

USB Spectrum Analyzers and SignalVu-PC

FREQUENTLY ASKED QUESTIONS



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Introduction

This document contains answers to questions about the RSA306/306B, RSA500A and RSA600A USB spectrum analyzers, and their associated SignalVu-PC software.

PC Recommendations for USB spectrum analyzers and SignalVu-PC

The Tektronix USB 3.0 Real-Time Spectrum Analyzers require a PC for operation. This document outlines the requirements for a PC to operate the analyzers, and provides selection advice and a list of tested PCs to use as guidance in your selection.

The requirements break into separate parts, depending upon how complete you need your capabilities to be. These parts are **general system requirements, real time spectrum analysis, and streaming operation.**

General System Requirements: Windows 7, Windows 8/ 8.1/10 64-bit operating system and a SuperSpeed USB 3.0 connection is required for operation. 8 GB RAM and 20 GB free drive space is required for installation of SignalVu-PC.

Real-Time spectrum analysis: To meet the specification of 100 usec minimum signal duration with 100% probability of intercept using the DPX spectrum display, a PC with an Intel i7 4th generation processor is required. Intel is now on their 5th generation of i7 processors, and in some cases a 5th-generation i5 can perform at full real time speeds. See the list of PCs for known good processor/computer combinations. Using a lower-performance PC will result in reduced real-time performance and limited AM/FM demodulation and listening, but standard spectrum and vector analysis should still operate.

Streaming operation (Record and Playback): USB spectrum analyzers can stream amplitude samples directly to a storage device for later review. The storage device must be capable of streaming storage of 300 MB/sec. This means that either a solid-state drive with 300 MB/sec write speed, or a RAID arrangement of spin drives capable of 300 MB/sec is required. If streaming of data to the hard drive is not important to you, this requirement does not need to be met with your PC. SignalVu-PC with Option SV56 (Playback of recorded signals) requires a storage device capable of reading out data at 300 MB/sec to maintain Live Rate playback. A mode in the play back called Skip-Free can use storage media that is slower than 300 MB/sec, but Live Rate playback will contain gaps. AM/FM listening can only be performed using Live Rate playback rate.

WHAT PC SHOULD I USE?

Any PC that meets the performance requirements should work. Your selection should take into account your operating environment, application and budget. Tektronix doesn't make a specific recommendation, but a list of models we've evaluated is shown in Table 1. In some cases, we've found an Intel core i5-based tablet (Surface 3 Pro, Surface 4 Pro and Panasonic FZ-G1) or laptop (Apple MacBook Air) that do meet minimum signal duration specifications. As new processors are introduced, more i5 machines will be able to meet the minimum signal duration specifications.

The Apple MacBook Air is included on the list. The MacBook, using Bootcamp, can operate as a fully functional PC. See <http://www.apple.com/support/macbook/bootcamp/> for details on this.

Manufacturer	Model	Processor	Meets Minimum Signal Duration Specification?	Meets Streaming Data Requirement?
Dell	XPS15-6842sLV	Intel corei7-4702HQ 2.2GHz	Yes	No (spin drive)
Lenovo	Yoga 2 Pro	Intel corei7-4500U 1.8GHz	Yes	No (spin drive)
Microsoft	Surface 3 Pro	Intel core i7-5650U 1.7-2.3 GHz	Yes	Yes
Microsoft	Surface 3 Pro	Intel corei5-4300U 1.7-2.5 GHz	Yes	Yes
Motion Computing	F5te	Intel core i7-3667 2.00 GHz	Yes	Yes
Lenovo	Think Pad	Intel core i7 3632QM 2.2 GHz	Yes	No (spin drive)
Panasonic	ToughPad FZ-G1 2015	Intel corei5 4310Y	Yes	Yes
Dell	Latitude E7440 Ultrabook	Intel Core i7-4600U 2.1 GHz	Yes	Yes (solid-state drive)
Apple	MacBook Air mid-2013 with Bootcamp Windows	1.3 GHz Intel Core i5	Yes	Yes (solid-state drive)

TABLE 1. List of PCs that tested with SignalVu-PC, February 2015.

CAN I ADD A USB 3 CARD TO MY EXISTING DESKTOP COMPUTER TO WORK WITH MY USB SPECTRUM ANALYZER?

Yes. We've used and recommend the StarTech PEXUSB3S400. If that card is not acceptable, then look for

1. A PCI Express 2.0 or later bus standard
2. A x4 or larger PCI interface (x1 cards do NOT have sufficient throughput for curveball)
3. Separate power connector to power the card from the power supply instead of the bus

WHAT HAPPENS IF I DON'T MEET ALL OF THE REQUIREMENTS WITH MY PC?

Processors of lower performance can be used, with reduced real time performance. This means that the minimum signal duration for 100% probability of intercept will increase, and the performance of AM/FM demodulation and listening will be degraded.

Older and/or lower performance PCs may also have slower drives, smaller drive caches, slower memories and slower busses, all of which may contribute to reduced performance. You may see slower updates rates, slower sweep times and long pauses in processing.

WHAT IF MY DISK DRIVE DOESN'T MEET THE WRITE-SPEED REQUIREMENT FOR STREAMING?

If a disk drive with sustained streaming write/read rates <300 MB/sec is used, you will not be able to stream data to the drive without gaps, or play back the signal at live rates without gaps. The unit will still write to the drive, but it will not be seamless. All other functions will work, including capturing and storing up to 1 second of data with SignalVu-PC. There are no spin-drives that meet the requirement for write speed. Many solid-state drives meet the requirement. The write speed of your drive can be determined from the manufacturer's specifications.

WILL A HYBRID SOLID-STATE PLUS SPIN DRIVE WORK FOR STREAMING?

Probably not. A hybrid drive has some solid-state memory, and during the time that memory is used, the read/write rate is very fast. However, once the memory starts to use the spin-drive portion of the device, read and write rates will become unacceptably slow, and gaps will occur in recording or playback.

