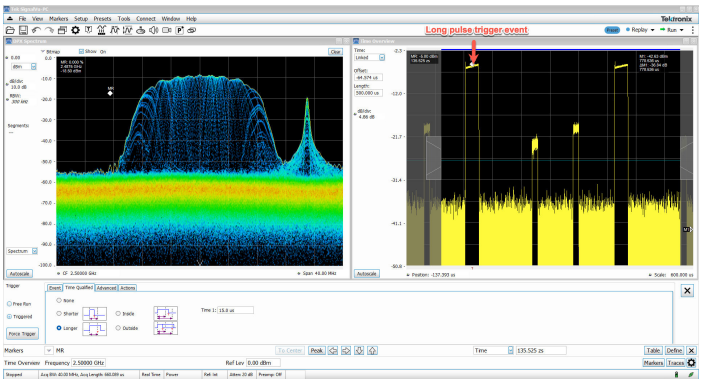
Define a frequency mask trigger to capture when signals appear inside or outside a predefined area.



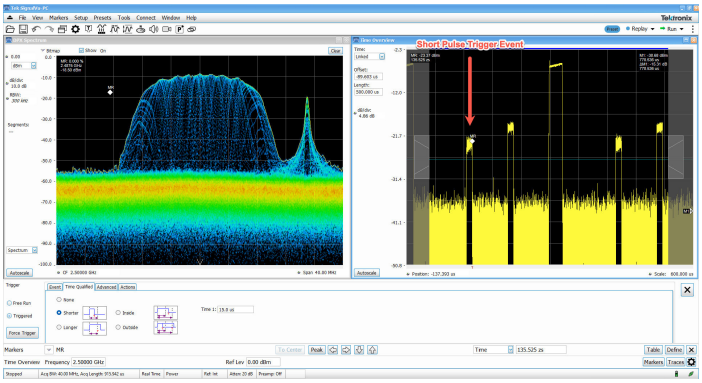
DPX density trigger_threshold



Frequency mask trigger



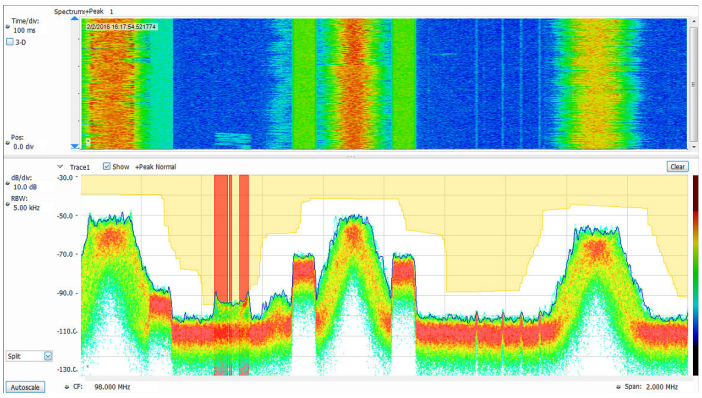
Time qualified long pulse



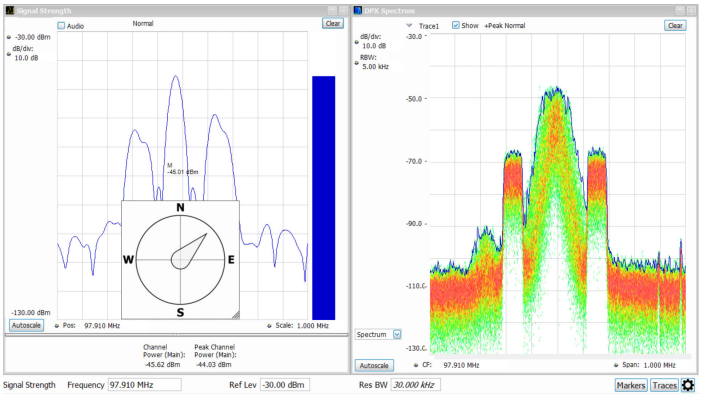
Time qualified short pulse

Spectrum monitoring

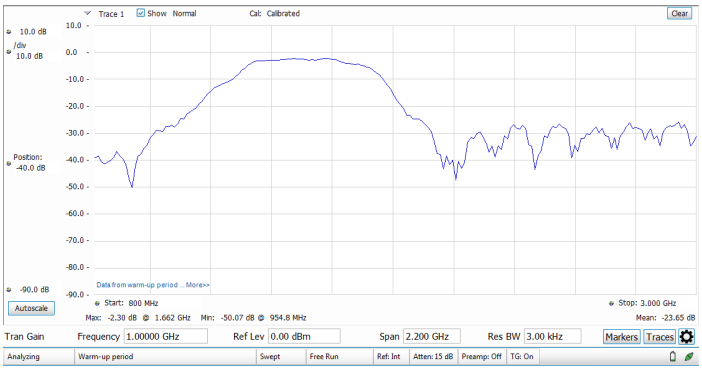
Finding unexpected signals is easy with unattended mask monitoring. A mask can be created on the DPX® spectrum display, and actions taken upon every violation, including stop, save a picture, save acquisition, or send an audible alert. In the illustration below, a mask violation has occurred in red on 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 recommended 3rd party 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. A bandpass filter response from 800 MHz to 3 GHz is shown below. Option SV60 adds return loss, cable loss, and distance to fault.



SignalVu-PC application-specific licenses

SignalVu-PC offers a wealth of application-oriented options available either installed on the instrument, or as a floating license that can be moved between instruments or attached to your PC. Applications include:

- General-purpose digital modulation analysis (SVM) supporting 26 modulation types from FSK to 1024QAM
- EMC/EMI analysis with CISPR peak, quasi-peak, and average detectors
- Bluetooth® analysis of Basic Rate, Low Energy, and Bluetooth 5. Some support of Enhanced Data Rate
- P25 analysis of phase 1 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 and RF measurements
- 5G New Radio (NR) uplink/downlink RF power, Power dynamics, Signal quality, and Emissions measurements
- Mapping
- Pulse analysis
- AM/FM/PM/Direct Audio Measurement including SINAD, and THD

- Playback of recorded files, including complete analysis in all domains
- Signal classification and survey

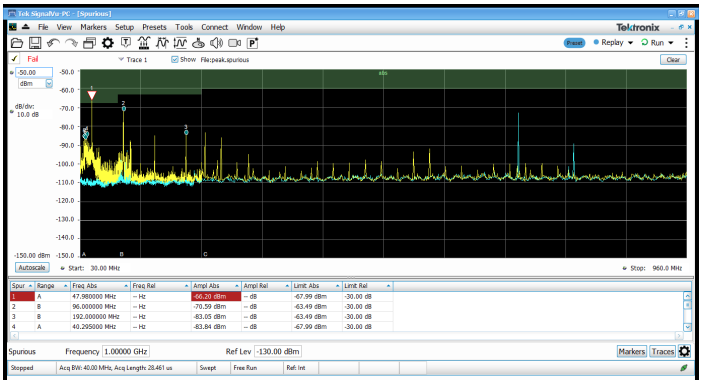
Any of these licenses above enable SignalVu's advanced triggering capabilities: Time qualified, DPX density, and Frequency mask triggers.

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

EMC/EMI

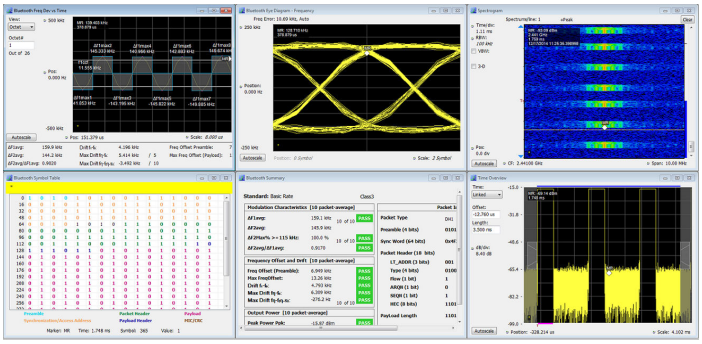
EMI pre-compliance and diagnostic measurements are easy with the instrument and SignalVu-PC. Transducer, antenna, preamplifier, and cable gain/loss can be entered and stored in correction files, and the standard spurious measurement feature of SignalVu-PC can be used to establish limit lines for your test. The following illustration shows a test from 30 MHz to 960 MHz against the FCC Part 15 Class A limit shown shaded. The blue trace is the capture of Ambient. Violations are recorded in the results table below the graph. CISPR quasi peak and average detectors can be added with option SVQP.

