

Frequently Asked Questions (FAQ) about the TAPR-TenTec Vector Network Analyzer

June 12, 2011

The following FAQs apply to Version 1.6 or later of the software.

1. Why does the display show the word 'Uncalibrated' on the screen? How do I get rid of it?

The 'Uncalibrated' (light gray) label is displayed whenever the instrument settings might compromise the accuracy of the measurement.

To remove the 'Uncalibrated' label, make sure that:

- The sweep speed selector button displays something other than 'fast'.
- That a fixture calibration has been run and that it is applied to the measurement (the 'apply calibration' box is checked).
- That the detector calibration has been correctly performed.
- That the TxLevel is set to 0 db.
- That the sweep frequency is in the range 1 MHz to 100 MHz.

2. Why do the markers I've set fail to display on screen?

Markers that are set below or above the sweep frequency would be off to the left (lower than the Start Frequency) or right (higher than the Stop Frequency) of the display, and thus cannot be displayed. Frequency marker entry is in units of hertz; if you enter 15 for a marker frequency it is interpreted as a value of 15 Hertz. If you meant 15 MHz, then enter 15000000 as the marker frequency.

3. Why do I see two different display lines for a measurement?

You have enabled display of both the current and a previously stored measurement result. Disable the display of the stored data, it's accessed via the VNA menu:

- Storage->Display Storage

4. When I export an Excel spreadsheet of the s-parameter data, all the numeric cells show the value #NAME.

The values are exported as COMPLEX numbers to the Excel spreadsheet. The default installation of Excel does not install Excel's Analysis Toolpack which provides engineering, statistical, and complex number functions. Different versions of Excel have slightly different ways to install the toolpack. Search for analysis toolpack, or add-ins in your Excel help menu. The toolpacks are usually installed via the Tools menu, using the

Add-Ins... submenu item. The exact menu item and method to install the toolpacks are different depending on the version of Excel that you have. Some versions of Excel may require you to insert the Excel program CDROM, but others don't.

5. When I measure the parallel-resonant frequency of a crystal, it's hard to read the exact point of the phase zero-crossing.

If the crystal is being measured by placing it in series from the Tx to the Rx connector, the crystal forms a series circuit element loaded by the 50 ohm input impedance of the receiver. At the point of parallel resonance, the crystal has very high impedance, and thus the signal reaching the Rx connector is strongly attenuated by the voltage divider formed. Near the parallel resonant point, the signal will be attenuated below the dynamic range of the VNA receiver, and the VNA measures only noise. The phase detectors in the VNA have about 20 dB less dynamic range than the amplitude detectors.

6. The detector calibration fails.

Check the cables you are using to perform the calibration. Make sure that there is continuity through all of the connectors, that there are no shorts or opens between the cable, connectors, and the connectors on the VNA or any adaptors being used. Also make sure that the cables are the correct length for the calibration step being run. Be sure you are using 50 ohm cables.

7. I get strange results when measuring a narrowband filter.

Narrow filters are high-Q devices and thus have a lot of time delay. You will need to set the sweep settling time to a slower value so that the VNA allows enough time for the signal to propagate completely through the filter before it takes a measurement.

8. The fonts are too small for me to easily see, or the display is too small to easily see.

The VNA software supports Windows display resolution and fonts size setting adjustments. These can be selected via the Windows Control panel. The software supports the default display resolution of 96 DPI, and the alternate value of 120 DPI. Setting the display resolution to 120 DPI will expand all of the display elements, making it easier to read, but also effectively reducing the extent of the display. Selecting a larger display font may make the display easier to read.

On Windows XP, select the Display Resolution using:

- Control Panel -> Display -> Settings -> Advanced -> DPI Setting

On Windows XP, select the Display Font using:

- Control Panel -> Display -> Appearance -> Font Size

9. When I try to compile and build the source software code, I get a missing files error message for the USB driver header files.

Most users will never need to compile source code, so this FAQ only applies to the very few people who want to modify the software themselves. Remember, the software has been released under the open-source GNU General Public License (GPL).

Microsoft does not allow re-distribution of the Windows device driver kit (DDK) or files (even header files). You can purchase the Windows DDK CDROM from Microsoft (it's about \$15). Sometimes MS has allowed free download of the DDK from their website, sometimes not. You will need the Windows Server 2003 version of the DDK to build the software. Install the missing header files into the proper directory.

10. I can't install the software from within the UNZIP window.

There are some operating system configurations that prevent executing and installing a program from within ZIP. Extract the ZIPPED files to your hard drive or desktop, close the ZIP program, then execute the Setup.exe file directly.

11. The software will not run on a 64-bit processor (X64 architecture).

The device driver used is only available in a 32-bit version, thus it is not currently possible to target the VNA software to a 64-bit processor (X64 version). Only X86 versions of processors are supported.

Version 1.6 is the last VS2003 / NET 1.1 / VC6 version.

The following FAQs apply to Version 2.0 or later of the software.

12. Version 2 does not run properly on my computer.

Version 2 of the VNA software **requires the .NET 2.0 runtime**. The installer will check to see if it's installed on your system. If not, you will need to install it from the Microsoft website. It's free, and is about a 23 Megabyte download. The installer will open your web browser to the approximate web page, but the exact page gets moved every once in awhile, so you may have to search a bit. Many applications and some updates install .Net 2.0, so you may already have it on your system.

The installer also checks to see if you have the exact needed version of the VC_8.0 libraries installed on your system, and will install them if necessary. Beta 2.0.3 fixes several bugs having to do with porting the software to the VS2005 tool set.

13. Beta version 2.1 detector calibration does not converge properly.

Version 2.1 uses a different detector error model than older versions of the code, and requires a different calibration method. Some of the 1 meter calibration cables are

actually a little bit short – around 36 inches (0.91 meters) instead of 39 inches. The convergence routine in 2.1.1 has been improved a little bit to work down to theoretically about 35.2 inches cable length. The older versions of code (2.0 and before) were less sensitive to the calibration cable length used for detector calibration. (Fixture calibration is not affected).

The following FAQs apply to Version 2.1.6 or later of the software.

14. Why does the display show the word “Unshielded” on the screen? How do I get rid of it?

The VNA uses broadband amplitude detectors. This means that a strong interfering source (for example a nearby AM broadcast transmitter) will be detected by the receive detector and will distort results regardless of the frequency of the transmit source. Starting with version 2.1.6, the software detects when the S21 receive amplitude measurements do not increase and decrease appropriately as the VNA transmit signal amplitude is changed, and puts the “Unshielded” warning on-screen. This warning is only placed on the rectangular screen, and only when S21 or Group Delay traces are enabled.

To eliminate the warning, the device under test must be well-enough shielded that the interfering signal is reduced below about -65 or -70 dBm to the 50-ohm Receive input.

The following FAQs apply to Version 3.0 or later of the software.

15. How do I install the software on Windows Vista or 7 operating systems?

Vista and 7 require that instead of double-clicking the setup.exe file, that instead you right-click the file and then select Run As Administrator. This is because they default all actions to a limited-privilege mode rather than full-privilege mode.

END