Instrument	Panasonic Battery	Measurement	Run time to 10% battery, minutes	Toughpad Operating Conditions
RSA507A	Standard	DPX Spectrum	138	<ul style="list-style-type: none"> • Bluetooth: OFF • WLAN: OFF • Power mode: “Panasonic Standard Power Management” in the default settings. Then set to “never turn off display” and “never go to sleep” • Backlight brightness at 50% • SV-PC running, Panasonic dash board app running (to monitor battery charge)
RSA507A	Extended	DPX Spectrum	299	
RSA507A	Standard	Spectrum	234	
RSA507A	Extended	Spectrum	524	

TABLE 2.

HOW LONG WILL MY LAPTOP OR TABLET BATTERIES LAST WHILE OPERATING THE SPECTRUM ANALYZER?

This depends upon the spectrum analyzer, the measurements being made, and the tablet or laptop used. The RSA306/B draws about 4.5 Watts from your PC. The RSA500A does not draw power from your PC, so your batteries will last longer.

SignalVu-PC will load the processors of the PCs to varying levels, depending upon what analysis is being performed. DPX real-time spectrum/spectrogram and AM/FM audio listening will heavily load your PC processor.

RSA306/B: Tablets such as the Surface Pro 3 and Motion Computing F5te both ran the RSA306 with continuous DPX processing for about 80-90 minutes before reaching 10% remaining battery capacity. A business-class laptop may run the system with continuous DPX processing for 3-4 hours. Using DPX and AM/FM listening sparingly can add 50-100% to these times.

RSA500A: When used with the Panasonic FZ-G1, the rundown times shown in Table 2 were measured. The FZ-G1 as shipped from Tektronix contains the standard battery, and the extended-life battery is an available accessory. Measurements tested were the DPX spectrum, and the standard spectrum display.

WHAT USB CABLE CAN I USE WITH THE RSA306? WHAT'S THE LONGEST USB CABLE I CAN USE?

The instrument ships with a 1M USB 3.0 cable with screw-locks for a positive connection to the instrument. A 0.5M cable with screw locks is available separately from Tektronix.

If a longer cable is needed, take care to purchase a high quality cable. The instrument is powered by the cable, and draws about 800 milliamps when operating. Lower quality cables will have higher resistance, and the voltage drop that results may cause the unit to be unable to operate. We have successfully used the Amazon Basics 9 foot USB cable with several laptops. However, the PC used must have a robust USB power supply to operate over a long cable.

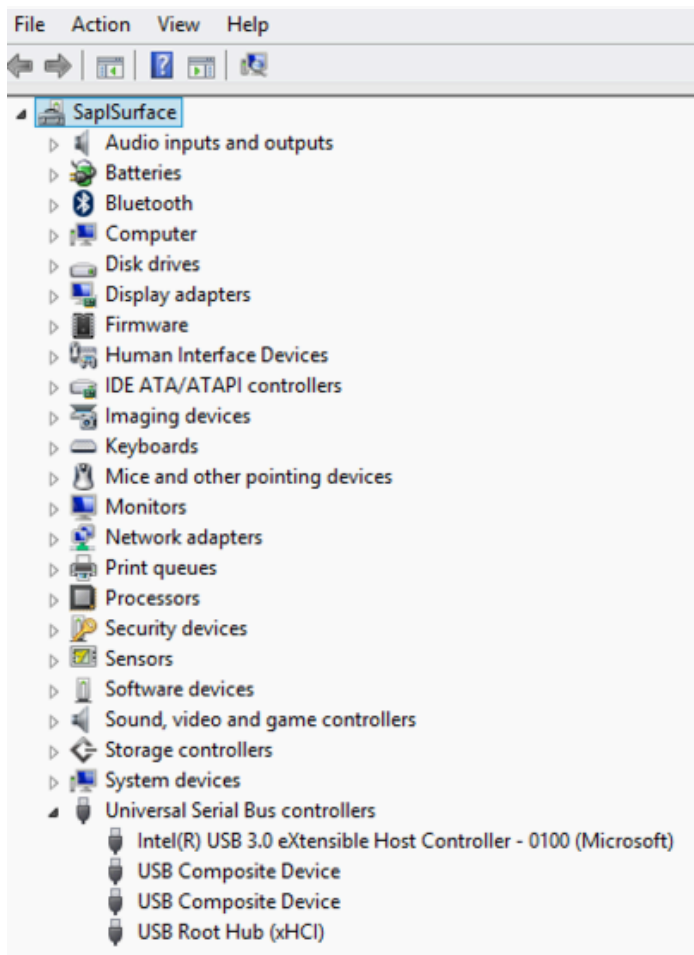
WHAT USB CABLE CAN I USE WITH THE RSA500/600?

These instruments ship with a USB 3.0 A-A cable, one end of which has a screw-on capture device to attach the cable securely to the instrument. Any USB 3.0 A-A connector can be substituted for this connector if necessary.

HOW CAN I TELL IF MY PC IS USB 3.0? WHAT ARE THE USB 3.0 MARKINGS ON THE CONNECTORS?

The best way is to ask Windows. In Windows 7, from the Start button, open Control Panel and select Device Manager. In Windows 8, search on 'Device Manager', select it and look for USB 3.0 as shown below

The USB installation is detailed in Universal Serial Bus Controllers. An example is shown below.



It may be that not all of your USB connections are USB 3.0. Frequently (but not always), the USB connector is blue and/or has the 'SS' or '3.0' designator written on it. There are four internal lines on the connector, but some USB 2.0 connectors also have 4 lines. You may also see a 'lightning bolt' printed near the connector: The lightning bolt does not designate USB 3.0, it just means that the port is powered and can charge devices when the PC is powered off.

SignalVu-PC SVE

SIGNALVU-PC-SVE OPTION SVE USED TO BE A PAY-FOR-OPTION IN THE SOFTWARE. WHAT HAPPENED TO IT? HOW DO I GET IT?

SignalVu-PC SVE Option SVE is now standard in the SignalVu-PC installation and is now a free download from www.tek.com. No option key is needed for the functions in the old Option SVE.

WHAT ABOUT ALL THE OPTIONS ON SIGNALVU-PC? WHAT HAS CHANGED?

In December 2015, we changed how SignalVu-PC applications (formerly options) are ordered, and introduced floating options. The new applications are described in the current literature for the RSA3/5/600s and the SignalVu-PC data sheet. If you have a previously purchased option, it still works in the latest versions of SignalVu-PC. Use the Tools: Licenses: Legacy menu in SignalVu-PC to manage your licenses.