The EMC pre-compliance solution can be added with option EMCVU. It supports many predefined limit lines. It also adds a wizard for easy setup of recommended antennas, LISN, and other EMC accessories with a one-button push. When using the new EMC-EMI display, you can accelerate the test by applying the time consuming quasi peak only on failures. This display also provides a push-button ambient measurement. The Inspect tool lets you measure frequencies of interest locally, removing the need for scanning.

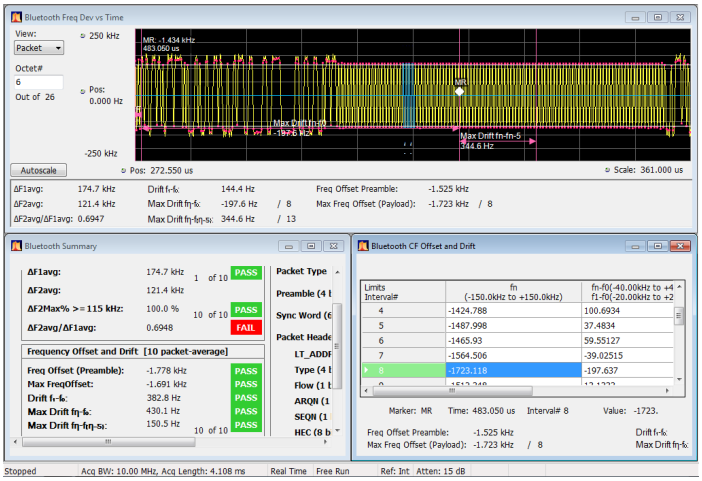


Bluetooth

Two new options have been added to help with Bluetooth SIG standardbase transmitter RF measurements in the time, frequency and modulation domains. Option SV27 supports Basic Rate and Low Energy Transmitter measurements defined by RF.TS.4.2.0 and RF-PHY.TS.4.2.0 Test Specification. It also demodulates and provides symbol information for Enhanced Data Rate packets. Option SV31 supports Bluetooth 5 standards (LE 1M, LE 2M, LE Coded) and measurements defined in the core specification. Both options also decode the physical layer data that is transmitted and color-encode the fields of packet in the symbol table for clear identification.

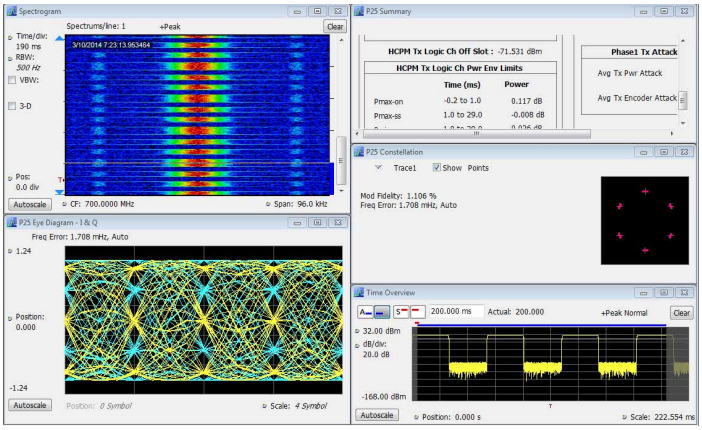


Pass/Fail results are provided with customizable limits. Measurement below shows deviation vs time, frequency offset and drift and a measurement summary with Pass/Fail results.



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

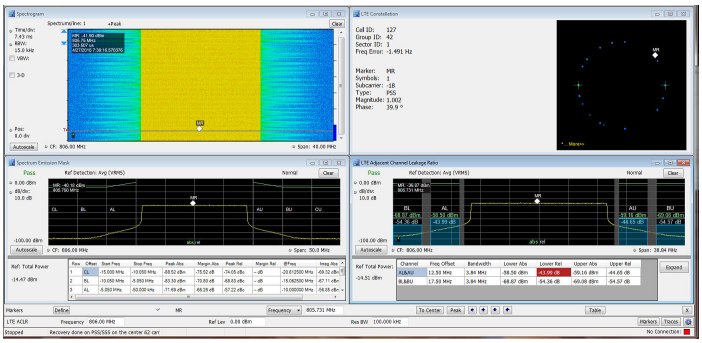
Application SV28 enables the following LTE base station transmitter measurements:

- Cell ID
- Channel power
- Occupied bandwidth
- Adjacent Channel Leakage Ratio (ACLR)
- Spectrum Emission Mask (SEM)
- Transmitter off power for TDD
- Reference Signal (RS) Power

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.



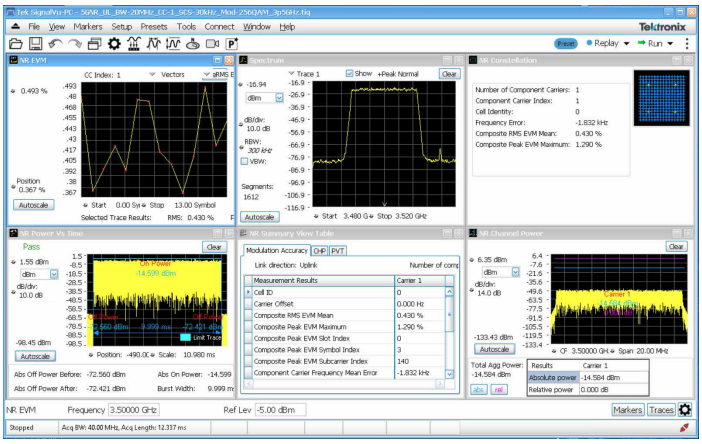
5G NR modulation analysis and measurements option

5G NR is among the growing set of signal standards, applications, and modulation types supported by Vector Signal Analysis (VSA) software. The VSA 5G NR analysis option provides comprehensive analysis capabilities in the frequency, time, and modulation domains for FR1 and FR2 (mmWave) signals based on the 3GPP's 5G NR specification.

By configuring result traces of spectrum, acquisition time, and NR specific modulation quality (e.g, EVM, frequency error, I/Q error) traces and tables, engineers can identify overall signal characteristics and troubleshoot intermittent error peaks or repeated synchronization failures.

Error Vector Magnitude (EVM) is a figure of merit used to describe signal quality. It does this by measuring the difference on the I/Q plane between the ideal constellation point of the given symbol versus the actual measured point. It can be measured in dB or % of the ideal sub-symbol, normalized to the average QAM power received, and display constellation of symbols vs ideal symbol. The EVM vs Symbol or EVM vs Time gives the EVM of OFDM symbols present in the number of symbols considered or the time within a slot.

For automated testing, SCPI remote interfaces are available to accelerate design, which enables the quick transition to the design verification and manufacturing phases.



Constellation, Summary View, CHP, and SEM displays supported in option 5G NR.

5G NR transmitter measurements core supported features

5G NR option (5GNRNL-SVPC) supports 5G NR modulation analysis measurements according to Release 15 and Release 16 of 3GPP's TS38 specification, including:

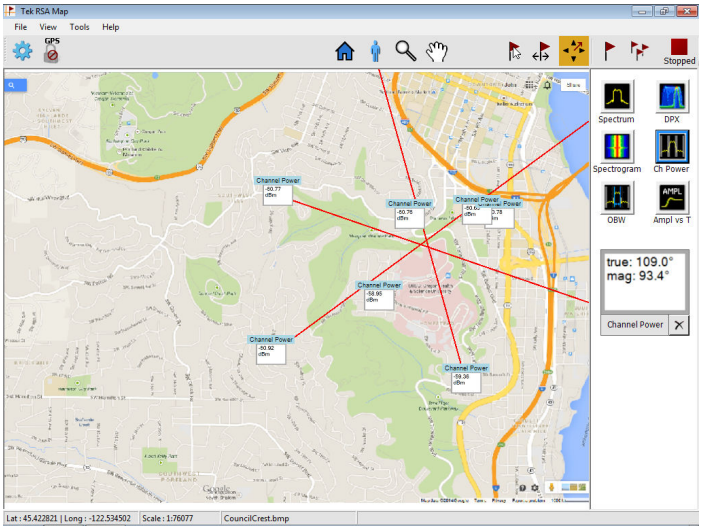
- Analysis of uplink and downlink frame structures
- 5G NR measurements and displays including
  - Modulation Accuracy (ModAcc)
  - Channel Power (CHP)
  - Adjacent Channel Power (ACP)
  - Spectrum Emission Mask (SEM)
  - Occupied Bandwidth (OBW)
  - Power Vs Time (PVT)[1]
  - Error Vector Magnitude (EVM)
  - Summary table with all scalar results for ModAcc, SEM, CHP, ACP, OBW, PVT, and EVM measurements
- In-depth analysis and troubleshooting with coupled measurements across domains, use multiple markers to correlate results to find root-cause.
- Saves reports in CSV format with configuration parameters and measurement results
- Configurable parameters of PDSCH or PUSCH for each component carrier

[1] PVT supports Uplink frame structure only.

