

Differential mmW on-Wafer Measurements up to 110 GHz with R&S ZNA67EXT



Integrated system for differential mmW characterization with R&S(R)ZNA Vector Network Analyzer and MPI TS350-SE Fully-Automated Probe System

YOUR TASK

Measuring the electrical characteristics of devices on the wafer is crucial during the development, validation and production of 5G, 6G and mmWave components. These measurements are essential for advancing technologies in telecommunications, defense and space applications.

The precise characterization of amplifiers, mixers and lines is essential for the later integration into modules and products. In addition, maximum throughput in production requires precise and quick on-wafer sample testing.

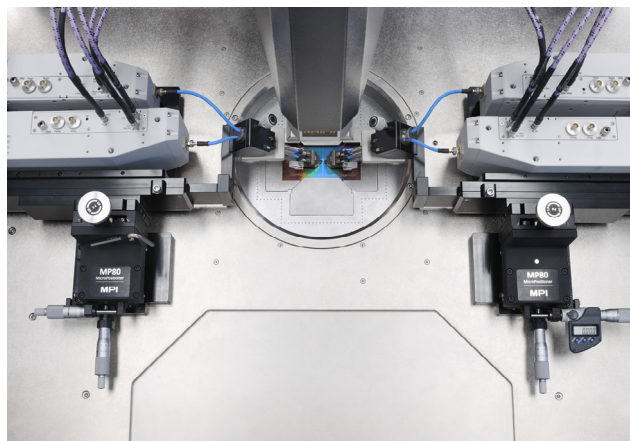
ROHDE&SCHWARZ SOLUTION

To address the challenges of differential on-wafer measurements up to 110 GHz, the R&S®ZNA67EXT vector network analyzer (VNA) offers a comprehensive single sweep solution.

The measurement setup combines the R&S®ZNA67 base unit with external frequency converters, enabling precise and repeatable measurements up to 110 GHz.

A key advantage of the measurement setup lies in its mechanical integration with MPI Corporation's probe systems. The frequency converters are mounted sideways, minimizing the distance between converters and RF probes. This thoughtful design reduces cable bending and signal path length, enhancing mechanical stability and overall RF performance.

The setup supports both virtual and true-differential configurations, offering flexibility for diverse device under test (DUT) scenarios. The VNA's architecture boasts multiple phase-coherent sources and parallel measurement receivers, enabling accurate multiport and true differential mixed-mode S-parameter analysis across the entire mmWave range.



Mechanical integration for MPI's IceFreeEnvironment™ (IFE) systems

RF PROBING INTEGRATION AND STABILITY

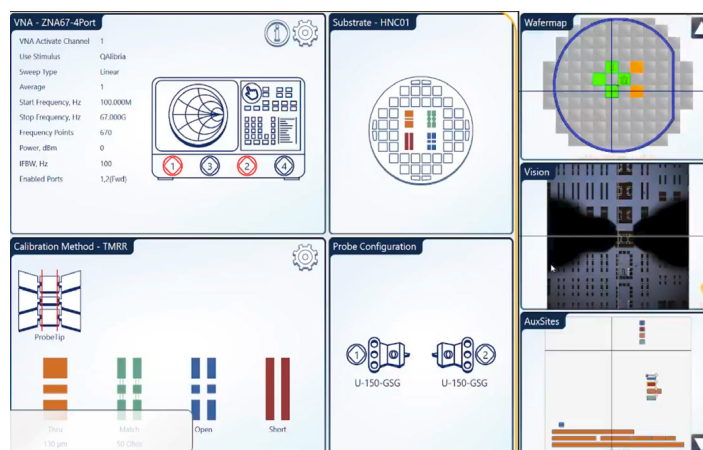
The setup features an MPI high-performance probe systems, available in manual and automated configurations, with thermal chuck options and vibration isolation options for stable probing. For the setup shown above, the RF interface relies on the MPI mmWave Dual TITAN™ Probes T120MS-GSGSGXXXX, which are optimized for differential measurements up to 120 GHz. These probes deliver exceptional lifetime, return loss, insertion loss and port isolation across the mmWave range as well as optimized tip visibility for precise pad contact.

To ensure repeatability and phase stability, MPI has developed a dedicated mechanical integration fixture that securely mounts the frequency extenders to the probe station. This fixture minimizes cable bending and movement, maintains consistent cable paths and shortens the RF signal path. This results in enhanced directivity, reduced loss and highly stable measurements across repeated touchdowns. The unique MPI RF probe arm embedded mechanical feedthrough ensures light-tight measurements without affecting the probe positioning on MPI's ShieldEnvironment™ (-SE) system platforms..

Calibration is performed using MPI TCS dual calibration substrates that are designed specifically for GSGSG configurations and matched to the probe's pitch.

The MPI TCS family is the next generation of calibration substrates designed to implement the latest achievements and recommended practices of the wafer-level RF calibration techniques. With the unique peer-terminated standards, it became possible to achieve outstanding calibration accuracy at frequencies beyond 110 GHz.

The MPI QAlibria® and SENTIO® software provide full support, enabling quick, accurate, reliable and fully automated calibration not only at the probe tips, but also when using on-wafer calibration standards and over wide temperature ranges.



QAlibria® wafer-level RF calibration software

SUMMARY

By combining cutting-edge RF performance with smart mechanical integration and advanced calibration tools, this setup streamlines complex mmWave testing into a reliable, efficient workflow.

The co-developed solution supports high frequency and high-precision applications with minimal setup complexity and maximum measurement integrity.

Together, the R&S®ZNA67EXT and MPI Corporation's probe systems provide a robust and precise solution for differential on-wafer measurements up to 110 GHz that meets the stringent demands of advanced semiconductor testing and characterization.

See MPI Corporation's Terms and Conditions of Sale for more details.

Direct contact:
Asia region: ast-asia@mpi-corporation.com
EMEA region: ast-europe@mpi-corporation.com
America region: ast-americas@mpi-corporation.com

MPI global presence: for your local support, please find the right contact here:
mpi-corporation.com/ast/support/regional-sales-contact

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