

# Sub-THz Wideband Modulated Device Characterization

Enabling Accurate, Reproducible & Scalable Wafer-Level Testing at subTHz Frequencies

## OVERVIEW

MPI Corporation, in collaboration with Keysight Technologies and Virginia Diodes Inc. (VDI), delivers a high-performance solution for **wafer-level wideband modulated device characterization**. This joint development turns complex sub-THz testing into a fast, simple, and accurate process—enabling high-fidelity measurements for next-generation wireless technologies like 6G.

## TECHNICAL CHALLENGES ADDRESSED

Testing wideband devices at sub-THz frequencies introduces several significant challenges. The combination of extremely high frequencies and wide bandwidths leads to a substantial degradation in Signal-to-Noise Ratio (SNR), making it harder to distinguish the signal from background noise. Additionally, the frequency response and impedance matching of the device test fixture and measurement setup can vary considerably across the wide frequency range, affecting the accuracy and repeatability of measurements. Compounding these issues, noise and errors introduced by the test system itself become increasingly prominent, further elevating measurement uncertainty and complicating the reliable characterization of devices. This collaboration focuses on solving these issues through advanced system integration, high-precision mechanical design, and calibration innovation.

### Advanced Wafer-Level Testing

- Support frequency from 75 to 330 GHz (banded) up to 40 GHz of instantaneous bandwidth with the capability to measure less than 1% EVM.
- Cross-platform probe station integration: from manual TS25-THZ to advanced automated system such as TS2000-IFE, offering ultra-stable positioning and excellent thermal & mechanical performance
- Capable of supporting both GSG and differential probing with minimal footprint

### Measurement System Integration

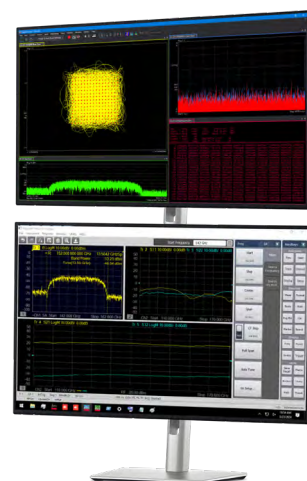
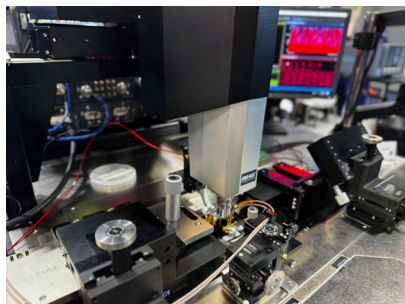
- Compact and scalable system configuration with VDI frequency extenders and multipliers
- Seamless integration with Keysight PNA-X vector network analyzers, VDI frequency extenders and arbitrary waveform generators
- Enhanced signal integrity, minimal conversion loss, and maximized SNR

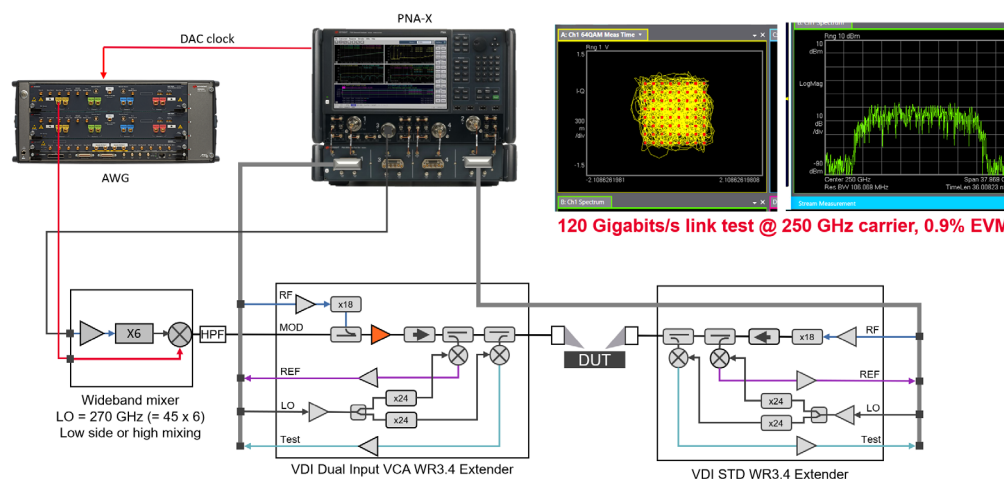
### Metrological-Grade Calibration

- Native integration with QAlibria® software for automated, high precision RF calibration
- Tailored calibration workflows for wideband modulated signal paths across sub-THz frequencies

### Applications

- 6G RFIC & MMIC characterization under real operation conditions
- Wafer-level packaging and antenna-in-package (AiP) validation
- Design validation & small-scale production screening of sub-THz IC





On-wafer WR3.4 (220 to 330 GHz) Wideband (up to 40 GHz bandwidth) Modulated Measurement Setup

## COLLABORATIVE INNOVATION

This solution exemplifies MPI's role in system-level innovation—bridging precision mechanical engineering with next-generation RF and mmW measurement techniques. The result is a robust, field-ready platform that empowers semiconductor and telecom R&D to validate their most advanced designs with confidence.

## TS2000-IFE FULLY-AUTOMATED PROBE SYSTEM

The TS2000-IFE is MPI's most versatile 200 mm automated probe platform, purpose-built for advanced RF, mm-Wave, and Silicon Photonics applications. It incorporates IceFreeEnvironment™, enabling reliable wafer-level testing from -60°C to +300°C without ice formation, while supporting both micropositioners and probe cards simultaneously. This ensures precise thermal control and stability for demanding mmW and load-pull measurements.

In addition, WaferWallet®MAX delivers up to 10x higher productivity by automating testing across multiple wafers, with fast thermal transitions, reduced soak times, and advanced wafer swapping—making the TS2000-IFE ideal for transitioning from lab to fab environments.



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

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