

MAGMA DESIGN AUTOMATION

Viewing and Analyzing Defects Using the Camelot Defect Wafer Map



Application
Overview

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Introduction

This document discusses the process of using the Camelot™ Defect Wafer Map to view and analyze wafer defects and communicate defect coordinates to automated failure analysis tools.

Yield fallout due to equipment related defects contribute 20 to 30 percent of yield loss. Defect scan equipment automatically detects some of these defects through inline defect inspection of each process step. These defects are then classified as killers or non-killers using manual and automated procedures. Reviewing individual defects, classified defects or spatial patterns on a wafer without a defect wafer map makes it difficult to get a visual picture of the wafer or individual die. Without a defect wafer map, the overlay of bitmap or logic map test data on to defects is also difficult and time consuming. In addition, defect wafer maps are needed in failure analysis (FA) to help identify and correlate bitmap and logic map test data to defects. This enables FA to focus on failing dies that do not have defects associated with them, so that systematic or process-induced issues can be isolated.

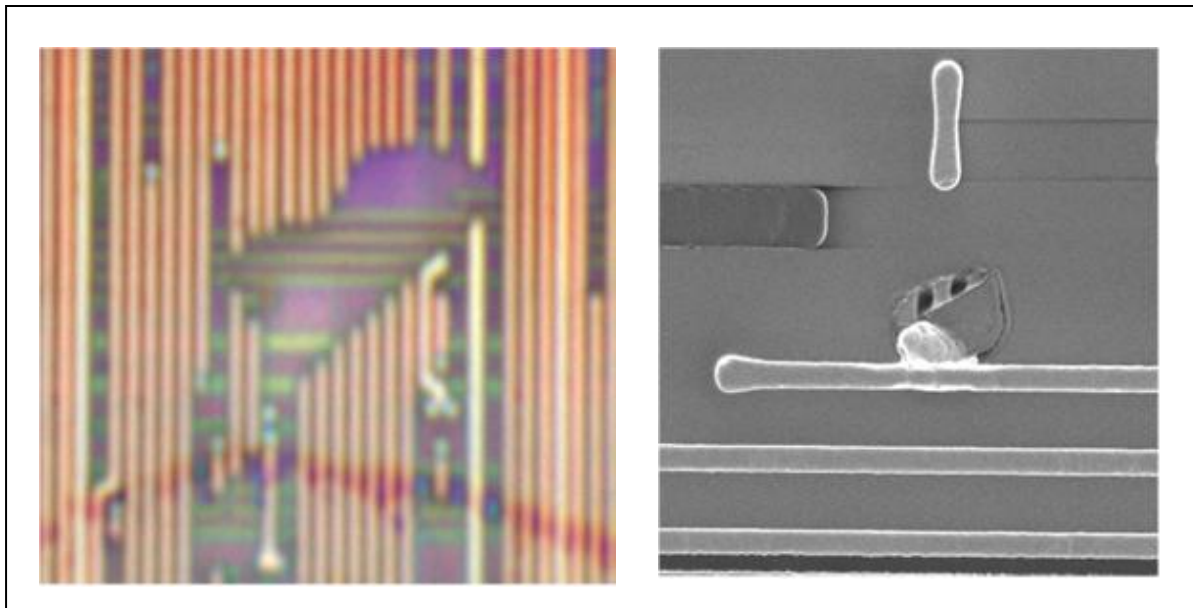


Figure 1. Viewing Defects

The Solution

To solve this problem, an approach is required that shows results visually with wafer maps that can display test results (bin sort, bitmap and logic map) to defect local localization with memory and logic devices. The solution should provide spatial analysis of defects on wafer maps to help pinpoint inline process tool defect signatures. It should have a quick and easy setup that comprehends multiple devices that can come online very quickly. It should enable expertise to be shared across different functional groups and should leverage the skills of many engineers working together as a cohesive group to perform root cause analysis. Additionally, it should communicate the defect coordinates from a defect wafer map to automated stages of any FA tool to enable automated fault localization and verification.