- For downlink, supported test models for FDD and TDD per 3GPP specifications

Mapping

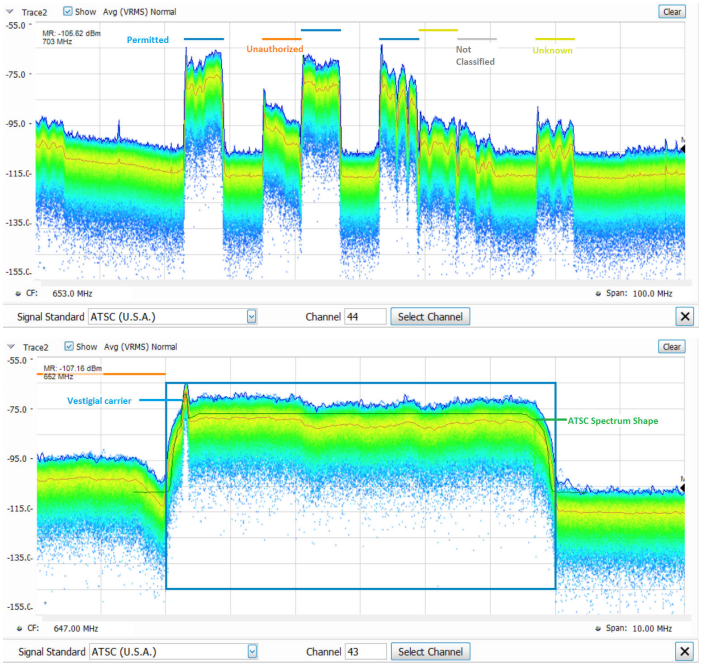
The SignalVu-PC MAP application enables interference hunting and location analysis. Locate interference with an azimuth function that lets you draw a line or an arrow on a mapped measurement to indicate direction, or use the recommended Alaris smart antenna with automated azimuth placement.



Signal survey/classification

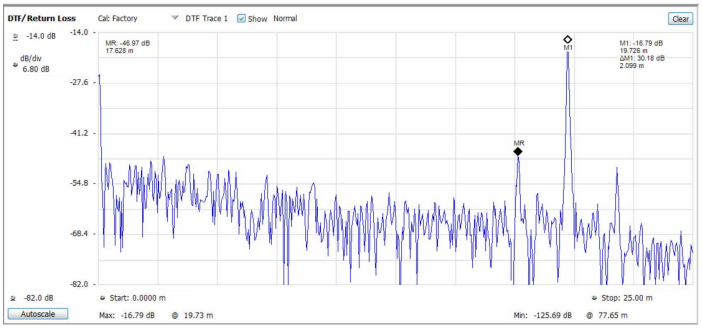
Application SV54 enables expert systems guidance to aid the user in classifying signals. You can quickly create a spectral region of interest, enabling users to identify and sort signals efficiently. The spectral profile mask, when overlaid on top of a trace, provides signal shape guidance while frequency, 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 seven regions have been declared as either Permitted, Not Classified, 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 have 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, which is the characteristic of ATSC broadcasts.

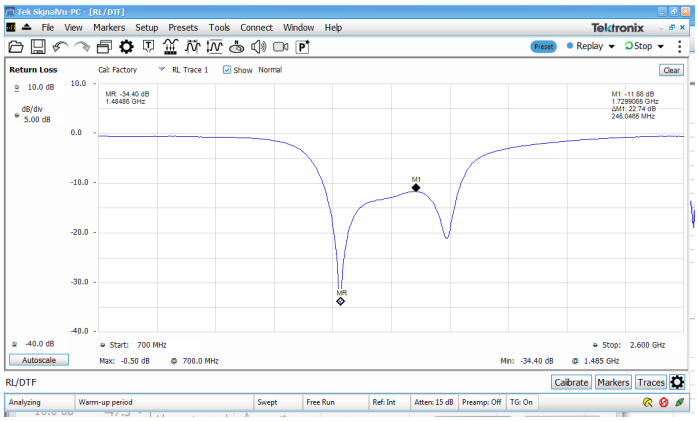


Return loss/VSWR, distance to fault, cable loss

Perform maintenance and troubleshooting tasks with ease. When equipped with the option 04 tracking generator, the RSA500A Series with application license SV60xx-SVPC makes one-port measurements on cables, devices and antennas.



Return loss vs distance for a cable with an inserted barrel and an extension cable. The point at M2 (17.638 m, MR) is the barrel connector and the point marked by M1 at 19.725 m is the end of the cable.



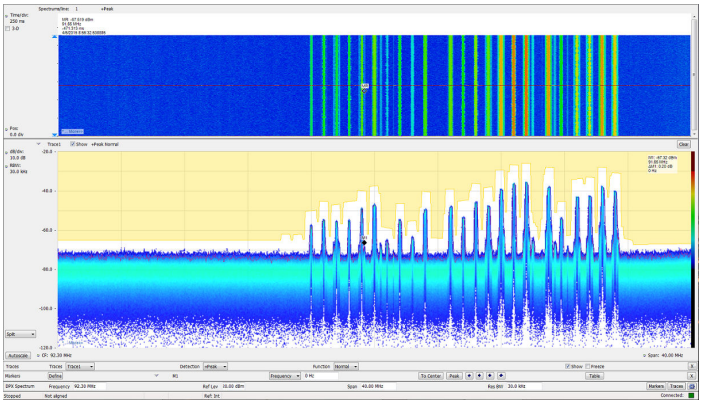
Return loss of a bandpass filter measured from 700 MHz to 2.6 GHz. Markers have been placed a 1.48 GHz (-34.4 dB return loss) and at 1.73 GHz (-11.68 dB return loss), indicating the best and worse match in the passband of the filter.

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.

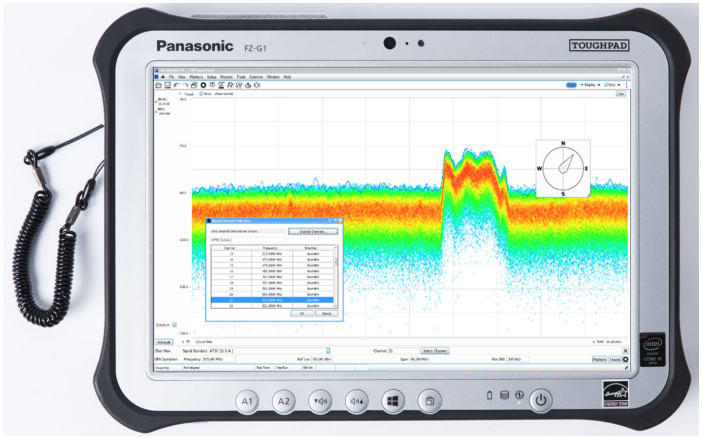


DataVu-PC for multi-instrument recording and analysis of large recordings

DataVu-PC software can control two spectrum analyzers simultaneously with independent settings. This allows you to monitor a wide span, while recording at up to 40 MHz bandwidth at any frequency in the range of the instrument. Once recorded, DataVu-PC can find and mark signals of interest based on amplitude and frequency-mask characteristics, eliminating the need for manual inspection of long recordings. Pulse measurements are available on up to 2,000,000 pulses.

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 recommends Panasonic rugged computers for controlling the RSA500 Series and as a standalone unit.



Panasonic rugged computers are sold separately and are available for purchase from Panasonic at *connect.na.panasonic.com/toughbook/rugged-computers* and a variety of third party vendors.