WILL THE NEW SIGNALVU-PC WORK WITH THE LIVE LINK OPTION (OPTION CON) TO CONTROL THE MD04KB?

Yes, all options in previous versions of SignalVu-PC are supported.

WILL THE NEW SIGNALVU-PC SOFTWARE READ MD04KB TIO FILES?

Yes.

WILL THE NEW SIGNALVU-PC SOFTWARE READ MD03K AND MD04K TIO FILES?

Yes, but the IQ data is not calibrated. This is not a change from previous versions.

SIGNALVU-PC-SVE WAS ORIGINALLY INTRODUCED WITH SUPPORT FOR 32 AND 64-BIT WINDOWS. THE NEW VERSION IS 64-BIT ONLY. CAN I GET THE OLD VERSION?

Yes. An archive version of SignalVu-PC SVE 32-bit is available on Tektronix.com/downloads. However, new options, such as mapping, APCO P25, LTE and Playback of recorded files are not available in the 32-bit version.

IF I PURCHASE APPLICATION LICENSES FOR SIGNALVU-PC, CAN I ACTIVATE THEM WITHOUT AN INTERNET CONNECTION?

No, a connection is required. After purchasing a license, 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.

The product license page 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. For a full description of the procedure, search SignalVu-PC help for licenses and select 'How to purchase and activate new licenses'

CAN I TRANSFER MY PURCHASED LICENSE FROM ONE PC TO ANOTHER?

If you have purchased a Node-locked license, you can move the license twice, providing use on up to 3 machines serially. If you have purchased a Floating license, you can freely move between any number of PCs. Both Node-locked and Floating license moves are facilitated in the Tektronix Asset Management system.

CAN I TRANSFER MY PURCHASED LICENSE FROM ONE PC TO ANOTHER WITHOUT AN INTERNET CONNECTION?

No. Connection to the Tektronix Asset Management System is required.

Installation, USB Drivers and TekVISA

THE INSTALLATION ASKS IF I WOULD LIKE TO INSTALL TEKVISA. WHAT IS TEKVISA?

TekVISA is the Tektronix implementation of the Virtual Instrument Software Architecture (VISA). VISA is a widely used application programming interface used in the test and measurement industry for communicating with instruments from a PC. The VISA standard includes specifications for communication with instruments via interfaces such as GPIB, VXI, LAN, USB and other interfaces.

IS TEKVISA REQUIRED? WHY WOULD I WANT TO INSTALL TEKVISA?

TekVISA is not required for manual operation of SignalVu-PC, or for communication with the API. However, if you would like to programmatically control SignalVu-PC, TekVISA is required. Also, SignalVu-PC application MAPxx-SVPC communicates to the SignalVu-PC software via TekVISA.

WHERE DO I GET THE USB DRIVER FOR MY INSTRUMENT?

It is installed when you install SignalVu-PC SVE or the application programming interface. The driver is also available separately on the USB thumb-drive included with the instrument.

THE GREEN LED IS ON BUT I CAN'T CONNECT

After installation of SignalVu-PC and the Tektronix USB driver, I cannot get the instrument to be found with SignalVu-PC Live Link.

The first time connecting to the instrument may require up to 30 seconds for SignalVu-PC to find the instrument. Subsequent links will occur faster.

To troubleshoot connection issues, first make sure that the Tektronix USB driver is installed. To do this:

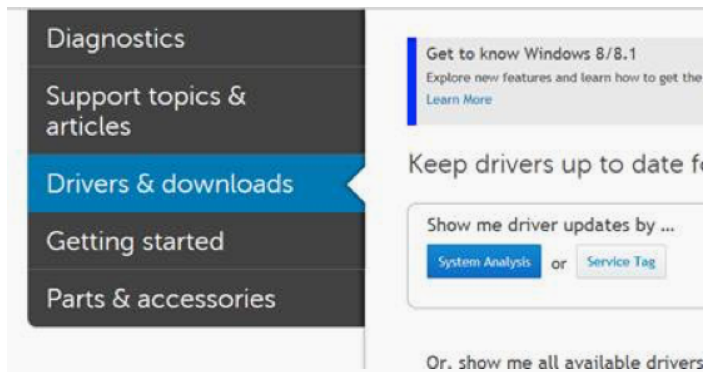
- Open device manager
 - If you can't open device manager then you may not have sufficient access rights to install SignalVu-PC. If you do not have administrator privileges, it is possible that the Tektronix USB driver will not install correctly.
- Look in "Universal Serial Bus controllers"
 - If "Tektronix RSA306 " is not found – you will need to update the USB3.0 drivers from the motherboard manufacturers website

In some PCs, the latest manufacturer's drivers for the PC and for the processor may need to be installed. Check on the website of your PC manufacturer for the latest drivers for your PC. In the case of drivers for Dell PCs, an example of how to do this is shown below.

- Go to www.dell.com
- Find the Product Support page for the specific PC model (e.g. "Latitude E5440")



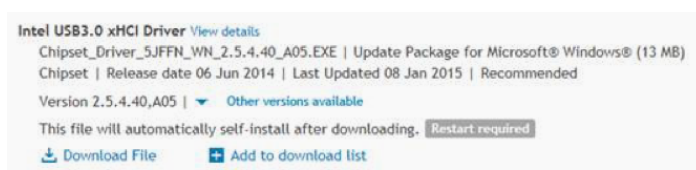
- On the left side, select the **Drivers and Downloads** tab



- On the right side, select (open) the **Chipset** driver dropdown



- Find the **Intel USB3.0 xHCI Driver** and install it



IF I HAVE ALREADY INSTALLED THE TEKTRONIX RSA USB DRIVER, DO I NEED TO INSTALL IT AGAIN WHEN I INSTALL SIGNALVU-PC OR THE API?

Yes. When you install either SignalVu-PC or the API, you will be asked to 'OK' installation of the Tektronix USB driver. When you install new software, you will be asked again to permit driver installation. You do need to install the driver again, because each new installation will erase the old driver, then install the driver from the installation package.

CAN YOU RUN MULTIPLE VERSIONS OF SIGNALVU-PC OR THE API EACH HOSTING 1 INSTRUMENT ON A SINGLE PC?