The Camelot Defect Wafer Map

The Camelot Defect Wafer Map enables fab analysis teams to efficiently view and analyze wafer defects. It displays the entire wafer map as well as comprehensive defect information, as shown in Figure 2. It integrates defect inspection data with the device CAD design by transferring defect coordinates from inspection equipment to the Camelot database. It provides highly automated features for defect file loading, wafer alignment and data correlation. It sorts defects by size, location or class, as well as layout location, and allows definition of custom wafer maps. It can also navigate to an equipment stage and locate the defect for

inspection and characterization. Finally, it integrates with Magma's KBitmap to provide correlation between defects and failing memory cells.

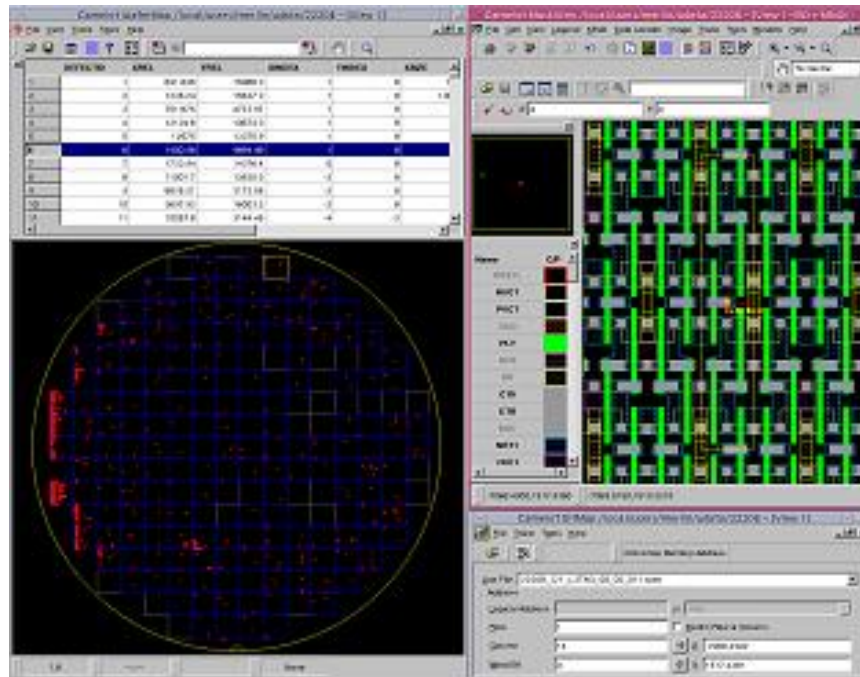


Figure 2. Defect Information Displayed by the Camelot Defect Wafer Map

Benefits of the Camelot Defect Wafer Map

The Camelot Defect Wafer Map, in conjunction with the Camelot CAD Navigation base system software, provides various benefits in viewing and analyzing defects. It displays defect wafer maps with defect information, including images and classification. It recalls the defect information, including images, for validation and reclassification. It displays spatial patterns by process levels on wafers, helping identify rogue tools. It allows spatial patterns to be correlated to bin-sort fallout to determine if defects have an impact on yield. It also provides a zoom-in capability to help identify defects within dies for further analysis.

In conjunction with the Camelot KBitmap option, the Camelot Defect Wafer Map displays bitmap fails to physical locations within the array in the die on the wafer. It also displays defects that correlate to bitmap hits or misses, and logic map traces to hits or misses. Using the defect wafer map as a visual aid, failure analysis teams can perform FA on bit fails or logic maps that do not have a defect associated with them. This helps further characterize the scan tool's sensitivity and detect defects that occur at levels that are not scanned. Users can then use this data to create a list of additional defect types that affect yield.

Summary

The Magma Camelot Defect Wafer Map along with the Camelot KBitmap option enables users to gather more data in less time than manual methods. Unlike a manual process which requires certain skills, the Camelot Defect Wafer Map tool automates the process and can be easily used by various members of the team.

System Requirements

The system requirements for the Camelot Defect Wafer Map and K-bitmap option are as follows:

- System: SunFire or Linux system with one or more CPUs
- Processor: UltraSPARC IIIi for Sun Fire or Intel/AMD Dual/Quad Core for Linux
- OS: Solaris 9,10, Redhat Enterprise or Suse Linux
- Memory: > 8GB
- Speed: > 1GHz
- Disk Space: > 250GB