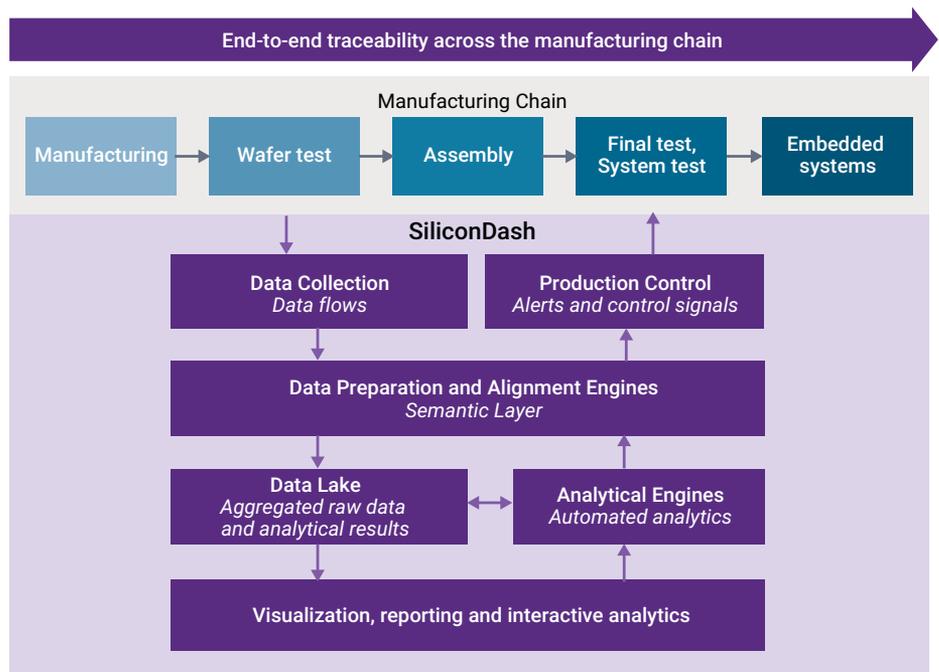


SiliconDash

Data Analytics for High-Volume Semiconductor Manufacturing and Test

Overview

SiliconDash is the next generation high-volume industrial big data analytics solution for fabless companies, IDMs, OSATs and foundries. It delivers comprehensive end-to-end real-time intelligence and control of IC manufacturing and test operations of your products for executives, managers, product engineers, test engineers, quality engineers, sustaining engineers, device engineers, yield engineers and test operators.



SiliconDash offers truly unprecedented engineering productivity by allowing you to focus on your job and providing you with incredibly valuable Insights instantly out-of-the-box all at your fingertips with no user setup, configuration or training required—an industry first. Other data analytics solutions in the market require significant configuration, training and ramp up time before delivering anything of value while consuming many man-hours and days of engineering productivity.

What are SiliconDash Insights

- Insights provide completely automated, unsupervised analysis and labeling of test data results along the semiconductor lifecycle
- Categories of Insights include test operations, retest and test efficiency, yield, quality/integrity, process and product
- Insights analysis run at data loading time and is systematically applied on all incoming data
- Insights analysis results are persisted in the backend and rolled-up for immediate visibility and quantification even in large data volumes
- Insights analysis results are available for visualization and can provide corrective action if required

