Millimeter Wave Device Characterization Solution



Leading-edge devices using SiGe, InP and GaAs technologies now operate at frequencies to 110 GHz and beyond. The transition to Silicon Germanium processes allows companies to create powerful new micro-communication devices. Due to increased competition, bringing these devices to market faster, cheaper and with higher performance is now a requirement. This turnkey solution combines the necessary tools to fully characterize these devices from 45 MHz to 110 GHz.

Benefits of this millimeter-wave solution:

- significantly improves characterization engineering productivity
- reduces modeling and design cycle times
- substantial time and cost savings
- the most advanced technical test capability available
- reduced time-to-market for next generation chips

CASCADE® MICROTECH

Innovating Test Technologies®

Solution Architecture

Cascade Microtech

- High performance characterization probes
- High performance millimeter-wave on-wafer calibration standards
- WinCal™ Calibration Software
- Wavevue™ Measurement Studio software
- State-of-the-art 200 mm and 300 mm probe stations

Agilent

- 8510 XF Network Analyzer

This solution expands the technical frontier through:

From Cascade Microtech

- **MicroChamber**® available on 200 mm and 300 mm stations, this capability eliminates the need to re-configure the test system between RF and parametric tests on the same wafer, thus improving test engineer and test equipment asset productivity. It also reduces the possibility of damage to expensive 1 mm coaxial cables and MMW modules. In addition, system integrity is ensured and there will be no need for continual re-qualification of the system.
- **Cascade's industry leading thermal test range capability (-65°C to 200°C)** permits modeling of 110 GHz devices over temperature
  – ensuring a more accurate and comprehensive device model.
- **Thermally isolated auxiliary chuck:** the calibration substrate resides on this chuck. The thermal isolation from the main chuck ensures the accuracy and integrity of the calibration is maintained during over temperature test. The load impedance on the substrate remains 50 Ohms in spite of changes to the main chuck temperature.
- **High-performance characterization probes to 110 GHz:** excellent tip visibility at the probe tip allows accurate probe placement on DUT contact pads. Individually supported contacts provide outstanding compliance for non-coplanar surfaces. The machined coplanar tips designed to ensure these probes are easy to planarize and align and reduce pad damage.
- **Reduced contact size tips** allow probing small pads.
- **Mode-free millimeter-wave calibration standards** provide uncompromised calibration performance and accuracy.
- **WinCal Calibration Software:** the use of Cascade's patented, advanced LRRM calibration technique demonstrated to be the most accurate method for calibration to 110 GHz.
- **Wavevue Measurement Studio** is a software package that combines the necessary tools to help RF test engineers fully characterize an RF semiconductor device. It includes S-Parameter measurement and parameter transformations, DC Bias and IV curves.
- **State-of-the-art family of RF probe stations** can be easily reconfigured for multiple RF and parametric applications ensuring significant improvement in asset utilization and engineering productivity.

From Agilent Technologies

- **8510 XF** provides the industry leading measurement performance, dynamic range, and measurement accuracy.
- **True single sweep system from 45 MHz to 110 GHz:** the reflectometer placed right behind the test port ensures the system is less susceptible to drift. This leads to increased measurement accuracy and productivity as the system is not required to be recalibrated as often.
- **Broadband performance** achieved without increased stability problems caused by couplers after the test ports.
- **Ability to accurately control power at test ports** with power control range of greater than 20 dB at 110 GHz.
- **Power leveling:** power measurements performed at any time without the need to calibrate. Ability to measure absolute power and 1-dB compression, without additional preparation.
- **Precision IEEE standard 1mm connector:** designed to maximize strength, increase durability, and provide highly repeatable interconnects.

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

Agilent 8510XF Vector Network Analyzer Product Overview (5965-9888E)
Using Power Leveling to Control Test Port Output Power – 8510XF (5968-5270E)
Data Sheets:
Nucleus (NUCLEUS-DS-0901)
WinCal (WINCAL-DS-0602)
Wavevue (WAVEVUE-DS-0602)
Summit Stations (RFMICRO-DS-1001)
ISS (ISS-DS-0602)
Probe head selection guide (RFPSG-1000)
LRM & LRRM calibrations app note (AR114)
Comparing the Accuracy app note (AR132)
Probe training video CD ROM (124-986)

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Innovating Test Technologies® for better measurements faster

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