KLA-Tencor Introduces 10th Generation E-beam Inspection System, Enabling 4Xnm and 3Xnm Production

SAN JOSE, Calif.--(BUSINESS WIRE)--

Today KLA-Tencor Corporation (NASDAQ:KLAC) introduced the eS35 e-beam inspection system, capable of detecting and classifying smaller physical defects and more subtle electrical defects at significantly higher speeds. As the tenth generation e-beam inspection system from KLA-Tencor, the eS35 features improved sensitivity and advances in on-board review and binning, along with substantial throughput gains, to accelerate yield of 4Xnm and 3Xnm devices.

"E-beam inspection is essential to capture and identify the smallest defects, as well as defects that can be detected only through their electrical characteristics. However, as fabs begin to explore the 4Xnm and 3Xnm nodes, they are reporting that today's e-beam inspection systems are unable to capture certain defect types consistently -- such as small residues at the bottom of high aspect-ratio capacitors in DRAM, subtle bit-line bridges in advanced flash, or sub-surface shorting or piping in logic devices," observed Zain Saidin, group vice president and chief engineer of KLA-Tencor's e-beam technology division. "As the leader in e-beam inspection, we were able to leverage our experience and resources to attack this problem, not only through advances in the e-beam system itself, but also by incorporating proprietary image computing technology from our industry-leading optical inspection systems. The result is a next-generation e-beam tool with unparalleled sensitivity, as well as throughput performance that allows fabs to operate the tool at high sensitivity inline. The eS35 is designed to enable our customers to bring their next-generation devices to yield as quickly and efficiently as possible."

The eS35 features significantly higher beam current density, a smaller pixel, and a faster data rate to deliver improved capture of the smallest defects at throughputs two to four times that of its predecessor, the industry-leading eS32. These advances are aided by a lower noise floor and algorithms which maximize sensitivity in each region of the die, across the wafer. Extended sensitivity, together with the widest range of beam conditions and pre-scan conditioning options in the industry, enable the eS35 to capture defects across an unparalleled range of defect types and materials.

Once a representative defect population has been captured by the eS35, the newly enhanced on-board review capability provides high resolution images of defects of interest. A rules-based binning application, based on algorithms from the KLA-Tencor optical inspection systems, classifies the defects with superior accuracy and purity. The result is a defect Pareto that allows defect or yield engineers to correct the cause of the defect excursion with minimal impact on work-in-progress.
Building on the success of the eS3x family, the e-beam inspection tools of record in most advanced fabs, KLA-Tencor has shipped eS35 systems to memory and logic customers in Asia, the United States and Europe. The system is currently being used for 6Xnm and 5Xnm device production, 4Xnm ramp, and 3Xnm development, capturing a wide range of defect types on both front-end and back-end layers.

**eS35 TECHNOLOGY SUMMARY**

**Industry-leading Defect Capture**

**Sensitivity**

The eS35 e-beam inspection (EBI) system introduces several technical advances to increase capture of yield-limiting electrical and small physical defects. Beam current density up to 2.5 times that of its predecessor, along with a smaller spot size and hardware advancements that allow an overall lower noise floor, deliver improved sensitivity to the smallest physical defects and most subtle voltage-contrast (VC) issues. Algorithms derived from KLA-Tencor’s brightfield inspectors reduce nuisance and deliver greater sensitivity in every area of the die, resulting in an improved defect-of-interest percentage. As a result, defect maps demonstrate significantly enhanced correlation to e-test results.

**Breadth of defect type capture**

The widest range of column conditions (beam current, Wehnelt voltage, landing energy) in the industry, together with expanded pre-scan conditioning options, enable the eS35 to address the widest range of materials and layers in the industry.

**Systematic defect detection**

Because systematic defects can have tremendous yield impact, the eS35 incorporates KLA-Tencor’s patented microLoop(TM) technology. With or without a test wafer, the microLoop proxy provides accelerated detection of systematic defects, and is particularly advantageous for logic and flash devices.

**Fastest Time to Actionable Defect Pareto**

**Throughput**

With data rate increased to 800 mpps, and higher beam current to enable pixel migration, the eS35 inspection system delivers two to four times the throughput of its predecessor. The increased speed can enable higher sensitivity operation, or more statistically robust sampling for tighter process control.

**Defect Review and Classification**

Improved on-board review image quality and new defect binning algorithms enable engineers to identify and resolve defect issues more quickly. Better review image quality enables faster recipe setup and is fundamental to more accurate defect classification. A combination of rules-based binning and nearest-neighbor algorithms improve classification purity and accuracy, while real-time context-based binning automatically assigns VC defects to specific microstructures.
About KLA-Tencor: KLA-Tencor is the world's leading provider of process control and yield management solutions for the semiconductor and related microelectronics industries. Headquartered in San Jose, California, the Company has sales and service offices around the world. An S&P 500 company, KLA-Tencor is traded on the NASDAQ Global Select Market under the symbol KLAC. Additional information about the Company is available at http://www.kla-tencor.com.

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