Recommended specifications, instrument controller

- Windows 10 or Windows 11 Pro 64-bit operating system
- Intel(R) CoreTM i5-6300U vProTM 2.4-3.0 GHz Processor
- 8 GB 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, and explosive atmosphere)
- IP65 certified sealed all-weather design

- Integrated microphone and speaker
- On-screen and button volume and mute controls
- Integrated battery backup for hot-swap of battery packs
- Three year warranty with business class support (provided by Panasonic in your region)

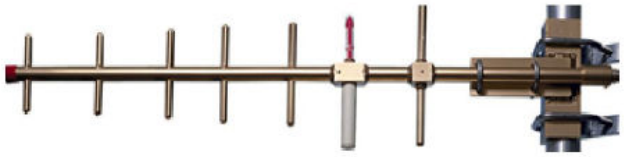
Smart antenna for interference hunting

Tektronix recommends the Alaris smart antenna (DF-A0047) with built-in USB compass for direction finding and interference hunting applications. Full details on the antenna are available from Alaris at *usa.alaris.tech/product?i=124&prodCode=DF-A0047&name=Handheld%20Direction%20Finding%20Antenna*. 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), contact Alaris.
- Trigger control for one-hand operation with functions for:
  - Preamp on/off
  - Band switch
- Standard armrest extension for ease in long interference hunting sessions
- Transit case available

Alaris direction-finding smart antenna.

Phase-stabilized cables from Tektronix 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
RSA513A	9 kHz to 13.6 GHz
RSA518A	9 kHz to 18.0 GHz

Frequency marker readout accuracy	±(RE × MF + 0.001 × Span) Hz RE: Reference Frequency Error MF: Marker Frequency [Hz]

Reference frequency accuracy	
Initial accuracy at Cal (30 min warm-up)	±1 x 10^{-6}
First year aging, typical	±1 x 10^{-6} (One year)
Cumulative error (Initial accuracy + temperature + aging), typical	3 x 10^{-6} (One year)
Temperature drift	±0.9 x 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. 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

GNSS

Accuracy, when locked to GNSS [2]	±0.025 ppm [3]

GNSS Trained Accuracy, when GNSS antenna is disconnected [2, 4]	±0.025 ppm [5] ±0.08 ppm [6]

[2] Tested using GPS system.

[3] For use to a stability of ±0.025ppm, the unit should be powered on continuously for two to five days after initial unpacking.

[4] For 24 hours continuous operation within temperature limits (see footnotes 5 and 6) after GNSS training. Refer to cumulative error specification if operating in GNSS trained mode beyond 24 hours since last training.

[5] For less than 3 °C ambient temperature change after training.

[6] For less than 10 °C ambient temperature change after training.

RF input

RF input impedance	50 Ω
RF VSWR (RF Attn = 20 dB), typical	< 1.2 (10 MHz to 3 GHz) < 1.5 (>3 GHz to 7.5 GHz) <1.9 (>7.5 GHz to 18 GHz)
RF VSWR preamp ON, RSA503A and RSA507A, typical	< 1.5 (10 MHz to 6 GHz, RF ATT=10 dB, preamp on) < 1.7 (> 6 GHz to 7.5 GHz, RF ATT=10 dB, preamp on) <1.9 (>7.5 GHz to 18 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 18.0 GHz, RF Attn ≥ 20 dB) +13 dBm (RF input, 9 kHz to 10 MHz, RF Attn ≥ 20 dB) +20 dBm (RF input, RF Attn < 20 dB)
Maximum safe input power (Preamp On)	+33 dBm (RF input, 10 MHz to 18.0 GHz, RF Attn ≥ 20 dB) +13 dBm (RF input, 9 kHz to 10 MHz, RF Attn ≥ 20 dB) +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)

Sweep speed

Full span sweep speed, typical mean [7]	70 GHz/sec (RBW = 1 MHz) 60 GHz/sec (RBW = 100 kHz) 15.7 GHz/sec (RBW = 10 kHz) 1.7 GHz/sec (RBW = 1 kHz)
Tuning step time via API	≤ 1 ms

Amplitude and RF

Amplitude and RF flatness

Reference level setting range	-170 dBm to +40 dBm, 0.1 dB step, (Standard RF input)

[7] Measured using a Dell Latitude E5540, i7, Windows®7 Pro. Spectrum display is only measurement on screen.

Frequency response at 18 °C to 28 °C (At 10 dB RF Attenuator setting)

Amplitude accuracy at all center frequencies

Center frequency range	18 °C to 28 °C
9 kHz ≤ 3.0 GHz	±0.8 dB
>3 to 7.5 GHz (RSA507A)	±1.5 dB
>7.5 GHz to 13.6 GHz (RSA513A/RSA518A)	±1.55 dB
>13.6 GHz to 18.0 GHz (RSA518A)	±1.55 dB

Amplitude Accuracy at all center frequencies - Preamp on (18 °C to 28 °C , 10 dB RF Attenuator)

Center frequency range	18 °C to 28 °C
200 kHz to ≤3.0 GHz	±1.0 dB
>3 GHz	±3.0 dB

Preamp gain

27 dB at 2 GHz

21 dB at 6 GHz (RSA507A)

25 dB at 10 GHz (RSA513A)

25 dB at 15 GHz (RSA518A)

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 [8]	±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°
>7.5 GHz to 13.6 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>13.6 GHz to 18.0 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>40 MHz to 4 GHz	≤40 MHz	±0.35 dB	0.14 dB	0.8°
>4 GHz to 7.5 GHz	≤40 MHz	±0.40 dB	0.20 dB	1.0°
>7.5 GHz to 13.6 GHz	≤40 MHz	±0.60 dB	0.40 dB	1.5°

Table continued…

8 Span extents cannot exceed lower frequency limit of the instrument

Characteristic		Description		
Measurement center frequency	Span	Amplitude flatness, typical	Amplitude flatness, RMS, typical	Phase linearity, RMS, typical
>13.6 GHz to 18.0 GHz	≤40 MHz	±0.60 dB	0.40 dB	1.5°

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

Trigger events

Power Level within Span (RF power trigger)

Frequency mask (Host)

Time-qualified level (Host)

DPX density (Host)

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.

Frequency mask and DPX density trigger

Frequency mask trigger mask point horizontal resolution: < 0.13 % of span

Frequency mask trigger level range

0 to -80 dB from reference level

Frequency mask trigger level resolution	0.1 dB
Frequency mask trigger level accuracy (with respect to reference level)	± (Channel Response Flatness + 2.5 dB) for mask levels ≥ -50 dB from reference level and >30 dB above the noise floor
Frequency mask trigger timing uncertainty	± (0.5 * Spectrum time)
DPX density trigger area of interest range	2 to 801 pixels (horizontal) x 2 to 201 pixels (vertical)

Noise and distortion

3rd Order IM intercept (TOI)	+14 dBm at 2.130 GHz (RSA503A/RSA507A)
	+12 dBm at 2.130 GHz (RSA513A/RSA518A)

3rd Order IM intercept (TOI),	
Preamp off, typical	+10 dBm (9 kHz to 25 MHz, RSA503A, RSA507A)
	+17 dBm (9 kHz to 25 MHz, RSA513A, RSA517A)
	+15 dBm (25 MHz to 3 GHz)
	+15 dBm (3 GHz to 4 GHz, RSA507A)
	+10 dBm (4 GHz to 7.5 GHz, RSA507A)
	+15 dBm (7.5 GHz to Max CF GHz, RSA513A/RSA518A)
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)
	-15 dBm (7.5 GHz to Max CF, RSA513A/RSA518A)

3rd Order Inter-modulation distortion	-74 dBc at 2.130 GHz (RSA503A/RSA507A)
	-78 dBc at 2.130 GHz (RSA513A/RSA518A)
	Each signal level -25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -20 dBm.

