Multiport/Differential Characterization



The use of differential circuit topologies is becoming increasingly common in a wide range of RF applications.

This solution enables on-wafer multiport or balanced devices and circuits to be characterized to frequencies as high as 8.5 GHz. This turnkey on-wafer solution includes dual high performance characterization probes, a differential ISS (Impedance Standard Subatrate), an Agilent ENA Series RF network analyzer and Cascade's probing system.

Benefits of this differential test solution:

- complete understanding of differential devices and components
- significantly improved characterization engineering productivity
- reduced modeling and design cycle times
- substantial time and cost savings
- the most advanced technical test capability available
- improved productivity and reduced time-to-market for next generation chips

CASCADE® MICROTECH

Innovating Test Technologies®

Solution Architecture

Cascade Microtech:

- High performance single and dual characterization RF probes
- Dual and Differential on-wafer calibration standards
- Semiautomatic or manual RF probe stations

Agilent:

- ENA Series RF network analyzer

This solution expands the technical frontier through:

From Cascade Microtech

- **Dedicated calibration substrates** for GS/SG and GSG contact configurations.
- **Multiport and differential calibration substrates:** these dedicated substrates for dual RF probes (GSGSG, GSSG, SGS, GSGS) ensure fast, accurate, and repeatable high frequency wafer probe calibration.
- **High performance characterization dual RF probes** available in multiple configurations (GSGSG, GSSG, SGS, GSGS, SS) and pitches. Excellent tip visibility at probe tip allows accurate probe placement on DUT contact pads. Individually supported contacts provide outstanding compliance for non coplanar surfaces. The machined coplanar tips are designed to ensure these probes are easy to planarize and align and reduce pad damage.
- **Innovative GSGSG tip design:** machined coplanar tip designed with shared common ground, ensures smaller center ground pad size, less pad damage, greater data integrity.
- **Reduced contact size tips available** to allow probing small pads.
- **State-of-the-art family of RF probe stations** that can be easily reconfigured for multiple RF and parametric applications ensuring significant improvements in asset utilization and engineering productivity.

From Agilent Technologies

- **Innovative multiport/balanced RF network analyzer:** ENA Series RF network analyzer has built-in balanced measurement capability with 16 traces and 16 channels display capability. It enables users to easily evaluate single-ended to differential or differential to differential components.
- **3 GHz and 8.5 GHz frequency selection** covers RF wireless communication IC component applications.
- **High performance** 125 dB dynamic range, 1 mdBrms trace noise, and measurement speed as fast as 9.6us/pt provide full capabilities to measure wide variety of components.
- **Easy-to-use user interface:** 10.4-inch color LCD display with touch screen and conventional softkey user interface makes it easier for users to quickly start component evaluation.
- **Touchstone s2p, s3p, s4p supported** enables transfer measurement data to circuit simulation software like Agilent ADS. It improves engineer's modeling and design efficiency.
- **Built-in 2-, 3-, 4-port selection** to measure multiport single-ended components.
- **Embedding/de-embedding capability** to remove/add fixture's circuit characteristics mathematically.

These advantages result in increased accuracy and measurement repeatability. In addition, they significantly increase the productivity of characterization engineers, while, at the same time greatly improving the return on the substantial investment RF semiconductor companies must make in wafer-based test systems.

Supporting literature

On wafer Multiport Calibration using the ENA with Cascade Microtech Probe System app note (ENA-MULTI-APP-0602)
On wafer Balanced Component Measurements Using the ENA Series app note (ENA-BAL-APP-0602)
On-wafer multiport calibration using the ENA Series RF network analyzer with the Cascade Microtech probing system (5988-5886 EN)
ISS data sheet (ISS-DS-0602)
Probe head selection guide (RFPSG-1000)
Summit Stations data sheet (RFMICRO-DS-1001)

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