Maury Microwave and Copper Mountain Technologies

SOLUTION PARTNER BROCHURE / 5G-002

"Alone we can do so little; together we can do so much." – Helen Keller

I started working with Maury Microwave in 2005 and one of the things that has always impressed me was Maury's presence in the microwave and RF community, as a pioneer and innovator since its inception in 1957.

Our history is full of firsts: the first commercial connector gage kit, the first 40 GHz mode-free coaxial connector, the first VNA calibration kit, the first manual slide-screw impedance tuner, the first commercial automated slide-screw impedance tuner, and the first non-50Ω device characterization software, just to name a few.

But as much as we accomplished ourselves, it has been through partnerships that we have been able to best support our customers with the largest offering of validated turnkey solutions. With our partners, we have launched the industry's first and widest assortment of commercial vector-receiver load pull systems, open-loop active and hybrid-active load pull systems, mixed-signal active load pull systems, compact model extraction and refinement systems, sub-THz active load pull systems, and the list goes on!

Partnerships are and remain a cornerstone of our strategy, and as Helen Keller said, "alone we can do so little; together we can do so much." With that, I would like to introduce you to a selection of our best-in-class solutions that have been made possible through intimate relationships with our partners.

Finally, I would like to extend an invitation to visit Maury Microwave and witness our best-in-class solutions in person. We hope to see you soon!

Michael Howo, CEO

Measuring Power Parameters under 50Ω and Non-50Ω Conditions (Load Pull)

Load pull is the art of presenting a set of controlled load impedances to a device under test (DUT) while measuring a multitude of parameters at each impedance state. By systematically varying the impedance, it is possible to characterize the performance of a device and design the ideal matching network for optimum realistic large-signal operating conditions.

Vector-receiver load pull, or VNA-based load pull, is a modern and efficient methodology for load pull measurements. Low-loss couplers are placed between the tuners and device under test and are connected to the receivers of a VNA, such as a Copper Mountain Technologies' Cobalt C2420. Doing so allows the a- and b-waves to be measured at the DUT reference plane in real-time, presenting vector information not normally made available through traditional power-meter load pull techniques. Vector-receiver load pull allows

the direct measurement of actual impedances presented to the DUT without any assumptions of pre-characterized tuner positioning or losses. The delivered input power is derived from the a- and b-waves with incredible accuracy, which results in properly-defined power added efficiency. Output powers at each frequency, fundamental and multiple harmonics, are made available, as are multi-tone carrier and intermodulation powers.

Measurement parameters include Zin, Pin,available, Pin,delivered, Pout, Gp, Gt, PAE, Eff, AM/PM, IMD, Pout@nF.

Benefits of using Copper Mountain Techologies' Cobalt-series VNAs with vector receiver load pull include industry-leading dynamic range and sweep speeds, resulting in fast and accurate load pull measurements.
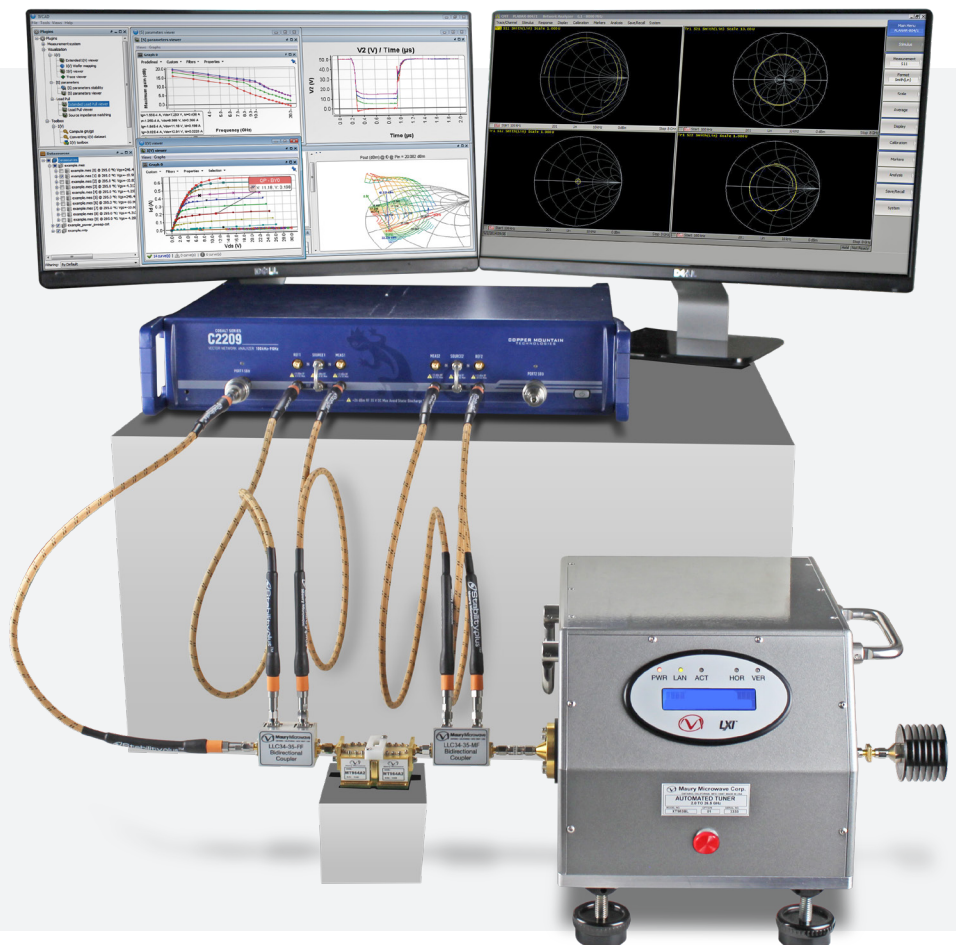