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, RSA507A)
	< -70 dBc (4 GHz to 7.5 GHz, RSA507A)
	< -80 dBc (7.5 GHz to Max CF, RSA513A/RSA518A)
	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, RSA507A)

< -70 dBc (4 GHz to 7.5GHz, RSA507A)

< -80 dBc (7.5 GHz to Max CF, RSA513A/RSA518A)

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)

<-75 dBc (3.75 GHz to 6.8 GHz, RSA513A)

<-75 dBc (6.8 GHz to 9 GHz, RSA518A)

2nd Harmonic distortion, Preamp on

< - 60 dBc (40 MHz to 15.9 GHz), input frequency

2nd Harmonic distortion intercept (SHI)

+35 dBm (40 MHz to 1.5 GHz)

+35 dBm (1.5 GHz to 9 GHz)

2nd Harmonic distortion intercept (SHI), Preamp on

+5 dBm (40 MHz to 15.9 GHz), input frequency

Displayed average noise level (DANL)

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

For the RSA503A and RSA507A:

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 GHz, RSA507A	-153 dBm/Hz	-156 dBm/Hz	-138 dBm/Hz
>4 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

For the RSA513A and RSA518A:

Frequency range	Preamp on	Preamp on, typical
500 kHz to 1 MHz	-138 dBm/Hz	-145 dBm/Hz
1 MHz to 25 MHz	-153 dBm/Hz	-158 dBm/Hz
>25 MHz to 1 GHz	-158 dBm/Hz	-161 dBm/Hz

Table continued…

Frequency range	Preamp on	Preamp on, typical
>1 GHz to 2 GHz	-156 dBm/Hz	-159 dBm/Hz
>2 GHz to 2.75 GHz	-153 dBm/Hz	-157 dBm/Hz
>2.75 GHz to 4 GHz	-149 dBm/Hz	-152 dBm/Hz
>4 GHz to 6 GHz	-155 dBm/Hz	-159 dBm/Hz
>6 GHz to 7.5 GHz	-151 dBm/Hz	-155 dBm/Hz
>7.5 GHz to 14 GHz	-161 dBm/Hz	-165 dBm/Hz
>14 GHz to 14.8 GHz	-159 dBm/Hz	-165 dBm/Hz
>14.8 GHz to 15.2 GHz	-157 dBm/Hz	-161 dBm/Hz
>15.2 GHz to 17.65 GHz	-159 dBm/Hz	-165 dBm/Hz
>17.65 GHz to 18.0 GHz	-157 dBm/Hz	-161 dBm/Hz

Phase noise

Offset	10 kHz	100 kHz	1 MHz
1 GHz CF	-94 dBc/Hz	-94 dBc/Hz	-116 dBc/Hz
10 MHz, typical (RSA503A, RSA507A)	-120 dBc/Hz	-124 dBc/Hz	-124 dBc/Hz
1 GHz CF (typical)	-97 dBc/Hz	-98 dBc/Hz	-121 dBc/Hz
2 GHz CF (typical)	-96 dBc/Hz	-97 dBc/Hz	-120 dBc/Hz
6 GHz CF, typical (RSA507A)	-94 dBc/Hz	-96 dBc/Hz	-120 dBc/Hz
10 GHz, typical (RSA513A, RSA518A)	-89 dBc/Hz	-90 dBc/Hz	-113 dBc/Hz
15 GHz, typical (RSA513A, RSA518A)	-86 dBc/Hz	-87 dBc/Hz	-110 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 Max CF), typical

(Exceptions: <-90 dBm (13.78 GHz to 13.94 GHz))

Spurious response with signal (Image suppression)

< -65 dBc (for RSA513/518A) (10 kHz to Max CF, Ref= -20 dBm, Atten = 10 dB, RF input Level = -20 dBm, RBW = 10 Hz)

< -63 dBc (for RSA503A/507A) (10 kHz to Max CF, Ref= -20 dBm, Atten = 10 dB, RF input Level = -20 dBm, RBW = 10 Hz)

Spurious response with signal at CF

Offset ≥ 1 MHz

Frequency	Span ≤40 MHz, swept spans >40 MHz	
1 MHz - 100 MHz	--	-75 dBc
100 MHz - 3 GHz	-72 dBc	-75 dBc
3 GHz - 7.5 GHz (RSA507A)	-72 dBc	-75 dBc
7.5 GHz to 13.6 GHz (RSA513A/RSA518A)	-72 dBc	-75 dBc

Table continued…

Frequency	Span ≤40 MHz, swept spans >40 MHz	
13.6 GHz to 18.0 GHz (RSA518A)	-72 dBc	-75 dBc

Spurious response with signal at CF

(150 kHz ≤ offset <1 MHz, Span=2 MHz):

Frequency	Typical
1 MHz - 100 MHz	-70 dBc
100 MHz - 3 GHz	-70 dBc
3 GHz - 7.5 GHz (RSA507A)	-70 dBc
7.5 GHz - 13.6 GHz (RSA513A/RSA518A)	-64 dBc
13.6 GHz - 18.0 GHz (RSA518A)	-64 dBc

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
7.5 GHz - 13.6 GHz (RSA513A/RSA518A)	-73 dBc
13.6 GHz - 18.0 GHz (RSA518A)	-73 dBc

Spurious response with signal at half-IF [9]

< -75 dBc, (CF: 30 MHz to Max CF, Ref = -20 dBm, Atten = 10 dB, RBW = 10 Hz, Span = 10 kHz)

Signal frequency = 2310 MHz, RF input level = -20 dBm

Local oscillator feed-through to input connector, typical

< -70 dBm, preamp off.

< -90 dBm, preamp on.

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.

ACLR

ACLR for 3GPP Down Link, 1 DPCH (2130 MHz)

-57 dB (Adjacent Channel)

[9] This is an input signal at half of the IF frequency.

	-68 dB w/Noise Correction (Adjacent Channel) -57 dB (First Alternate Channel) -69 dB w/Noise Correction (First Adjacent Channel)
ACLR LTE	-58 dB (Adjacent Channel) -61 dB w/Noise Correction (Adjacent Channel) -61 dB (First Alternate Channel) -63 dB w/Noise Correction (First Adjacent Channel)

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 46 sec (cold start). -130 dBm input signal power.
Horizontal position accuracy	GPS: 2.6 m Glonass: 2.6 m BeiDou: 10.2 m GPS + Glonass: 2.6 m GPS + BeiDou: 2.6 m Test conditions: 24 hr. static, -130 dBm, full power

Tracking generator (Option 04)

Tracking Generator (Option 04)

Frequency range

Reflection	9 kHz - 3.0 GHz (RSA503A) 9 kHz - 7.5 GHz (RSA507A/513A/518A)
Transmission	10 MHz to 3 GHz (RSA503) 10 MHz to 7.5 GHz (RSA507A/513A/518A)

Sweep speed, typical mean	0.192 sec/sweep, 101 points, 50 kHz RBW, 980 to 1020 MHz sweep (1.9 mS per point) Measured using a Dell Latitude E5540, i7, Windows®7 Pro. Transmission Gain display is only measurement on screen.
Frequency resolution	100 Hz
TG output connector	N type
VSWR	< 1.9:1, 10 MHz to 7.5 GHz, -20 dBm output level
Maximum output power	-3 dBm,10 MHz to 7.5 GHz
Output power level setting range	40 dB, 10 MHz to 7.5 GHz
Output power level step size	1 dB, 10 MHz to 7.5 GHz
Output power level step size accuracy	± 0.5 dB

Harmonics	< -22 dBc, ≥20 MHz
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

SignalVu-PC standard measurements and performance

Measurements included.

General signal analysis	
Spectrum analyzer	Spans from 1 kHz to 18.0 GHz Three traces plus math and spectrogram trace 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 up to 15 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
Signal recording	Record 40 MHz bandwidth gap-free in .r3f file format for re-analysis in all domains including real time spectrum analysis (requires option SV56 installed in PC controller for Playback)
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. Four traces can be saved and recalled; CISPR Quasi-Peak and Average detectors available with option SVQP.
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 (RSA503A) 9 kHz - 7.5 GHz swept (RSA507A) 9 kHz - 13.6 GHz swept (RSA513A) 9 kHz - 18.0 GHz swept (RSA518A)
Maximum acquisition time	2.0 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, TDSCDMA, 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 spectrums per second
DPX bitmap resolution	201 pixels vertical x 801 pixels horizontal
DPX Spectrogram minimum time resolution [10]	1 ms ≤10,000 per second (span independent)
Marker information	Amplitude, frequency, signal density
Minimum signal duration for 100% probability of intercept (POI), typical [11]	15 µs up to 40 MHz span
Span range (continuos 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 4.99 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	1 ms to 6400 s, user selectable

Spectrum and Spurious display

[10] 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.

[11] Subject to differences in host PC performance and 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.

Traces	Three traces + 1 math trace + 1 trace from spectrogram for Spectrum display; four traces for Spurious display
Trace functions	Normal, Average (VRMS), Max Hold, Min Hold, Average of Logs
Detector	Average (VRMS), Average (of logs), CISPR peak, +Peak, Sample for Spectrum only -Peak; when Option SVQP is enabled, CISPR Quasi Peak and Average
Spectrum trace length	801, 2401, 4001, 8001,10401, 16001, 32001, and 64001 points
RBW range	1.18 Hz to 8 MHz for Spectrum display

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

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
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: Modulation rate = 5 kHz AM depth: 50% 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 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 Rate: 1 kHz
Residual SINAD	43 dB	56 dB	40 dB	FM deviation 5 kHz FM deviation 100 kHz Rate: 1 kHz

APCO P25 Measurements Application (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.