You can have multiple USB spectrum analyzers connected to a single PC with multiple USB 3.0 ports, but SignalVu-PC or the API address only one of them at a time. Tektronix has not tried to run multiple instances of SignalVu-PC or the API on a single PC.

IS THERE A DECLASSIFICATION PROCEDURE FOR THE INSTRUMENT? WHAT DATA, IF ANY, WOULD PERSIST THROUGH A FACTORY CALIBRATION

Declassification procedure is on Tek.com, search on your instrument nomenclature (e.g. RSA507A) + declassification. No user data is stored in the instrument, only calibration data. User data IS stored in the PC running SignalVu-PC or the API.

Using SignalVu-PC with a USB instrument, operational questions

HOW CAN I TELL IF THE INSTRUMENT IS CONNECTED?

When first plugged in, the instrument status light is red. When a successful connection is made and the instrument boots, the light turns green. This takes about 5 seconds. When SignalVu-PC searches for and connects to an instrument, it forces a re-boot of the instrument, and you will see the light cycle to red, then green again.

WHAT DO THE RED/GREEN LIGHTS ON THE INSTRUMENT INDICATE?

- Solid Green: Instrument has finished boot-up and is ready to connect or operate.
- Red: Unable to power up, or re-booting the instrument
- Flashing green: Transferring data

WHAT IS THE SPECTRUM UPDATE RATE FOR THE INSTRUMENT?

For the DPX spectrum display at 40 MHz span, RBW=auto, the spectrum update rate is 10,000/second. As the resolution bandwidth is reduced, the spectrum processing rate slows. This affects the minimum signal duration for 100% probability of intercept. You can see the minimum signal duration by selecting DPX Spectrum Settings:Pref:Show Parameter Readouts. The instrument must be connected for this menu to appear in SignalVu-PC.

For the standard spectrum analyzer, the spectrum update rate can be as fast as 50/sec for spans of 40 MHz, RBW=Auto, depending upon your PC. For full-range sweeps of 6.2 GHz in auto-RBW, the sweep rate is generally greater than 1.5 GHz/sec, depending upon the PC used.

HOW DO I QUICKLY SAVE A SCREEN SHOT FROM SIGNALVU-PC?

In SignalVu-PC, navigate to File: Save As: Save as Type: Picture, and select .png or .bmp. Or, use the Windows Snipping Tool.

HOW DO I USE SIGNALVU-PC TO RE-ANALYZE DATA COLLECTED WITH A SECOND PC?

To save data acquired with the RSA306 and SignalVu-PC, use File: Save As: and select .tiq or .mat. .tiq is the native format for SignalVu-PC, and .mat is Level 5 Matlab file format. Either of these can be opened by any SignalVu-PC installation. Files saved as .Mat can be opened with Matlab.

WHAT CAUSES THE INSTRUMENT TO TRIGGER ON SIGNALS THAT AREN'T SHOWN IN THE DISPLAY ?

The trigger in the RSA306 sees the entire 40 MHz intermediate frequency bandwidth of the instrument, independent of the displayed spectrum span or selected measurement bandwidth. If a signal is present above the trigger level in the IF, it will cause the instrument to trigger.

DOES THE RSA306 HAVE A PREAMPLIFIER AND HOW DO I TURN IT ON?

Yes, there is a preamplifier in the RSA306. It turns on and off automatically depending upon the reference level setting of the instrument. When the reference level is -30 dBm or lower, the preamplifier is always on. Between -10 dBm to -30 dBm, the preamplifier may be turned on, depending on the selected center frequency. This is to account for varying amounts of loss through the RF chain as the center frequency is changed. For example, the preamp is off at -20 dBm, 1 GHz CF, and on at -20 dBm, 6 GHz CF. The RSA500/600s have user-activated preamplifier controls with user-selectable attenuation

Application Programming Interface

HOW IS THE API DIFFERENT FROM SIGNALVU-PC?

The API is a Windows 64-bit C/C++ DLL that provides direct access to the instrument. It enables full control of the instrument and provides several forms of data and measurements to support custom applications independent of SignalVu-PC.

WHAT ARE THE PC REQUIREMENTS FOR THE API?

The API has the same requirements as SignalVu-PC.

WHAT COMMANDS ARE AVAILABLE FROM THE API?

A complete list of available function calls is available in API manual. The manual covers sections on:

Connection	Device status
Device operation	Trigger
ADC streaming	IQ data
DPX	Audio
Self test	Alignment

WHAT IS THE DIFFERENCE BETWEEN AN RSA306, MDO3000, MDO400B AND AN RSA5106B?

- The RSA306 is a small, portable real time spectrum analyzer that has amazing performance for
- The RSA500 is a ruggedized, portable, battery-powered USB analyzer that is ideal for field spectrum management, transmitter maintenance and troubleshooting.
- The RSA600 is a small laboratory spectrum analyzer with 40 MHz of analysis bandwidth for low-cost wide-bandwidth design, validation and manufacturing.
- its price and it is used with a Windows 64-bit PC with SignalVu-PC
- The MDO3000 is the ultimate six instruments in one instrument for unmatched versatility and value.
- The MDO4000B provides unique time correlation of the frequency domain signals (SA, RF vs Time) with the time domain signals (Analog and digital channels) and supports being controlled by a Windows 64-bit PC for advanced signal analysis with SignalVu-PC.
- The RSA5000B is a full featured real time performance spectrum/signal analyzer.

A summary comparison is show in the following tables. The comparison strives to give performance in similar conditions, but for full specifications and conditions, see the individual data sheets.

