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Copper Mountain Technologies' VNAs Gain Non-Invasive Stability Measurement - NISM

July 24, 2020 Phoenix, AZ: Picotest.com, a leader in high resolution test and measurement equipment, has announced the availability of new software that brings the unique output impedance based non-invasive stability test capability to the Copper Mountain Technologies (CMT) Compact series vector network analyzers (VNA). The software add-on, available from Picotest for new or existing customers, allows the instrument to perform non-invasive stability margin (NISM) measurement.

NISM is a simpler alternative to a Bode plot measurement that allows the user to test circuit or filter stability even when the control loop is not accessible. It determines phase margin from an output impedance measurement via group delay. This capability, available for many other VNA instruments as well, allows the user to measure the stability of opamps, voltage references, voltage regulators, LDOs, switching amplifiers, POLs, input filters, and all types of power converters through their output impedance. "Even very high bandwidth control loops that are challenging, if not impossible, to measure via Bode plots, can be assessed," stated Steven Sandler, Picotest CEO.

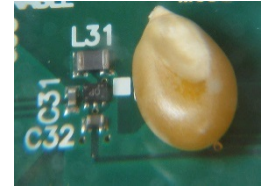
The software guides the user through a few simple steps to obtain the stability margin from a circuit's output impedance; a simple measurement that does not require breaking the control loop. The measurement results can be saved or printed as with other VNA measurements.

CMT VNA users can use 1-port or 2-port impedance measurements which the software can convert to phase margin. The software supports the full frequency range of the instrument to assess the stability of all types of the aforementioned circuits.

The software is available immediately and is priced at \$795. Options include Picotest's 1-port and 2-port PDN transmission line probes which greatly ease the measurement of output impedance due to their small form factor and minimal circuit loading (< 0.2pf). The NISM software with the P21B01 PDN Probe Bundle is \$3,595.

Testing Stability When There's No Control Loop Access

The stability of linear or switching regulators, including regulators with no exposed control loops, cannot be assessed using a traditional Bode plot. "Very often you cannot make a Bode plot for a number of reasons. Either the loop is not exposed, or frequently newer devices have multiple control loops, which are not all accessible. The non-invasive stability margin measurement is the only way to verify stability for these types of circuits that provides a numerical phase margin result," stated Sandler. "A huge benefit of the measurement is that because it is based on impedance, it can be measured 'in-situ' with a one probe measurement and non-invasively, that is without impacting the result." In fact, given opamp and regulator dependency on loading, and the shrinking size of ICs as depicted by the TI LDO image next to a kernel of corn, in-circuit is often the only access available. Traditional control loop breakage is not possible.



What is NISM?

Since Picotest introduced the method in 2011, it has published many articles and application notes related to the assessment of stability without access to the control loop. The method has proven to be a well-received, simple and accurate technique for determining the exact level of stability and phase margin.

The mathematics behind the non-invasive measurement was first incorporated into a simulation tool (SPICE) and hardware VNAs in late 2011. Bode plot measurements and non-invasive results are generally within 1 degree of each other up to and including a phase margin of 65 degrees.

Is the Non-Invasive Stability Measurement as Accurate as a Bode Plot?

Yes. In fact, it is accurate in cases where Bode plots are invalid and is not subject to some of the issues that plague Bode plot's accuracy. "In many cases, the NISM is a better assessment of stability than a Bode plot," states Sandler. More information and reference material is located at:

<https://www.picotest.com/non-invasive-stability-measurement.html>

<https://www.picotest.com/measurements/NISM.html>

https://www.picotest.com/products_NISM_software.html

About Picotest, Inc.

Founded in 2004, Picotest Corp. specializes in developing and manufacturing high-tech precision electronic instruments and related equipment. Picotest aims to utilize its strong R&D capability to provide the highest quality products and services to customers worldwide. Picotest Corp is ISO 9001:2008 certified and is located in Kaohsiung, Taiwan. SM Sandler Holdings LLC dba Picotest is the

exclusive US distributor for Picotest test equipment products and is headquartered in Phoenix, AZ. For more information on Picotest, please contact the company at 1-877-914-PICO or visit www.picotest.com. PDN Cable® is a registered Trademark of Picotest.com