Bluetooth Measurements Application (SV27xx-SVPC and SV31xx-SVPC)

Supported standards	Bluetooth® 4.2 Basic Rate, Bluetooth® 4.2 Low Energy, Bluetooth® 4.2 Enhanced Data Rate. Bluetooth® 5 when SV31 is enabled.
Measurements	Peak Power, Average Power, Adjacent Channel Power or InBand Emission mask, -20 dB Bandwidth, Frequency Error, Modulation Characteristics including ΔF_1avg (11110000), ΔF_2avg (10101010), ΔF_2 > 115 kHz, $\Delta F_2/\Delta F_1$ ratio, frequency deviation vs. time with packet and octet level measurement information, Carrier Frequency f_0, 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 (BR and LE), typical mean	Supported measurements: Average power, peak power Level uncertainty: refer to instrument amplitude and flatness specification Measurement range: signal level > –70 dBm
Modulation characteristics, typical mean	Supported measurements: ΔF_1avg, ΔF_2avg, ΔF_2avg/ ΔF_1avg, ΔF_2max%>=115 kHz (basic rate), ΔF_2max%>=115kHz (low energy) Deviation range: ±280 kHz Deviation uncertainty (at 0 dBm): <2 kHz [12] + instrument frequency uncertainty (basic rate) <3 kHz [12] + instrument frequency uncertainty (low energy) Measurement range: Nominal channel frequency ±100 kHz
Initial Carrier Frequency Tolerance (ICFT) (BR and LE), typical mean	Measurement uncertainty (at 0 dBm): <1 kHz [12] + instrument frequency uncertainty Measurement range: Nominal channel frequency ±100 kHz
Carrier Frequency Drift (BR and LE), typical mean	Supported measurements: Max freq. offset, drift f_1- f_0, max drift f_n-f_0, max drift f_n-f_{n-5} (BR and LE 50 µs) Measurement uncertainty: <1 kHz + instrument frequency uncertainty Measurement range: Nominal channel frequency ±100 kHz
In-band emissions (ACPR) (BR and LE)	Level uncertainty: refer to instrument amplitude and flatness specification

General-purpose digital modulation analysis (SVMxx-SVPC)

Modulation formats	BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 1024QAM, π/2DBPSK, DQPSK, π/4DQPSK, D8PSK, D16PSK, SBPSK, OQPSK, SOQPSK, 16-APSK, 32-APSK, MSK, CPM, 2FSK, 4FSK, 8FSK, 16FSK, C4FM
Analysis period	Up to 163,500 samples
Filter rolloff factor	α : 0.001 to 1, in 0.001 steps
Vector diagram display format	Symbol/locus display, Frequency Error measurement, Origin Offset measurement

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 versus. Time showing Transmitter OFF power for TDD signals and LTE constellation diagram for Primary Synchronization Signal and Secondary Synchronization Signal with Cell ID, Group ID, Sector ID, RS (Reference Signal) Power and Frequency Error.

[12] At nominal power level of 0 dBm

5G NR Uplink/Downlink measurements (5GNRNL-SVPC)

Standard supported
TS 38.141-1 for BS and 38.521-1 for UE

Modulation accuracy
Sec 6.5.2 for BS and Sec 6.4.2 for UE.

ACP
Sec 6.6.3 for BS and Sec 6.5.2.4 for UE

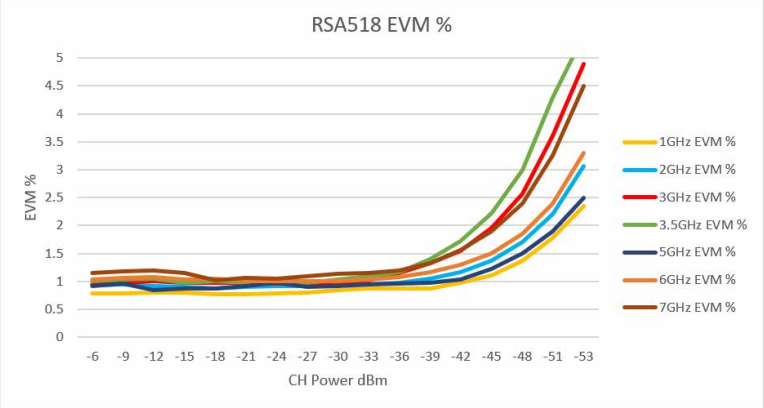
Frame format supported
Uplink (FDD and TDD)
Downlink (FDD and TDD)

Measurements and displays supported
Channel Power (CHP), Adjacent Channel Power (ACP), Power Vs Time (PVT)[1], Modulation Accuracy (including Error Vector Magnitude (EVM), Frequency Error, IQ Error), EVM vs. Symbol, Occupied Bandwidth (OBW), Spectral Emission Mask (SEM), Constellation Diagram, and summary table with scalar results.

EVM (typical)

20 MHz 1CC, 256QAM UL, 30 kHz subcarrier spacing					
1 GHz	2 GHz	3.5 GHz	5 GHz	6 GHz	7 GHz
0.78%	0.93%	1.04%	0.87%	1.01%	1.05%

For RSA518 Series Spectrum Analyzers: ≤ 39.2 dB rms EVM from 1 GHz to 7 GHz for 20 MHz CC1, 256 QAM, -6 dBm to -33 dBm channel power, within -1 dB of full scale.



ACLR (typical)
< -48 dBc for 20 MHz CC1, 256 QAM, -6dBm to -27 dBm channel power, within -1 dB of full scale < 7GHz

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)
Pulse-Ogram™ waterfall display of multiple segmented captures, with amplitude vs time and spectrum of each pulse. Pulse frequency, Delta Frequency, 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 (dB), Ripple (%), Droop (dB), Droop (%), Overshoot (dB), Overshoot (%), Pulse- Ref Pulse frequency difference, Pulse- Ref Pulse phase difference, Pulse- Pulse frequency difference, Pulse- Pulse phase difference, RMS frequency error, Max frequency error, RMS phase error, Max phase error, Frequency deviation, Phase deviation, Impulse response (dB), Impulse response (time), Time stamp.
Minimum pulse width for detection, typical	150 ns
Average on power at 18 °C to 28 °C, typical	±0.4 dB + absolute amplitude accuracy 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 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 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 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 For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB

Playback of recorded signals (SV56)

Playback file type	R3F recorded by RSA306, RSA500, or RSA600
Recorded file bandwidth	40 MHz
File playback controls	General: Play, stop, exit playback Location: Begin/end points of playback settable from 0-100% Skip: Defined skip size from 73 µs up to 99% of file size Live rate: Plays back at 1:1 rate to recording time Loop control: Play once, or loop continuously
Memory requirement	Recording of signals requires storage with write rates of 300 MB/sec. Playback of recorded files at live rates requires storage with read rates of 300 MB/sec.

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); spectralflatness 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 5.8 GHz, 20 MHz BW: -38 dB 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 % 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); spectralflatness vs. symbol (or time), vs. subcarrier (or frequency)
EVM performance - 802.11n, 64-QAM, typical	2.4 GHz, 40 MHz BW: -39 dB 5.8 GHz, 40 MHz BW: -38 dB 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); spectralflatness vs. symbol (or time), vs. subcarrier (or frequency)
EVM performance - 802.11ac, 256-QAM, typical	5.8 GHz, 40 MHz BW: -38 dB Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each

EMC pre-compliance and troubleshooting (EMCVUxx-SVPC)

Standards	EN55011, EN55012, EN55013, EN55014, EN55015, EN55025, EN55032, EN60601, DEF STAN, FCC Part 15, FCC Part18, MIL-STD 461G
Features	EMC-EMI display, Wizard to setup accessories and limit lines, Inspect, Harmonic Markers, Level Target, Compare Traces, Measure Ambient, Report generation, Re-measure Spot
Detectors	+Peak, Avg, Avg (of logs), Avg (VRMS), CISPR QuasiPeak, CISPR Peak, CISPR Average, CISPR Average of Logs, MIL +Peak, DEF STAN Avg, DEF STAN Peak
Limit lines	Up to 3 Limit Lines with corresponding margins
Resolution BW	Set per standard or user definable
Dwell time	Set per standard or user definable
Report format	PDF, HTML, MHT,RTF, XLSX, Image File format
Accessory type	Antenna, Near Field Probe, Cable, Amplifier, Limiter, Attenuator, Filter, Other
Correction format	Gain/Loss Constant, Gain/loss table, Antenna Factor
Traces	Save/recall up to 5 traces, Math trace (trace1 minus trace2), Ambient trace

Return Loss, Distance-to-Fault, and Cable Loss measurements

Measurements	Return Loss, Cable Loss, Distance-to-Fault (DTF)
Frequency range	10 MHz to 3 GHz (RSA503A) 10 MHz to 7.5 GHz (RSA507A/513A/518A)
Sweep speed [13]	5 ms/point, Return Loss measurement 5 ms/point, Distance-to-Fault measurement 5 ms/point, Cable Loss measurement
Frequency resolution	500 Hz
Return Loss measurement error	Return Loss of 0 to 15 dB: ±0.5 dB Return Loss of 15 to 25 dB: ±1.5 dB Return Loss of 25 to 35 dB: ±4.0 dB

[13] 201 point sweep Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro. Return Loss, Cable Loss, or Distance-to-Fault display is the only measurement on screen.