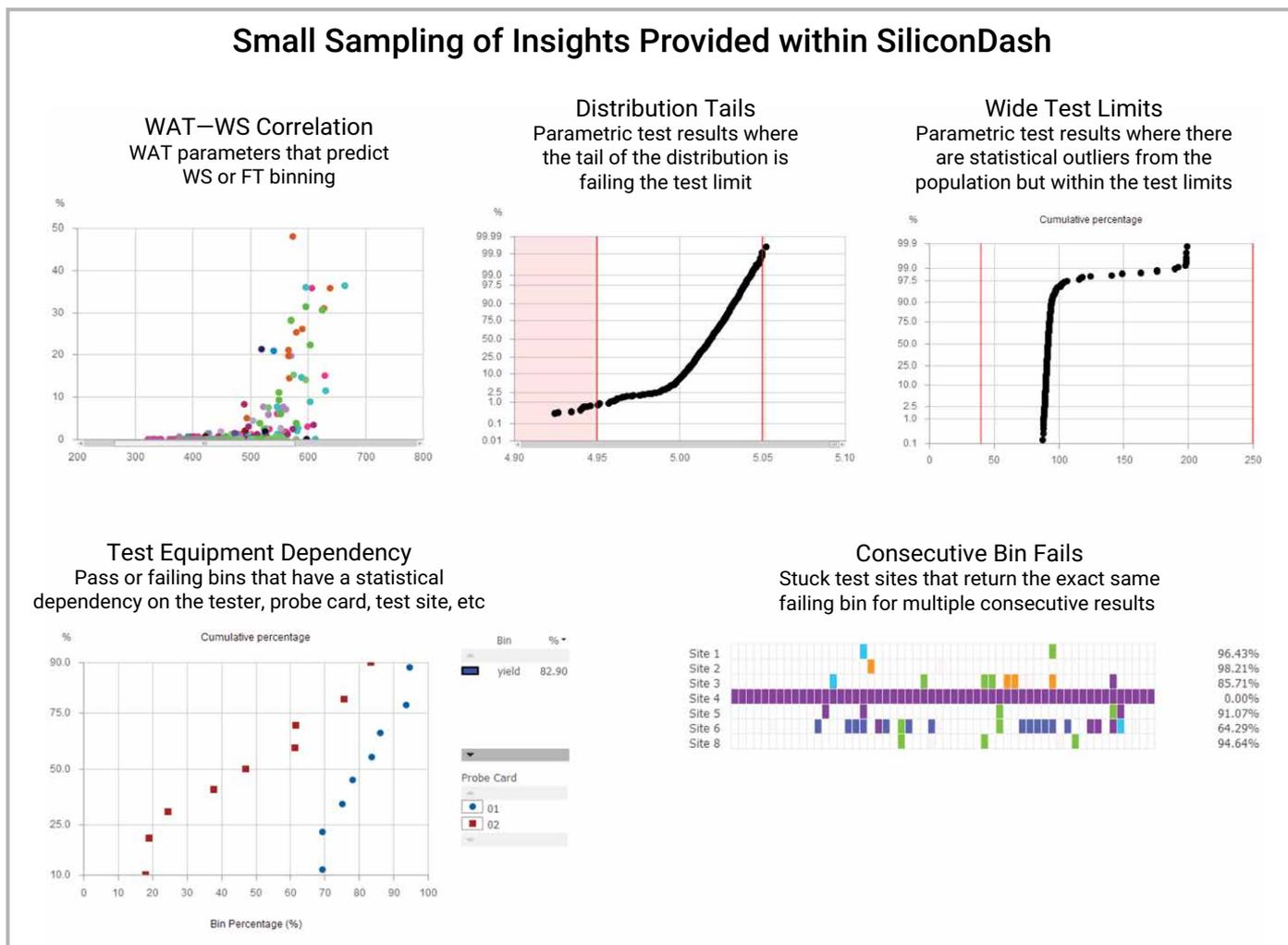


Figure 1: All Insights are instantly and automatically refreshed within seconds as your data continuously streams in independent of data volume

Architected with the User Experience in Mind

SiliconDash leverages modern high-speed web-based UI technology enabling ease-of-use and a worldwide collaborative infrastructure between users of different roles and profiles. SiliconDash has a flexible access model that enables you to securely access your data and analysis from anywhere in the world without having to be physically tied to your desktop. Once within SiliconDash, you can quickly analyze, triage and identify root causes of issues across all phases of the silicon lifecycle—from early product characterization and early yield analysis, through yield ramp, monitoring and management, through quality escape prevention and outlier detection, and onto sustaining engineering. It provides high-level production and engineering dashboards, as well as detailed visualization and drill-down capabilities for more in-depth analysis to quickly identify issues and track down root causes.