Applications

> Amplifier design

> Model validation and extraction

> Reliability test (VSWR test)

Key Attributes

> Low cost

> Compact solution

> High measurement accuracy

Measuring S-Parameters with Uncertainty

As new technologies emerge and are introduced as standards, the specifications and requirements for products get tighter, and the competitive landscape even fiercer. This puts the responsibility on engineers and designers to squeeze out every tenth of a dB of performance, and to publish ambitious specifications. This introduces a potential problem; how can one balance the desire to list aggressive specifications yet still have confidence that their products will meet the promised performance? And not only performance as measured by the designer but also by the end-user, today and over time.

Scientists have been investigating the sources of uncertainty in microwave and RF measurements and have proposed models and techniques to quantify the individual contributions.   These contributions can be systematically determined and added as part of an overall S-parameters measurement.

Maury Microwave's Insight VNA calibration and S-parameter measurement software can be used with almost any Copper

Mountain Technologies 2-port or 4-port VNA to calibrate, validate and measure S-parameters with uncertainty. Individual uncertainty contributors such as the VNA, calibration kit, cable assemblies, connectors, and operator are quantified and shown real-time with the S-parameter measurements. Copper Mountain Technologies' VNAs offer some of the industry's best-in-class uncertainty and result in more accurate S-parameter measurements. This empowers a designer to report a product's performance with uncertainties, and give both designers and end-users the confidence needed to ensure product performance over time.

Thanks to their low noise floor and improved drift, users can take advantage of Copper Mountain Technologies' VNAs to achieve more accurate S-parameter measurements with reduced measurement uncertainties.

Applications
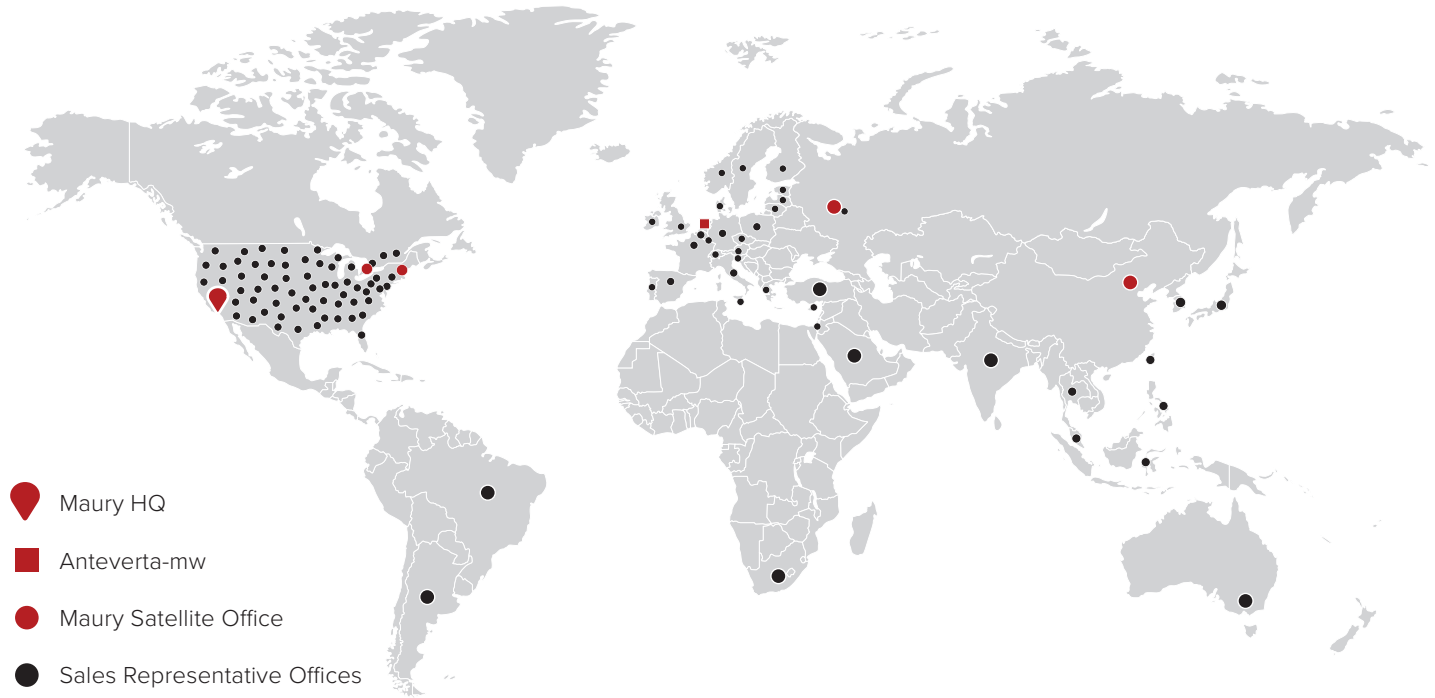
> Production test (pass/fail)