	RSA306B	RSA500/600	MD03xxx Opt SA	MDO4000C	RSA5106B
Input Frequency	9 kHz to 6.2 GHz	9 kHz to 3.0/7.5 GHz	9 kHz to 3.0 GHz	9 kHz to 3/6.0 GHz	1 Hz to 6.2 GHz
Reference Frequency accuracy	±3 ppm	±1 ppm, 3 ppb with GPS lock	NA	±1.6 ppm	±1 ppm + aging ± 0.1 ppm (Opt PFR)
External frequency reference input	10 MHz ±10 Hz	10 MHz plus selected other inputs	NA	10 MHz	Every 1 MHz from 1 to 100 MHz
RF Input					
VSWR (Typical)	≤ 1.8:1 (10 MHz to 6.2 GHz, reference level ≥ +10 dBm)	< 1.2 (10 MHz to 3 GHz) < 1.5 (>3 GHz to 7.5 GHz) RF Atten=20 dB	—	—	< 1.2 10 MHz to 2 GHz < 1.4 >2 GHz to 3 GHz < 1.5 >3 GHz to 6.2 GHz RF ATT=10 dB, Preamp OFF
Max. Input, no damage	DC voltage ±40 V _{DC} +23 dBm (Ref. level ≥ -10 dBm) +15 dBm (Ref. level < -10 dBm)	+ 33 dBm (RF Input, 10 MHz to 7.5 GHz, RF Attn ≥ 20dB) + 13 dBm (RF Input, 9 kHz to 10 MHz) + 20 dBm (RF Input, RF Attn < 20 dB)	DC voltage ±20 VDC +30 dBm	DC voltage ±40 VDC +32dBm (Ref. level ≥20dBm) +25dBm (Ref. level < -20 dBm)	DC Voltage +5V + 30 dBm (RF ATT≥10dB, Pre-amp Off) + 20 dBm (RF ATT≥10dB, Pre-amp On)
Amplitude Accuracy Typical					
10 MHz - < 3 GHz	± 8 dB	± 0.2 dB	±0.6 dB	±0.5dB	±0.3 dB
≥ 3 GHz – 6 GHz	±1.0 dB	±0.6 dB	NA	±0.5dB	±0.5 dB
Intermediate frequency and acquisition system					
IF Bandwidth	40 MHz	40 MHz	1 GHz	Up to 3.75 GHz	25/40/85/165 MHz BW
Sample rate, bits	112 MS/s, 14 bit	112 MS/s, 14 bit	10 GS/s, 8 bit	10 GS/s, 8 bit	16 bits, 200 MS/s (Opt B25/B40), plus 14 bits, 400 MS/s (OptB85/ B16x) 16 bits, 400 MS/s (HD Options)
Noise and Distortion					
Displayed Average Noise Level (DANL), dBm/Hz, typical	Internal preamp automatically activated at low reference levels	Preamp Off/On	with/without TPA-N-PRE	with/without TPA-N-PRE	Preamp Off/On
100 kHz	-133	-130 / -145 (500 kHz)	-130/-140	-134/-144	-150 dBm/Hz (10 kHz to 32 MHz, LF Band)
5 MHz	-148	-130 / -158	-130/-140	-150/-160	-139/-160
1.0 GHz	-163	-141 / -164	-140/-150	-150/-160	-157/-167
2.0 GHz	-161	-141 / -164	-140/-150	-150/-160	-157/-167
4.0 GHz	-157	-138 / -159	NA	-151/-161	-155/-164
6.2 GHz	-153	-145 / -160	NA	-145/-155 (6 GHz)	-153/-164
Phase Noise at specified offset, dBc/Hz, 1 GHz carrier, typical					
1 kHz	-89			-104	-107
10 kHz	-87	-97	-85	-111	-113
100 kHz	-93	-98	-101	-113	-117
1 MHz	-120	-121	-122	-123	-139
Input related spurious response, typical	< -60 dBc, to 2.7 GHz <-50 dBc 3-6.2 GHz	< -75 dBc, to 3 GHz <-75 dBc 3-7.5 GHz	Not specified	< -65 dBc	<-75 dBc, typical
3rd-Order Intercept at 2 GHz, typical	+14 dBm	+15 dBm	Not specified	Not specified	+18 dBm

	RSA306B	RSA500/600	MD03xxx Opt SA	MD04000C	RSA5106B
Other					
Weight	0.73 kg (1.6 lb)	3.17 kg/ 7.0 lbs with battery (RSA500) 2.88 kg/ 6.35 lbs (RSA600)	4.2 kg (9.2 lb.)	5.5 kg (12.2 lb)	24.8 kg (54.5 lb)
Temperature Ranges	Operating: -10°C to +55°C Non-operating: -51°C to +71°C	Operating: -10°C to +55°C Non-operating: -51°C to +71°C	Operating: -10°C to +55°C Non-operating: -40°C to +71°C	Operating: -0°C to +50°C Non-operating: -30°C to +70°C	Operating: 5°C to +40°C Non-operating: -20°C to +60°C
Tracking Generator option	No	Yes	No	No	No