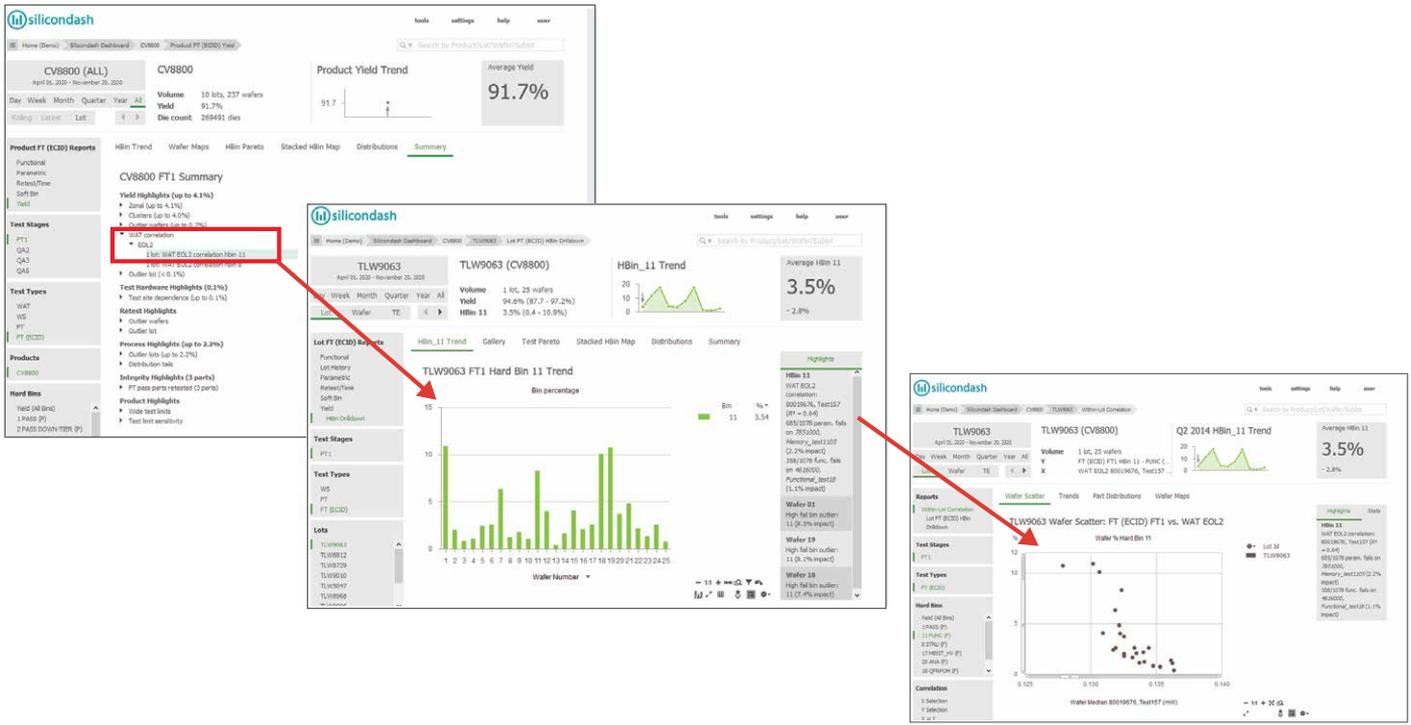


Figure 2: From hierarchical analysis to root cause in only a few clicks

Automated Production Control

SiliconDash goes beyond analysis turning Insights into corrective actions by providing full production control in the supply-chain automatically and in real-time. With the use of preconfigured libraries of recipes, algorithms and scripting support, users can configure and deploy rules running 24/7 on the manufacturing test floor that can intercept test operations upon triggering specific conditions known to be causing serious issues. These rules can be configured to automatically send out alerts or emails and if required, halt specific test operations altogether in real-time. For example, if there is an indication that a tester may be allowing test escapes into the final end product, that machine can be ordered to be stopped and wait for maintenance before being allowed to test any other parts.

