

## Introduction

Copper Mountain Technologies provides Vector Network Analyzers without a built-in computer, which enables the VNAs to be highly compact, lightweight and very low power. Those characteristics allow for easily taking CMT's well-known lab-grade measurement results into the field.

There are three main categories of VNA form factor available from Copper Mountain Technologies: small, pocket size devices (1-Port Reflectometers); compact instruments (including M-, S-, SC-, and TR-series devices); and rackable (Multiport and Cobalt series instruments).

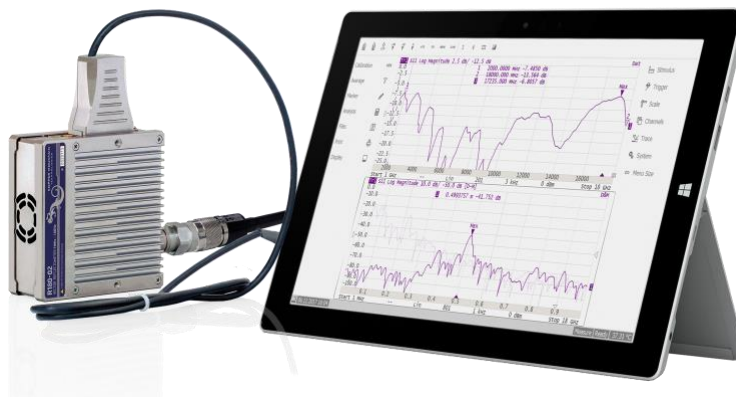
Using the reflectometers and compact VNAs when A/C mains are not available is very simple, though the latter requires using an external battery pack instead of the ordinary +12V supply. This application note describes both configurations, presents some recommendations, and shows photos taken in the field.

## 1-Port Reflectometers

Each member of the CMT reflectometer family has a size similar to that of a deck of playing cards. These instruments can perform one 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 reflectometers is so small that they don't require a dedicated power supply. You can simply plug them into your Windows tablet or laptop USB port and you are fully ready to go. The image below shows use of the R180 with a Windows tablet PC.

Any Windows PC or tablet that runs CMT VNA software can be used to automate the R-series devices and to collect measurement results without access to any additional power source.



## Compact VNAs

Copper Mountain Technologies' Compact VNAs, such as TR1300/1, 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 analyzers are widely recognized to be truly lab grade instruments. 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, all 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 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 M5045 power consumption is no greater than its specified maximum of 12 Watts. Therefore, if you use a 10Ah 5V battery, it will provide for about 4 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 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 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.

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