DATASHEET

Hyperion II System

Atomic force probe nanoprober for fast transistor probing and current imaging

The Hyperion II System is a Atomic Force Prober (AFP) based nanoprobing platform that employs multiple scanning probe tips to image and electrically contact the device under test for fault localization and electrical characterization in support of semiconductor technology development, yield engineering and device reliability improvement.

AFP technology in the Thermo Scientific™ Hyperion™ II System also provides two unique image-based fault localization capabilities, PicoCurrent and Scanning Capacitance Microscopy (SCM) which increase user productivity by decreasing the time required to localize a fault. PicoCurrent and SCM scan large areas to identify suspected shorts, opens, leakage paths and resistive contact faults. The suspected faults identified by PicoCurrent or SCM are then confirmed by nanoprobing thereby reducing or eliminating the need to nanoprobe large numbers of individual devices.

Hyperion II System

The Hyperion II system includes an AFP probe station, nitrogen purged acoustic enclosure, a granite top active vibration isolation table and a Nano-Accurate Positioning (SNAP) Stage for precise sample navigation to the region of interest (ROI). The Hyperion II system can be configured with either four (4), six (6), or eight (8) AFP probe heads. The Hyperion II system utilizes non-contact (tapping mode) imaging which produces high resolution topography images while minimizing sample and probe damage Hyperion II system operation and electrical measurements are performed with MultiScan IV software which tracks the position of each probes relative to one another and to the sample.

Additional MultiScan IV features include automated tip exchange and software controlled measurement switching between CV, DC IV, and Pulsing which eliminates the need for manual re-cabling. The Hyperion II system also automates probe tip approach and landing with closed loop probe force feedback simplifying operation and increasing productivity.

Key benefits

Fast fault localization, integrated PicoCurrent Imaging and Scanning Capacitance Microscopy (SCM) quickly identifies fault candidates for nanoprobing

eFast guided operation, semi-automated step by step guided operation for increased productivity, ease of use and reduced training burden

No ebeam-sample interaction, atomic Force Probes image and probe features, eliminating need for SEM imaging and vacuum system

Nanoprobing applications

PicoCurrent imaging

PicoCurrent identifies suspected shorts, opens, leakage paths and resistive contact faults over a large area by scanning a Hyperion II AFP probe in contact mode while connected to the input of a high gain current amplifier with the probe or sample biased with respect to the other. Current is measured as the probe is scanned across the region of interest to produce a current map. Faults candidates are identified visually from the map if one structure does not match similar structures in the image. The fault candidates can then be verified and characterized with I-V probing to measure current-voltage curves.

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Current voltage (I-V) measurements

The Hyperion II system combines measures current-voltage curves, without introducing measurement-related shifts associated with electron beam – sample interaction. The DC Measurement Software allows users to easily create, save and run electrical tests through the main user interface. The DC characterization system includes an industry standard parametric analyzer and is designed for low-noise measurements.

eFast guided workflows

eFast is a semi-automated, guided workflow that steps users through core tasks, automatically performing some steps while providing specific instructions for others. eFast helps to get uniform results across users and minimizes training time for new users.

Scanning Capacitance: (optional)

Scanning Capacitance Microscopy (SCM) identifies faults over a large area by scanning the Hyperion II AFP probe in contact mode while connected to an ultra-high-frequency (1 GHz) detector which measures variations in the tip to sample capacitances induced using an AC-bias applied between tip and sample. After rectification with a lock-in amplifier the dC/dV signal is mapped and faults are identified visually from the map if one structure does not match similar structures in the image. The dC/dV signal can also be separated into amplitude and phase data revealing information about carrier type and relative carrier concentrations.

C-V characterization (optional)

C-V is used to study oxide layers, interface traps and charge carrier densities. The Hyperion II system offers high resolution C-V measurements with excellent impedance control, low leakage and very low noise for characterization of individual transistors, in-die capacitive structures and capacitive test structures.

Pulsed I-V measurements (optional)

Pulsed I-V measures transistor I-V curves in response to high speed signals sent to the transistor gate. This is used to localize failures associated with resistive gates that would be missed by standard DC I-V measurements. The parametric analyzer is integrated with a high speed pulsed and oscilloscope to conduct pulsed I-V measurements and capture results.

Thermal probing (optional)

Provides ability to localize faults only seen at high temperatures and characterize performance of devices at a range of temperatures.

Summary

The Hyperion II Atomic Force Prober (AFP) based Nanoprobing platform provides unique capabilities that make it an extremely versatile and easy to use high throughput nanoprobing system and ideal for transistor probing at the most advanced nodes.

Find out more at **thermofisher.com/EM-Sales**

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