Alternatively, dice on wafers that show a higher than normal number of probable-failure indicators during wafer-level testing, such as increased leakage, can be automatically binned out to prevent being packaged into products that require the highest quality, zero-defect assurances. Certain parts used in automotive systems and medical devices have strict zero defective parts per million (DPPM) requirements and some are starting to approach zero defective parts per billion (DPPB) to ensure the highest possible quality and prevent any catastrophic failures while the end product is in use.

Support and Traceability of Multi-Chip Modules (MCMs)

SiliconDash has the ability to trace and debug all of the dice that are associated with an MCM from field failures (RMAs) all the way back to the wafer before the dice were placed into an MCM package. By tracking each unique electronic chip ID (ECID) within a die, we can trace and correlate test results from the various manufacturing stages. In the event MCMs start showing poor yield results during final test (FT) or system-level test (SLT) or even if the MCMs fail further downstream in the field, you can trace back each individual chip within an MCM and correlate the test results from the various stages to isolate where the failure originated from. Typically, you may find the issue had appeared during wafer sort (WS) but was not detected. Once the issue is identified, you can incorporate preventative measures at WS that prevents faulty chips from escaping into future end products.

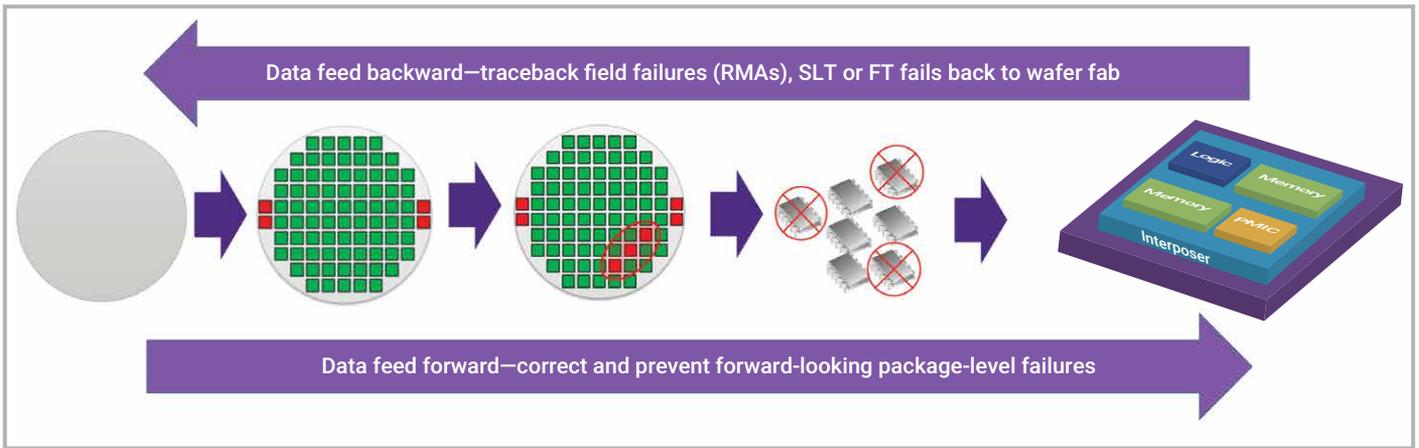


Figure 3: End-to-end part-level and MCM-level traceability and correction is made possible with SiliconDash

Data Sources, Data Volume and Data Quality

SiliconDash handles any volume of test data from any data source, equipment or supplier in any format. Built-in mechanisms providing real-time monitoring and repair of all incoming data guaranteeing data quality and completeness above 99%.