Return Loss measurement error at 14 dB Return Loss	±1.5 dB from 10 MHz to 6.8 GHz ±3.0 dB from 6.8 GHz to 7.5 GHz
Return Loss measurement range	50 dB
Interference immunity	Return Loss Measurement Error within specifications for the following conditions: +5 dBm interferer power within 800 kHz of measurement point +5 dBm interferer power more than 800 kHz away from measurement point (High power test level. Interferer not included in accuracy assessment.)
Distance-to-Fault range	1500 m or 15 dB one-way cable loss capable, user defined Maximum range is a function of the cable velocity factor and the frequency step size as follows: $\text{Range} = \left(\frac{Vp \times c}{2}\right) \times \left(\frac{N-1}{F_{stop} - F_{start}}\right)$ Where: V_p = Cable velocity factor relative to the speed of light c = Speed of light (m/s) F_{start} = Sweep start frequency (Hz) F_{stop} = Sweep stop frequency (Hz) N = number of sweep points
Distance-to-Fault resolution	RSA503A, (RG-58Vp=0.66): 0.03 m (User Definable) RSA507A, (RG-58Vp=0.66): 0.01 m (User Definable) Minimum resolution is a function of the cable velocity factor and the frequency step size as follows: $\text{Resolution} = \left(\frac{Vp \times c}{2}\right) \times \left(\frac{1}{F_{stop} - F_{start}}\right)$ or $\text{Resolution} = \left(\frac{\text{Range}}{N-1}\right)$

Input and output ports

Inputs, outputs, and inferfaces

RF input	RSA503A/507A: N type, female RSA513A/518A: N type, female (ships standard with this connector) RSA513A/518A: Planar Crown, 50 Ω. Users can select this connector instead of the N type in order to select the connector that best fits their applications. (Users can use adapters compatible with the planar crown that best fits their application.)
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
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	2.5 mm 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) [14]: -10 °C to +45 °C (14 °F to 113 °F) [15] Charging: 0 °C to 45 °C (32 °F to 113 °F)
Battery storage life	two years at +20 °C (68 °F) nominal Max storage duration between recharge: 10 months @ +20 °C (68 °F)

Physical characteristics

Height	67.3 mm (2.65 in)
Width	299.1 mm (11.78 in)
Depth	271.3 mm (10.68 in)
Net weight	RSA503A/507A: 2.54 kg (5.6 pounds) without battery 2.99 kg (6.6 pounds) with battery RSA513A/518A: 3.40 kg (7.5 pounds) without battery 3.85 kg (8.5 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)[14] : -10 °C to +45 °C (+14 °F to +113 °F)[15] 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

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

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

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

Instrument models

RSA503A: USB real time spectrum analyzer, 9 kHz - 3.0 GHz, 40 MHz acquisition bandwidth

RSA507A: USB real time spectrum analyzer, 9 kHz - 7.5 GHz, 40 MHz acquisition bandwidth

RSA513A: USB real time spectrum analyzer, 9 kHz - 13.6 GHz, 40 MHz acquisition bandwidth

RSA518A: USB real time spectrum analyzer, 9 kHz - 18.0 GHz, 40 MHz acquisition bandwidth

The RSA500 Series instruments require a PC with Windows 7, Windows 8/8.1, Windows 10 or Windows 11, 64-bit operating system and a USB 3.0 connection. 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 or greater 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), API and documentation files. A GPS antenna is not included with the instrument. See Accessories for available GPS antennas.

Instrument options

Option	Description
Option 04[16]	Tracking generator: • 10 MHz to 3 GHz (RSA503A) • 10 MHz to 7.5 GHz (RSA507A, RSA513A, and RSA518A)

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

[16] Tracking Generator must be ordered at the time instrument is ordered.

Language options for the RSA500

Opt. L0	English manual
Opt. L1	French manual
Opt. L2	Spanish manual
Opt. L3	Japanese manual
Opt. L4	Portuguese manual
Opt. L5	Simplified Chinese manual
Opt. L6	Korean manual
Opt. L7	Russian manual

RSA500A 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. R5	Repair Service 5 Years (including warranty)

Warranty

RSA500 Series warranty: Three years.

Licenses

A variety of optional, licensed applications are available for purchase for SignalVu-PC. These licenses can be associated with and stored on either your PC or any RSA300 Series, RSA500 Series, RSA600 Series, and RSA7100A spectrum analyzers. Licenses can be purchased as an option to your hardware or separately as a Node-locked or a Floating license.

Contact your local Tektronix Account Manager to purchase a license. If your purchased license is not ordered as an option to your instrument, you will receive an email with a list of the applications purchased and the URL to the Tektronix Product License Web page, where you will create an account and can then manage your licenses using the Tektronix Asset Management System (AMS):*www.tek.com/products/product-license*.

AMS provides an inventory of the license(s) in your account. It enables you to check out or check in a license and view the history of licenses.

Optional applications are enabled by one of the following license types.

License type	Description
Node locked license (NL) purchased as an option to your instrument	This license is initially assigned to a specific host id, which can be either a PC or an instrument. It can be reassociated to either a PC or another spectrum analyzer two times using Tek AMS. When associated with an instrument, this license is factory-installed on that instrument at the time of manufacture. It will be recognized by any PC operating with SignalVu-PC when the instrument is connected. However, the licensed application is deactivated from the PC if the licensed instrument is disconnected. This is the most common form of licensing, as it simplifies management of your applications.

Table continued…

License type	Description
Node locked license (NL) purchased separately	This license is initially assigned to a specific host id, which can be either a PC or an instrument. It can be reassociated to either a PC or instrument two times using Tek AMS. This license is delivered via email and is associated with either your PC or with an instrument when you install the license. This license should be purchased when you want your license to stay on your PC, or if you have an existing USB instrument on which you would like to install a license.
Floating license(FL) purchased separately	This license can be moved between different host ids, which can be either PCs or instruments. It can be reassociated to different PCs or instruments an unlimited number of times using Tek AMS. This license is delivered via email and is associated with either your PC or with an instrument when you install the license. This is the most flexible license and is recommended in applications where the license needs to be moved frequently.

SignalVu-PC application-specific modules

The following SignalVu-PC license options are available.