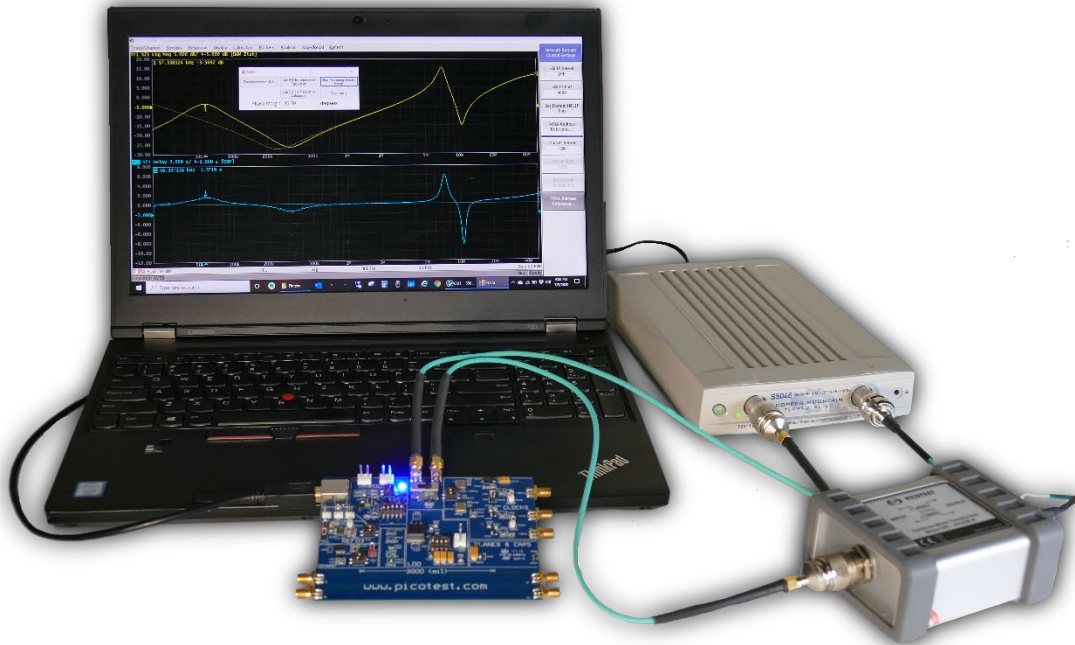
About Copper Mountain Technologies

Copper Mountain Technologies develops innovative RF test and measurement solutions for engineers all over the world. It is based in Indianapolis with sales offices in Singapore, London, and Miami. The company pioneered metrology-grade USB VNAs in 2011 and continues to push for innovation and change in the industry.

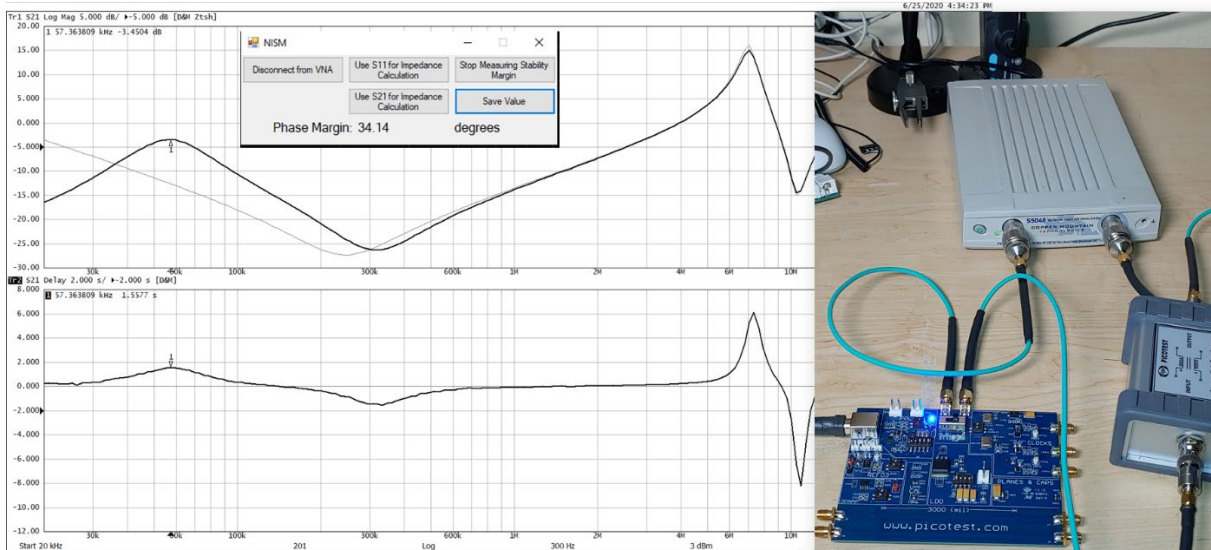
Copper Mountain Technologies provides a broad range of USB VNAs, calibration kits, and accessories for 50 Ohm and 75 Ohm impedance from 9 kHz to 110 GHz. The VNAs use software for Windows® or Linux® operating system on an external computer, PC, or tablet. CMT VNAs are used by engineers in defense, automotive, materials measurement, medical, broadcasting, telecommunications, and other industries. All CMT VNAs include application and automation support, and years of our engineering expertise at your disposal. For more information visit www.coppermountaintech.com.

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New software from Picotest enables Copper Mountain Technologies' VNAs to make a non-invasive stability margin measurement via output impedance (inset). Here the Picotest J2102B loop breaker and PDN Cable® are used to make a 2-port shunt through impedance measurement of a sample LDO circuit.



The Picotest NISM software enables the Copper Mountain Technologies Compact and Cobalt series VNAs to make a non-invasive stability margin measurement. Here a 2-port impedance measurement tests the stability of a LDO. The big "WOW!" is that we obtained the (very poor) phase margin from the impedance measurement using NISM. This is a great capability; to be able to accurately assess

stability at 100's of MHz or higher without lifting any wires (which would interfere with the measurement).