- Test Data
 - Wafer test data
 - Final test data
 - Bin, parametric and functional data
 - Fully compatible with ECID data
- Wafer Fab Data
 - Wafer Acceptance Data (WAT) and Process Control Monitoring (PCM) data

Interactive Charts and Table Widgets

- Wafer maps for bin, functional, parametric data
- Stacked wafer maps for thousands of wafers
- Scrollable wafer galleries and wafer-flows[®] capable of displaying 1000's of wafers
- Trends, pareto plots, CDF plots, histograms, box-plots, scatter plots
- Interactive features such as auto-zoom, select, highlight, and auto-drilldown on data points and data series

SiliconDash Benefits—Management

- Executive traffic light dashboards
- Real-time and historical operational overviews on all manufactured volume
- Automatically summarizing the main operational metrics and issues across all products, foundries, test houses, equipment, and organizations
- Automatic aggregation and categorization operational issues and prioritization by direct visibility of the values at-stake

SiliconDash Benefits—Quality Control

- Front-to-back part-level traceability - Full ECID support
- Powerful customer returns analysis
- 100% analysis exhaustiveness and uniformity across all products and technologies
- Fully reproducible analysis results and reporting
- Advanced built-in outlier detection algorithms - compliant with automotive standards
- Custom development of user defined outlier detection algorithms, including high-volume simulation and qualification
- Automated “across the supply chain” analysis and alerts in production triggered by incoming data

SiliconDash Benefits—Yield Management

- Continuously up-to-date yield trending and traffic-light dashboards for all products, product families, technologies, sites and organizations
- Easy prioritization of actions through automatically generated comprehensive issue Pareto charts
- Product and process yield analysis
- Root cause analysis
- Test yield analysis
- Process capability and process variability analysis
- Parametric and functional yield analysis
- Correlation analysis
- Equipment communality analysis
- Process corner analysis
- Multi product Pareto analysis
- Easy search of material with similar yield signatures

SiliconDash Benefits—Product & Test Engineering

- Yield analysis, monitoring and reporting
- Customizable engineering dashboards
- Root cause analysis
- Matrix lot analysis
- Scripting
- Across test stage / test type correlation—WAT, wafer test, final test
- Shift analysis
- Outlier analysis
- Test quality and test time optimization
- Re-test recovery analysis
- Test process capability analysis
- Tester, probe card, load board correlation analysis
- Test program limits analysis and tuning

SiliconDash Benefits—Sustaining Engineering

- Daily production analysis
- Yield and D0 reporting
- Customizable dashboards
- Automatic consolidation and aggregation of test data
- Real-time reporting and drill downs
- Root cause analysis
- Hold lot analysis and dispositioning
- Foundry yield feedback
- Test house feedback
- Early problem detection
- Scripting

Key Features

- Out-of-the-box access to full breadth of comprehensive dashboards and reports
- Users can generate custom dashboard views that contain any collection of charts
- Continuous 24/7 monitoring and analysis of high-volume content rich data streams
- Automated part level traceability and analytics across the entire supply chain
- Quick drill down into details, performing root cause analysis, what-if-scenarios, modeling
- Flexible production control platform enabling corrective action within specific manufacturing and test operations
- Modern high-speed web-based UI technology enabling ease-of-use and a worldwide collaborative infrastructure between users of different roles and profiles
- Extremely fast tool response times and virtually instant data visualizations and content delivery regardless of data volume
- Consumption of any volume of test data from any data source, equipment or supplier in any format
- Built-in mechanisms providing real-time monitoring and repair of all incoming data guaranteeing data quality and completeness above 99%
- Instant and automated stacking, merging, alignment and aggregation of all incoming data for every manufactured product
- Service hundreds of users simultaneously through secure web infrastructures
- ISO 27001 certified—your data, the data centers and SiliconDash are all secure

For more information about Synopsys products, support services or training, visit us on the web at www.synopsys.com, contact your local sales representative or call 650.584.5000