	RSA306B, RSA500/600	MD03xxx Opt SA	MD04xxx-6B	RSA5106B
Spectrum Analysis Features				
RBW Range	10 Hz-10 MHz	20 Hz-200 MHz	20 Hz-200 MHz	0.1 Hz – 10 MHz
Measurements/ displays	Markers (5, time-correlated). Absolute, delta power, frequency, time, Integrated power, power density, dBc/Hz. Measurements: Spectrum, Spectrogram, Amplitude/Frequency/Phase vs. time, RF I and Q vs. time, Time Overview/Navigator, AM, FM, PM analysis, Spurious Measurement, Spectrum Emission Mask, Occupied Bandwidth, Channel Power and ALCR, MCPR, CCDF	Markers (6, absolute, delta power, frequency, time, dBc/Hz) Measurements: Spectrum, spectrogram, Channel Power, Occupied Bandwidth, ACPR	Markers (6, absolute, delta power, frequency, time, dBc/Hz) Measurements: Spectrum, Spectrogram, Amplitude/Frequency/Phase vs. time, Channel Power, Occupied Bandwidth, ACPR, Time Navigator, correlated to oscilloscope and logic analyzer measurements With SignalVu-PC and Live Link option: All measurements except DPX spectrum/spectrogram available in SignalVu-PC (see RSA306 for list)	Markers (5, time-correlated). Absolute, delta power, delta time, Integrated power, power density, dBc/Hz. Measurements: Spectrum, Spectrogram, Amplitude/Frequency/Phase vs. time, RF I and Q vs. time, Time Overview/Navigator, AM, FM, PM analysis, Spurious Measurement, Spectrum Emission Mask, Occupied Bandwidth, Channel Power and ALCR, MCPR, CCDF
Real Time Features				
Maximum span	40 MHz real time 9 kHz – Max frequency of instrument, swept	Up to 3 GHz real time 9 kHz – 3.0 GHz swept	Up to 3.75 GHz real time 9 kHz-6.0 GHz swept	25/40/85/165 MHz real time 1 Hz – 6.2 GHz swept
Maximum acquisition time	1.0 s, 40 MHz bandwidth (span-independent) plus streaming to disk	NA	5 ms at 3.75 GHz bandwidth Longer at lower bandwidths	19 sec at 40 MHz bandwidth, longer at lower bandwidths
DPX spectrum display				
Available Displays	Spectrum, Spectrogram	NA	NA	Spectrum, Spectrogram, Amplitude, Frequency, Phase
Spectrums/sec	Up to 10,000/s	NA	NA	Up to 390,625 per second
Minimum signal duration, 100% probability of intercept	100 us, span=40 MHz, RBW=Auto	NA	NA	2.7 us (165 MHz, Opt. 09, RBW=20 MHz) 23.3 us (std), 10.5 us (opt. 09), span=40 MHz, RBW=auto
Minimum resolution bandwidth	1 kHz (DPX spectrum) 10 Hz (standard spectrum)	NA (DPX spectrum) 20 Hz (standard spectrum)	NA (DPX spectrum) 20 Hz (standard spectrum)	0.1 Hz (DPX spectrum) 0.1 Hz (standard spectrum)
Triggers (RF/IF)	IF Level (40 MHz BW)	NA	RF Power level, Width, Runt, Timeout, and Logic triggers. Triggers on events between 1 MHz-3.25 GHz or 3.25 GHz-6 GHz, based on center frequency.	IF Level (1 kHz-165 MHz BW) Frequency Mask Frequency Edge Density Time-qualified and runt
Triggers (Other)	External	Any analog (scope) channel input, Edge, Sequence, Pulse Width, Timeout, Runt, Logic, Setup and Hold, Rise/Fall, Video Aux in (External) Line	Any analog (scope) or digital (LA) channel input: Edge, Sequence, Pulse Width, Timeout, Runt, Logic, Setup and Hold, Rise/Fall, Video bus. AC Line input	External (2) Line

RSA MAP

WHAT TYPE OF MAP FORMATS DOES RSA MAP SUPPORT ?

Supported map types Pitney Bowes MapInfo (*.mif), Bitmap (*.bmp) and Open Street Maps (*.osm)

- Map file used for the measurements: Google Earth KMZ file
- Recallable results files (trace and setup files): MapInfo-compatible MIF/MID files

WHAT GPS RECEIVER CAN I USE WITH MY PC?

Any GPS receiver with National Marine Electronics Association (NMEA) data outputs should work, and most GPS receivers support this standard. More information on the NMEA data format is at http://en.wikipedia.org/wiki/NMEA_0183. We have tested and found that the devices listed below do work with SignalVu-PC Option MAP.

- GlobalSat BU-353S4, information available at http://www.amazon.com/GlobalSat-BU-353-S4-USB-Receiver-Black/dp/B008200LHW/ref=sr_1_1?ie=UTF8&qid=1425688275&sr=8-1&keywords=bu-353s4
- Holux M-215+ USB Mouse GPS Receiver, information at http://www.amazon.com/Holux-M-215-USB-Mouse-Receiver/dp/B00FN2QR7A/ref=sr_1_1?s=electronics&ie=UTF8&qid=1426766655&sr=1-1&keywords=holux+m-215%2B
- Pharos GPS360, <http://www.amazon.com/GPS-Receiver-Cables-Microsoft-GPS-360/dp/B005JZX8T6>

CAN I USE RSA MAP INDOORS, OR WITHOUT GPS INSTALLED?

Yes. You manually place the measurements you make on the map you have created and selected.

DO I HAVE TO CREATE A MAP TO COLLECT DATA WITH RSA MAP?

Yes. To create a Geo-referenced map, follow the directions in the Word document below. To create a simple map on which you can manually place your measurements, save any map in .jpg format, import it into the RSA Map program.

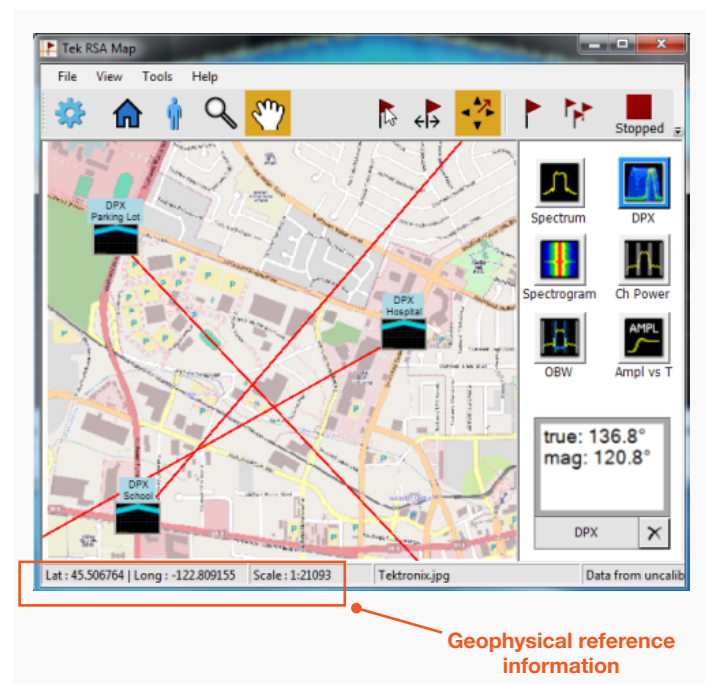
HOW TO CREATE A GEO-REFERENCED MAP FOR RSA MAP

This guide shows how to create a geo-referenced map to load into RSA Map.

The example in this Demo guide uses a free online mapping source OpenStreetMap to capture maps.

- OpenStreetMap: <http://www.openstreetmap.org/>

Same map conversion technique could be used for scanned paper maps.



