Unpatterned Wafer Surface Inspection

THE SURFSCAN SP2 WAFER SURFACE INSPECTION SYSTEM provides the increased sensitivity and throughput needed to enable qualification of current and next-generation substrates, as well as qualification and monitoring of process tools, at the 90-, 65- and 45-nm technology nodes and below. By minimizing the risk of migration to smaller geometries, this system also facilitates rapid fab ramps. Incorporating revolutionary ultraviolet (UV) laser technology, new darkfield optics and advanced algorithms, the Surfscan SP2 finds defects as small as 30nm, and throughputs up to 5x those of the prior-generation tool. Moreover, it is the only solution that provides consistent, high sensitivity defect detection on engineered substrates, such as silicon-on-insulator (SOI), strained silicon and strained SOI.

PRODUCT DESCRIPTION

UV Illumination Technology The most advanced surface-inspection tool ever introduced, the Surfscan SP2 features UV illumination technology that allows the system to span both today’s and tomorrow’s technology nodes and materials.

Enables Front-End-of-Line (FEOL) Sensitivity at 65/45 nm The Surfscan SP2’s proprietary short-wavelength UV technology delivers ultimate sensitivity down to 30-nm defect sizes—addressing the critical sensitivity gap in the gate module at the 65- and 45-nm nodes.

Enables Increased Sensitivity on Films The UV darkfield optical design provides significantly improved sensitivity on all film types and thicknesses. It is especially beneficial on transparent films, such as low-k and high-k dielectric films; rough films, including gate poly; and all new film materials, especially organic low-k dielectrics.

Enables Engineered Substrate Inspection The SP2’s specific wavelength represents a breakthrough in sensitivity on engineered substrates, which introduce an entirely new set of control parameters and challenges compared to traditional polished and epitaxial wafers. The Surfscan SP2 eliminates interference effects arising from multiple reflections from interfaces between silicon and buried-oxide (BOX) layers on SOI and sSOI. These effects, which occur when using traditional visible-wavelength inspection tools, can cause inconsistent and false defect readings, as well as reduce overall defect sensitivity.

Comprehensive Surface Inspection Building on the proven capabilities of its predecessor, the Surfscan SP2 delivers the most comprehensive surface inspection available, including darkfield inspection (scattering defects), haze measurement (wafer surface quality) and a new data channel for surface imaging (spatially extended surface anomalies)—all in a single scan. The system can perform normal or oblique illumination, and has a larger axisymmetric multi-channel collection system than that found in the Surfscan SP1DLS, enabling the highest critical defect capture at production throughput.

Advanced Haze Monitoring Advanced haze-monitoring algorithms provide critical information that correlates to a broad spectrum of device performance attributes, such as DRAM cell retention time and source/drain parametrics, which can be monitored by statistical process control (SPC) charts to detect process tool excursions before devices are impacted.

Surface Imaging Channel A new surface imaging data channel enables easy identification of spatially extended surface anomalies, such as local variations in surface micro-roughness which can impact device performance and parametrics.

Optimized Throughput The Surfscan SP2 enables significantly increased throughput (up to 75 wafers-per-hour on 300-mm wafers) at sensitivities beyond those achievable by visible-wavelength inspection tools. Throughput has been enhanced by introducing a new dual front-opening interface mechanical standard (FIMS) handler and dual-arm robot, a faster processing architecture and image computer, a new faster software platform and an improved electronics infrastructure.

Real-Time Defect Classification (RTDC) The Surfscan SP2 can perform rapid failure analysis and root-cause analysis on a broad range of defect types, including crystal-originated particles (COPs), epitaxial wafer stacking faults, slip lines, scratches, clustered defects, and accurate defect sizing.

Improved Edge Exclusion and Handling The Surfscan SP2 features 2 mm edge exclusion as standard, providing maximum coverage of the wafer surface. It’s production proven (SP1) edge handling capability enables inspection without backside contact and the industry’s lowest backside contamination specification—a critical requirement for 300-mm double-sided polished wafers.

Improved Coordinate Accuracy The new Surfscan SP2’s coordinate accuracy for darkfield defects is more than twice as good as that of the Surfscan SP1DLS at equivalent throughput. This capability allows easy review on optical and scanning electron microscopes to enable faster problem root cause determination.

New Windows XP-Compatible Software Platform With advanced algorithms that provide faster data processing and fast recipe creation, the Surfscan SP2 offers improved ease of use compared to the SP1. Surface quality templates for both wafer and IC manufacturers enable even the novice user to quickly create a recipe and collect data.

OPTIMIZED TOOL SUPPORT

Surfscan SP2 is compatible with KLA-Tencor’s iSupport network, which includes expert onsite tool support, 7x24 online support, expedited parts replacement, and e-diagnostics built into the tool, enabling it to perform at maximum efficiency.
KLA-TENCOR: ACCELERATING YIELD

KLA-Tencor’s portfolio of solutions includes the industry’s broadest fleet of advanced inspection and metrology systems, which enables customers to capture yield-critical defect and metrology data. It also includes the sophisticated software to turn that data into quick corrective action. Finally, it includes the expertise to help customers rapidly understand and resolve complex manufacturing problems so they can reap the financial and market rewards associated with faster time to market and increased product yields.

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