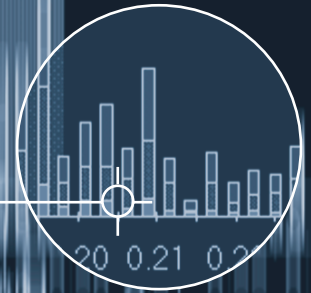**Spatial Signature Analysis**

Klarity SSA

KLA-Tencor

KLARITY® SSA IS AN ADD-ON PROCESS MONITORING CAPABILITY for KLA-Tencor's proven family of Klarity yield analysis software. Supported by all KLA-Tencor inspection tools, Klarity SSA employs a sophisticated, proprietary algorithm to perform automated detection and classification of spatial signatures (i.e., defect clusters and patterns), which can indicate an out-of-spec process or a process tool problem. Using Klarity Defect, KLA-Tencor's defect line monitoring software, defect and yield engineers can import and analyze wafer-map data generated by their inspection tools and then deploy Klarity SSA to automatically characterize and group defect clusters by their identifiable signatures. With Klarity SSA incorporated into their process-control strategies, fabs can accelerate their yield learning and improve baseline yields, while greatly streamlining their manufacturing processes.

PRODUCT DESCRIPTION

Enhanced Excursion Detection Klarity SSA automatically detects and classifies signatures on excursion wafers that are currently "beneath the radar," i.e., wafers that are within spec based on raw defect count, or on random defect and cluster count. The capability complements KLA-Tencor's existing Decision Flow Analysis (DFA) technology while adding an additional data filter that allows greater insight into the manufacturing process.

Zonal Analysis Klarity SSA can combine SSA classes (e.g., ring, radial, scratch, line, area, and slip line) with pre-defined zones on the wafer (e.g., edge, 9 o'clock) to further refine the defect signature identification process.

Root-Cause Analysis Once a spatial signature wafer map has been generated, the operator can then focus on determining the root cause by querying the defect database to search for and identify previously generated wafer map images with the same signatures. A signature library can be created based on the information from Klarity SSA and Klarity Defect, and it can be easily updated each time a new type of signature is identified.

Fab-Wide Control Solution Together with Klarity ACE and Klarity Bitmap, Klarity SSA works with the Klarity Defect fab-wide data management system, enabling greater insight into the manufacturing process by giving fabs the ability to quickly and effectively convert defect data into relevant quantitative information.

Recipe Setup and Editing SSA recipes can be set up by inspection tool or tool cluster, by device layer, by the device itself, or by other user-defined parameters, such as operator, tool brand, or process. By collecting and analyzing data generated from Klarity Defect in the form of KLA Results File (KLARF) data sets, the user can easily clarify and adjust SSA recipes. Recipe maintenance is done offline.

SSA Service Automatically performs SSA on any incoming KLARF, delivering an enhanced results file. With SSA Service Manager, you can configure tools and data paths, view log files, and determine the appropriate SSA recipe to use as a function of tool, layer, and device.

Optimized for Klarity Defect 2.6 Klarity Defect 2.6 is "SSA ready," with the ability to load signature IDs and classes, as well as filter, chart, and count SSA attributes—including wafer-level filtering based on defect attributes (e.g., existence of a signature type).

Open Architecture In addition to being supported by all KLA-Tencor inspection tools (brightfield, darkfield, e-beam, and unpatterned), Klarity SSA features an open architecture approach—requiring only the use of industry-standard KLARF data sets—that enables broad implementation of this valuable new signature identification and analysis capability.

User-Friendly Views View screens are designed with ease of use in mind—with the click of a button, the operator can perform a host of tasks. These include configuring SSA load data to create recipes; editing recipes by choosing, disabling, removing or reordering rules; accessing and viewing zonal analysis data; and viewing/analyzing excursions.

Next-Generation Capabilities The initial version of Klarity SSA will focus on line and tool monitoring. Capabilities to be incorporated into future revisions include ad-hoc engineering analysis and root-cause analysis with work-in-process (WIP) data.

OPTIMIZED YIELD MANAGEMENT

Klarity SSA integrates with KLA-Tencor software, hardware, and yield-management products to deliver a new level of defect detection and analysis—one that becomes increasingly important in the 300-mm wafer era. With modern 300-mm fabs costing upwards of $3 billion to build, process-induced signature defects can spell disaster for fab managers under pressure to push productivity and yields ever higher. Klarity SSA is the solution to finding and fixing these defects as early in the manufacturing process as possible.

Klarity SSA

Klarity SSA Recipe
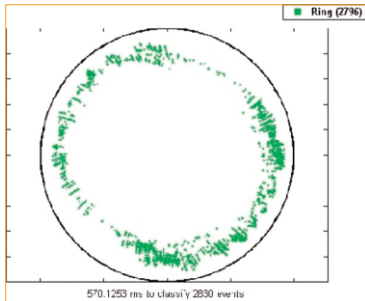
Example of a single signature.
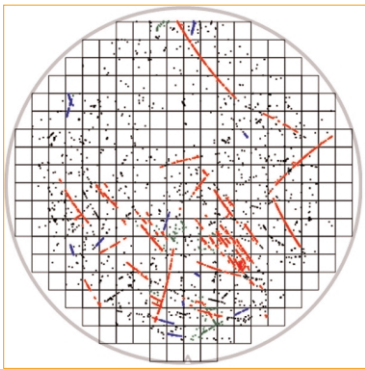
Klarity SSA features a scratch rule that works well on these types of scratches.

BENEFITS

Automatically identifies, analyzes and characterizes process-induced signature, or cluster, defects.

Provides insight into potential hazards of signature defects.

Allows early detection of process problems, eliminating signature defects on wafers before they infiltrate the entire lot.

Optimizes user interaction through convenient recipe setup and editing and user-friendly screen views, while minimizing human error in analysis process.

Facilitates integration into fab lines, due to open architecture.

Enables faster yield learning and streamlined manufacturing processes for both 200-mm and 300-mm fabs.

APPLICATIONS

- ➲ **Enhanced excursion detection**
- ➲ **Line and tool monitoring**
- ➲ **Backside inspection**
- ➲ **Root cause determination**

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.

KLA-TENCOR SERVICE/SUPPORT

Customer service and support are an integral part of KLA-Tencor's yield optimization solution. Our vast customer support organization services our worldwide installed base and is responsible for much of the support of our customers following shipment of equipment and software. This support includes secure online monitoring, on-site repair, telephone support, system installation, relocation services, and selected post-sales applications.