Application license	License type	Description
SVANL-SVPC	NL	AM/FM/PM/Direct Audio Analysis
SVAFL-SVPC	FL	
SVTNL-SVPC	NL	Settling Time (frequency and phase) measurements
SVTFL-SVPC	FL	
SVMNL-SVPC	NL	General-purpose digital modulation analysis
SVMFL-SVPC	FL	
SVPNL-SVPC	NL	Advanced pulse radar analysis
SVPFL-SVPC	FL	
SVONL-SVPC	NL	Flexible OFDM Analysis
SVOFL-SVPC	FL	
SV23NL-SVPC	NL	WLAN 802.11a/b/g/j/p measurements
SV23FL-SVPC	FL	
SV24NL-SVPC	NL	WLAN 802.11n measurements (requires SV23)
SV24FL-SVPC	FL	
SV25NL-SVPC	NL	WLAN 802.11ac measurements (requires SV23 and SV24)
SV25FL-SVPC	FL	
SV26NL-SVPC	NL	APCO P25 measurements
SV26FL-SVPC	FL	
SV27NL-SVPC	NL	Bluetooth 4.2 measurements
SV27FL-SVPC	FL	

Table continued…

Application license	License type	Description
SV31NL-SVPC	NL	Bluetooth 5 measurements (requires SV27)
SV31FL-SVPC	FL	
MAPNL-SVPC	NL	Mapping
MAPFL-SVPC	FL	
SV56NL-SVPC	NL	Playback of recorded files (installed in PC controller only)
SV56FL-SVPC	FL	
CONNL-SVPC	NL	Live connection and base SignalVu-PC VSA measurements using the 5 or 6 Series B MSO or LPD64 (requires opt. SV-RFVT)
CONFL-SVPC	FL	
SV2CNL-SVPC	NL	Bundle of WLAN 802.11a/b/g/j/p/n/ac (SV23, SV24, and SV25) and Live Connect (CON) to 5/6 Series MSO or LPD64 (requires opt. SV-RFVT)
SV2CFL-SVPC	FL	
SV28NL-SVPC	NL	LTE Downlink RF measurements
SV28FL-SVPC	FL	
5GNRNL-SVPC	NL	5G NR Uplink/Downlink RF Power, Bandwidth, Demodulation, and Error Vector Magnitude Measurements[17]
SV54NL-SVPC	NL	Signal survey and classification
SV54FL-SVPC	FL	
SV60NL-SVPC	NL	Return loss, distance to fault, VSWR, cable loss (requires Option 04 on RSA500A/600A)
SV60FL-SVPC	FL	
SV30NL-SVPC	NL	WiGig 802.11ad/ay measurements (only for offline analysis)
SV30FL-SVPC	FL	
EMCVUNL-SVPC	NL	EMC pre-compliance and troubleshooting (includes EMI CISPR detectors)
EMCVUFL-SVPC	FL	
SVQPNL-SVPC	NL	EMI CISPR detectors
SVQPFL-SVPC	FL	
EDUFL-SVPC	FL	Education-only version with all SignalVu-PC modules except 5GNR

Recommended accessories

Tektronix offers a wide variety of adapters, attenuators, cables, impedance converters, antennas and other accessories for the RSA500A 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)

[17] The 5GNR license is available as a standalone item, not as an option to your hardware, therefore it is considered a post-purchase upgrade and not installed at the time of purchase of the instrument.

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	
119-8733-00	Antenna, Active. GPS & GLONASS, magnetic mount, 5M cable, 3V, 8ma SMA connector, RG-174 Cable
119-8734-00	Antenna, Active, GPS and Beidou, magnetic mount, 5M cable, 3V, 8ma SMA connector, RG-174 Cable
DF-A0047	Directional antenna, available from Alaris *www.alarisantennas.com/* 20-8500 MHz, with electronic compass and preamp [18]
016-2107-00	Transit case for DF-A0047 and DF-A0047-01[18]
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

[18] Not available in China, Japan, New Zealand, Australia, Russia, Belarus, Kazakhstan

E/H field probes, lower cost alternative	Available from Beehive *beehive-electronics.com/*
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
EMI-NF-PROBE	Near Field Probe set (Tebox TBPS01)
Additional batteries and Cables	
065-1004-00	Replacement battery pack for RSA500A Series
016-2109-01	Additional soft carry-case with shoulder strap
174-6810-00	Additional USB 3.0 cable (2 M), A-A connection, screw lock

Recommended third party equipment and accessories

EMC accessories available from Com-Power *www.com-power.com*:

CLCE-400	RF current probe 10 kHz to 400 MHz
ABF-900A	Biconical antenna 25 MHz to 300 MHz
ALC-100	Compact Log Periodic antenna 300 MHz to 1 GHz
PAM-103	Preamplifier 1 MHz to 1 GHz
AT-812	Antenna Tripod 0.8 to 1.5m height range

EMC accessories available from Tekbox *www.tekbox.com*:

TBPS01	Near field probe set, H20, H10, H5, and E5
TBCP1-150	RF current monitoring probe 10 kHz to 250 MHz
TBLC08	Line impedance stabilization network (LISN) 50uH AC
TBOH01	Line impedance stabilization network (LISN) 5uH DC
TBFL1	Transient limiter 150 kHz to 30 MHz
TBWA2	Near field probe amplifier 20 dB

Spectrum monitoring and direction-finding antennas from Alaris Antennas *www.alarisantennas.com*:

DF-A0047	Directional antenna, 20-8500 MHz, with electronic compass and preamp
DF-A0047-01	Frequency range extension for DF-A0047 directional antenna, 9 kHz-20 MHz Upgrade

Calibration kits from SPINNER *products.spinner-group.com*

533863R000	Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, Type-N(f), 50 ohm
533864R000	Calibration kit, 3-in-1, open, short, load, DC to 6 GHz, Type-N(m), 50 ohm

Transit cases available from Pelican *www.pelican.com* and associated distribution partners

IM2720	Pelican hard transit case, 22" × 17" × 10" interior

Tracking generator accessories

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

Calibration kits can be used to improve the factory calibration of the tracking generator when equipped with application SV60-Return loss, VSWR, cable loss, and distance to fault.

These phase-stabilized cables are high performance cables that are phase-stable to +- 2 degrees at 7.5 GHz, with return loss less than -20 dB. Velocity constant is 0.78. Loss at 7.5 GHz specified to be less than -1.05 dB (0.6 m), -1.61 dB (1.0 m), -2.30 dB (1.5m) (all values nominal).

Calibration kits	Recommended calibration kits available from Spinner at *products.spinner-group.com/rf/test-measurement/vna-test-measurement*
Phase-stabilized cables	
012-1745-00	Type-N (m) to type-N (f), 5 ft or 1.5 m
012-1746-00	Type-N(m) to type-N(m), 5 ft or 1.5 m
012-1747-00	Type-N(m) to 7/16(f), 60 cm (23.6 in.)
012-1748-00	Type-N(m) to 7/16(f), 3.28 ft or 1 m
012-1749-00	Type-N(m) to 7/16(f), 5 ft or 1.5 m
012-1750-00	Type-N(m) to 7/16(m), 3.28 ft or 1 m
012-1751-00	Type-N(m) to 7/16(m), 5 ft or 1.5 m
012-1752-00	Type-N(m) to 7/16(m), 60 cm (23.6 in.)
012-1753-00	Type-N(m) to DIN 9.5(f), 60 cm (23.6 in.)
012-1754-00	Type-N(m) to DIN 9.5(f), 3.28 ft or 1 m
012-1755-00	Type-N(m) to DIN 9.5(f), 5 ft or 1.5 m
012-1756-00	Type-N(m) to DIN 9.5(m), 3.28 ft or 1 m
012-1757-00	Type-N(m) to DIN 9.5(m), 5 ft or 1.5 m
012-1758-00	Type-N(m) to DIN 9.5(m), 60 cm (23.6 in.)
012-1759-00	Type-N(m) to TNC(f), 3.28 ft or 1 m
012-1760-00	Type-N(m) to TNC(f), 5 ft or 1.5 m
012-1761-00	Type-N(m) to TNC(f), 60 cm (23.6 in.)
012-1762-00	Type-N(m) to TNC(m), 60 cm (23.6 in.)
012-1763-00	Type-N(m) to TNC(m), 3.28 ft or 1 m
012-1764-00	Type-N(m) to TNC(m), 5 ft or 1.5 m
012-1765-00	Type-N(m) to type-N(f), 60 cm (23.6 in.)
012-1766-00	Type-N(m) to type-N(f), 3.28 ft or 1 m
012-1767-00	Type-N(m) to type-N(m), 3.28 ft or 1 m
012-1768-00	Type-N(m) to type-N(m), 60 cm (23.6 in.)
012-1769-00	Type-N(m) to type-SMA(f), 60 cm (23.6 in.)
012-1770-00	Type-N(m) to type-SMA(f), 3.28 ft or 1 m
012-1771-00	Type-N(m) to type-SMA(f), 5 ft or 1.5 m
012-1772-00	Type-N(m) to type-SMA(m) 60 cm (23.6 in.)
012-1773-00	Type-N(m) to type-SMA(m), 3.28 ft or 1 m
012-1774-00	Type-N(m) to type-SMA(m), 5 ft or 1.5 m

Tektronix is ISO 14001:2015 and ISO 9001:2015 certified by DEKRA.

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

Bluetooth is a registered trademark of Bluetooth SIG, Inc.

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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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