> Research and development

Key Attributes

> Low cost

> Compact and portable 1-port and 2-port solutions

> High measurement accuracy

Where You Can Find Us

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- **Anteverta-mw**
- **Maury Satellite Office**
- **Sales Representative Offices**

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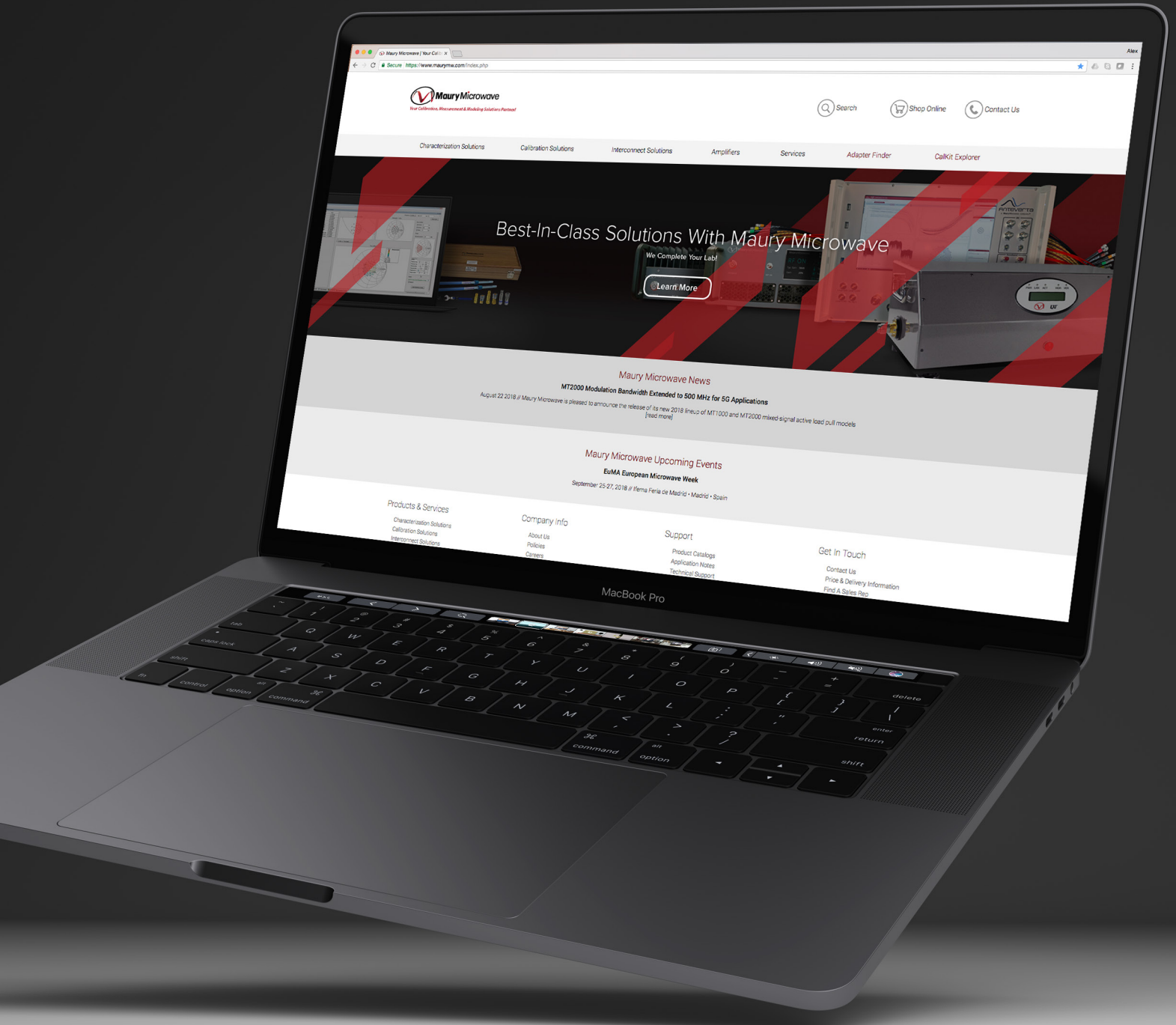
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