Overview:

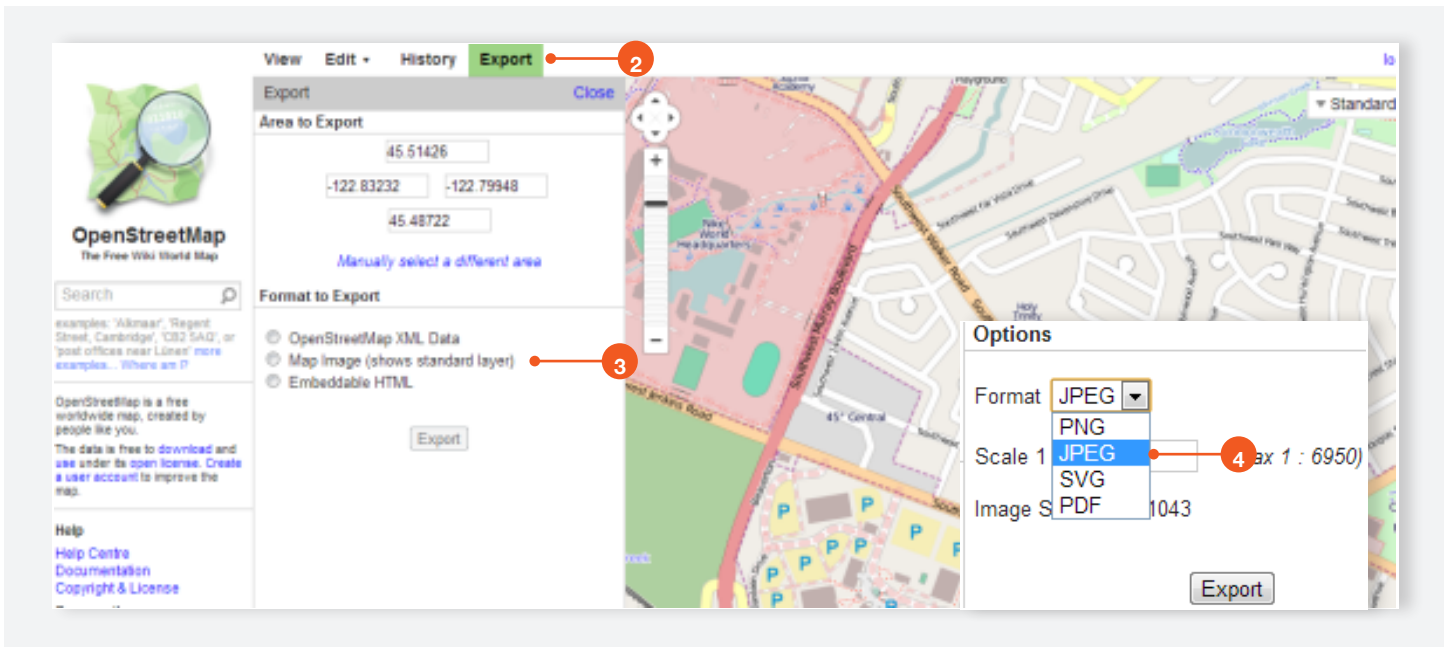
The RSA Map tool lets you use an on-screen map to record the location and value of measurements. With RSA Map you can use a GPS receiver (customer supplied) to automatically position measurements at your current location on maps with geophysical reference information.

The map format supported by RSA Map tool includes MapInfo format map files (.mif), Windows bitmap files (.bmp), and JPEG interchange format file (.JPEG or .JPG). The .bmp and .JPEG format map files can be either geo-referenced (using world map file format to specify geographic location) or non geo-referenced (which does not have geographic location information). To perform repeat measurements, GPS must be enabled and locked. The map used must be a geo-referenced map.

What is in a Geo-referenced Map?

A geo-referenced map is made of two files:

- Bitmap file
- World file (Geo-reference information file)



How to Create a Geo-referenced Map?

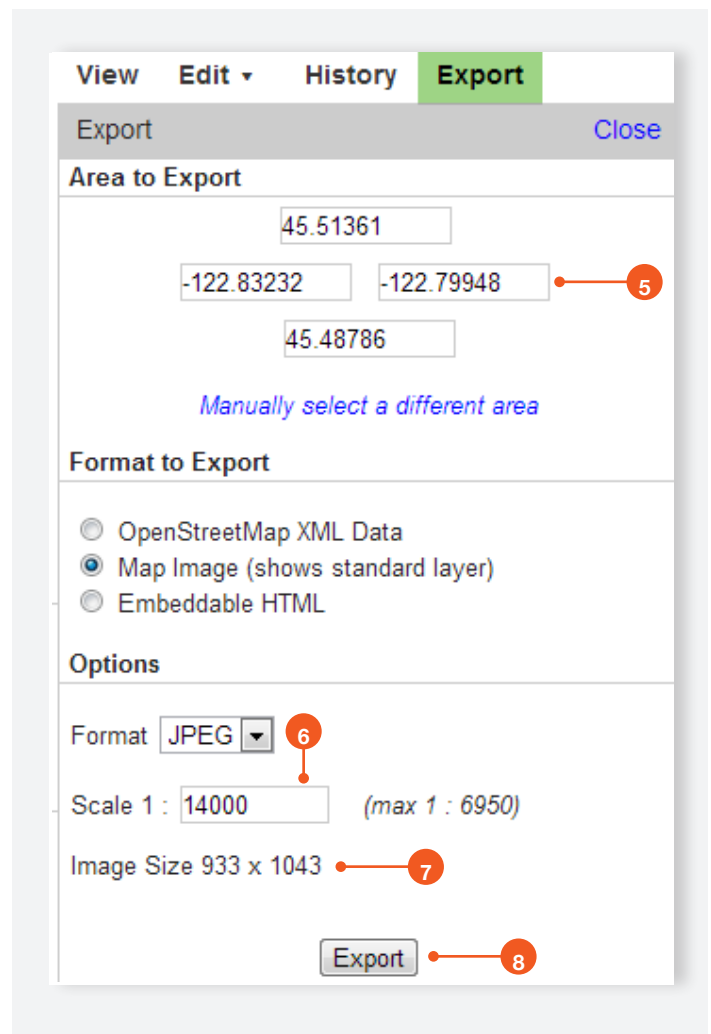
STEP 1: CAPTURE A BITMAP FILE

OpenStreetMap is a collaborative project to create a free editable map of the world. It can capture a map anywhere in the world and can export it in its native format, bitmap image, and embeddable HTML. At this moment, RSA Map does not support the native format but can import a bitmap image file.

