

USING COMPACT USB VNAs WITH OFF-THE-SHELF BATTERIES

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Introduction

Copper Mountain Technologies (CMT) provides Vector Network Analyzers without a built-in computer, which enables the VNAs to be highly compact, lightweight and operate on very low power. Those characteristics allow for easily making lab-grade measurements in the field.

There are three main categories of VNA form factor available from Copper Mountain Technologies: small, pocket-size devices (1-port Cable and Antenna Analyzers); portable 2-port (Compact and M series devices); and rack mountable (Planar and Cobalt series 2- and 4-port instruments).

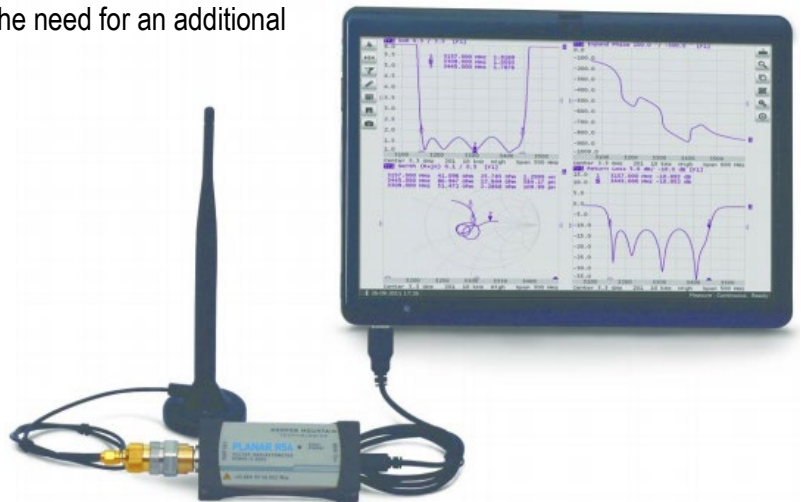
Using the 1-port and compact VNAs when A/C mains are not available is very simple, though the latter requires using an external battery pack instead of the ordinary +12V supply. This application note describes both configurations, presents some recommendations, and shows photos taken in the field.

1-Port VNAs

Each member of the CMT 1-port family has a size similar to that of a deck of playing cards. These instruments can perform 1-port vector measurements, known as vector S11, and optionally apply various sophisticated post-processing analyses such as impedance transformation, time domain analysis, time domain gating, limit testing, and much more.

Power consumption of the 1-port analyzers is so small that they don't require a dedicated power supply. You can simply plug them into your Windows/Linux tablet or laptop USB port and you are fully ready to go. The image below depicts the use of the R54 with a Windows tablet PC.

Any Windows or Linux PC or tablet that runs CMT's VNA software can be used to automate the 1-Port devices and collect measurement results without the need for an additional power source.



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Compact VNAs

Copper Mountain Technologies' portable VNAs, such as the Compact and M Series, can readily provide lab-grade 2-port testing results in the field thanks to their compact size and low power consumption. Unlike some instruments whose accuracy is compromised to achieve the form factor necessary for field testing, CMT's analyzers are widely recognized to be truly metrology-grade instruments with traceable metrology. Using a lab-grade VNA as opposed to a less accurate instrument has many benefits, including faster measurement speed, more stable calibration over temperature, higher dynamic range, and less trace noise.

And of course, most CMT VNAs include many useful software functions, such as time domain analysis, time domain gating and impedance conversion as standard features, not costly software options.*

The compact form factor instruments ordinarily are powered by an included +12V DC adaptor. However, to use any of the compact CMT VNAs where power is not available, all you need is the VNA, a portable battery, and a Windows/Linux tablet or laptop running the VNA software.

Power Consumption and Battery Life

The power consumption of a compact VNA is quite low. For example, the S5048 power consumption is no greater than its specified maximum of 10 Watts. Therefore, if you use a 10Ah 5V battery, it will provide power for about four hours of continuous use. Note that the DC input range of the compact VNAs is 9-15V, so the battery you select needs to be able to output voltage in this range.

The battery shown in the picture below is the 20Ah Anker 2nd Gen Astro Pro2 with 12 Volt output, available for less than \$100 as of this writing. This battery can provide +5V DC via its multiple USB charging ports, and optionally provide either +9V or +12V DC via a "Multi-voltage" output port. Conveniently, the adaptor cable included with the pack is compatible with all compact series VNAs from Copper Mountain Technologies.



Naturally, the battery pack, VNA, and tablet can be easily attached to one another or otherwise consolidated into a suitable carrying bag for convenience.



Conclusion

For using CMT VNAs in the field, all you need is a Windows/Linux computer or tablet running the VNA software and a suitable portable battery, in the case of the compact devices. CMT's lab-grade VNAs can provide faster measurements, maintain more stable calibrations, and produce more accurate measurements in the field compared with typical field-grade equipment with compromised performance.

The light weight, low power consumption, and compact size of CMT VNAs make them an ideal solution for testing when accuracy and measurement speed matter.

*M Series VNAs do not include the following software features: Time Domain, Mixer Measurements, TRL calibration.

If we can be of assistance regarding your remote testing application, please don't hesitate to contact us as support@coppermountaintech.com.