1. Open <http://www.openstreetmap.org/>
2. Once the user locates the map, select **Export** tab.
3. Select **Map Image**.
4. Choose the **Format** to be .JPEG.
5. Record the **Latitude** and **Longitude** information.
6. Adjust the **Scale** of the map.
7. Record the **Image Size**.
8. Click **Export** to save the map.

QUICK TIP:

- Sometimes the web server is busy and the user needs to try several times.
- OpenStreetMap requires a credit on the map when you distribute the map.
- Smaller scale ratio provides more details, but generates larger file.



STEP 2: CREATE A WORLD FILE:

The created world file needs to be located in the same directory as the bitmap file.

To prepare for a world file, we need to calculate map parameters by using the recorded data from OpenStreetMap, then use text editor to create the world file.

9. Open <http://egb13.net/2009/03/worldfile-calculator/>
10. Enter the **Latitude** and **Longitude** two of corners recorded in 5.
11. Enter the **Width** and **Height** of the map recorded in 7. The first box is Width, and the second is Height.
12. Click **Calc** to calculate the map parameters.
13. Copy the parameters.
14. Create a **Text Document** and open.
15. Copy the calculated parameters in 13 to the text editor.
16. Save it to the same folder as the Bitmap file exported from OpenStreetMap, and use the same name.
17. Change .txt to the matched file extension.

Bitmap Extension	World File Extension
bmp	bpw
jpg	jgw

QUICK TIP:

- The bitmap file and the world file have to be located in the same directory.
- OpenStreetMap uses + and - to present North/South and East/West, but this map parameter calculator uses N/S and E/W to indicate direction. Do not enter the negative number.
- Inversed width and height of map may cause error in SPECMON.

Calculate Worldfile
Use "N" and "W" if entering northing and easting instead of latitude and longitude.

First corner: 45.51361 N 122.83232 W

Second corner: 45.48786 N 122.79948 W

Image size: width: 933 px height: 1043 px

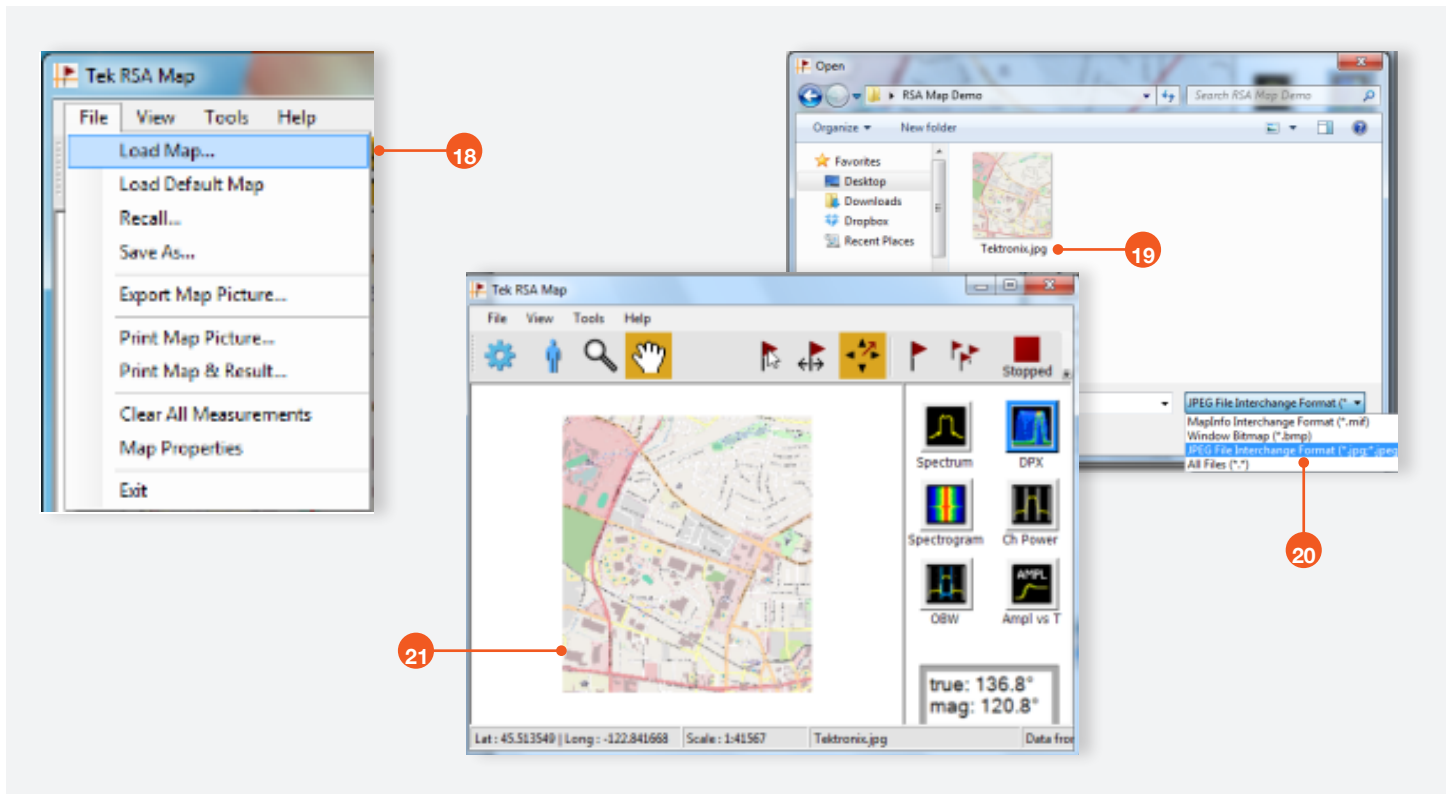
worldfile:
0.00003519828510181468
8
0.00000
0.00000
-0.000024688398849474747
-122.83230240085744
45.513597655800574

Calc

To use, worldfile name should match image basename with proper one of these for the suffix:
 .gif - gif
 .tif - tif
 .jpg - jpg
 .png - png

0.00003519828510181468
0.00000
0.00000
-0.000024688398849474747
-122.83230240085744
45.513597655800574

Tektronix.jgw
Tektronix.jpg



18. Click **Load map** in Tek RSA Map
19. Choose the map file type.
20. Select the map you created.
21. The selected map will be loaded into RSA Map.

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