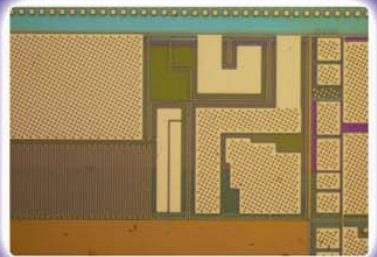
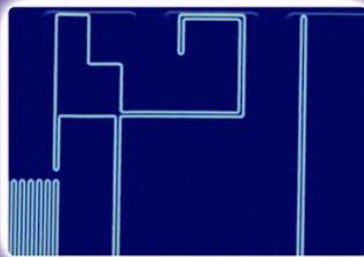
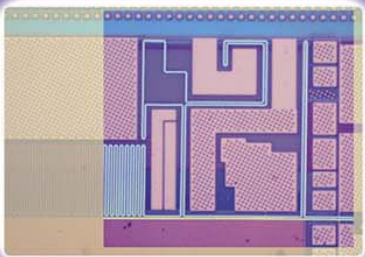


Circuit Scan™

CS1000



 **Micro Magnetics**
Sensible Solutions



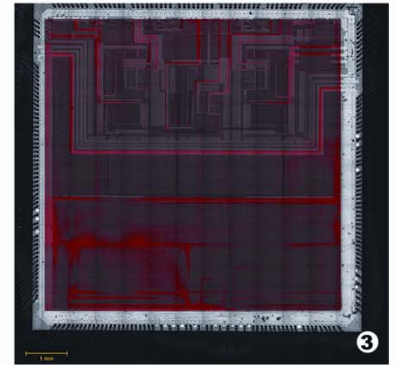
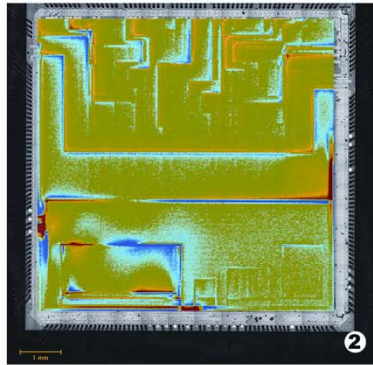
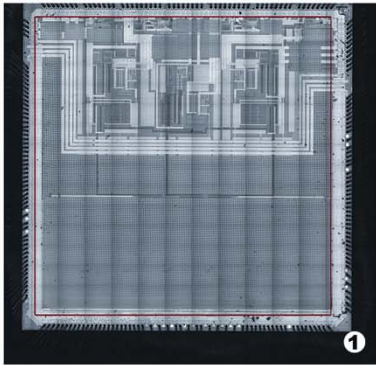
Circuit Scan™ CS1000

Magnetic Field Imaging for Current Density Metrology

The Circuit Scan 1000 (CS1000) uses ultra-high resolution magnetic field imaging for fault isolation and failure analysis of electrical components. Using our patented MTJ sensor technology, electrical currents as small as one microamp can be resolved non-invasively and with submicron spatial resolution.

Current density map of a leaky logic device which has experienced an ESD-related failure.

Measurement Process:



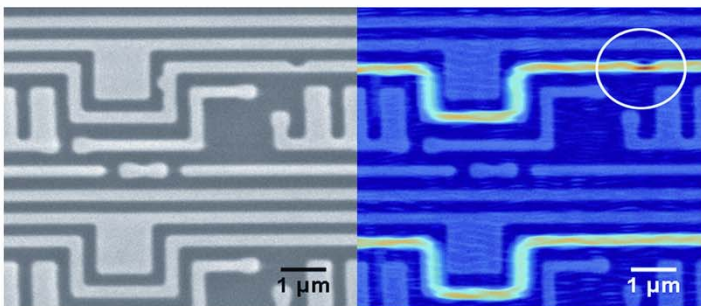
1. An optical or infrared image is used to select a region of interest.
2. The CS1000 then acquires a magnetic field map over the selected area.
3. Algorithms automatically calculate and display the current flow on all levels of the sample.

Advantages of Magnetic Field-based Metrology:

- Non-invasive technique operates regardless of ANY non-ferrous (metallic or insulating) overlayer.
- Maps all lateral current flow on every level of the device.
- High current sensitivity detects electrical flow down to the single-microamp level.
- Lock-in modulation allows imaging either of entire devices or only of selected pins/regions of the sample.

Applications of Magnetic Field-based Metrology:

- Metallization short circuits
- Physical defects in metallization layers.
- Conductive leaks and pinholes in oxide layers
- Burn-in and reliability testing
- Design debug



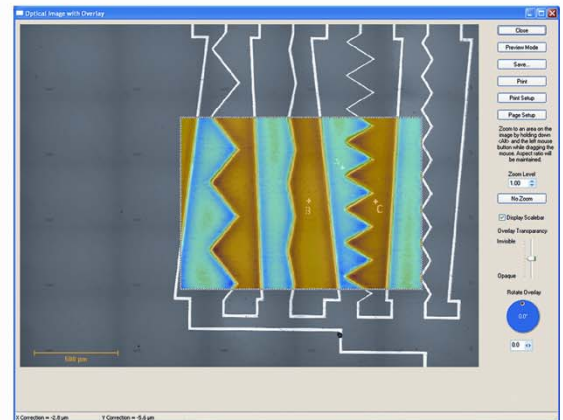
Side-by-side SEM and current density images indicate the location of a 125 nanometer “mouse bite” defect in a quarter-micron pitch copper conductor.

CS1000 System Features

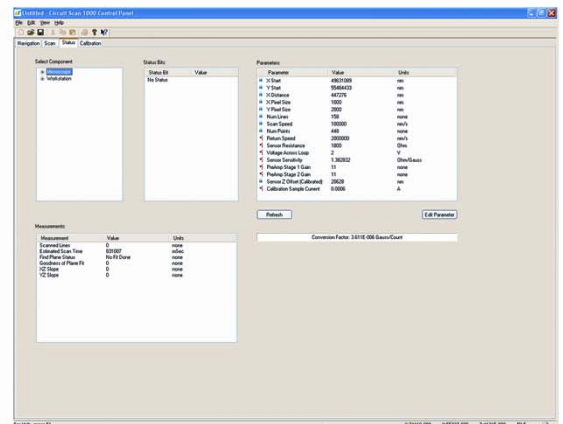
- **Sample level sensor:** Automatically detects the presence of the sample surface with submicron precision to allow imaging in a non-invasive fashion.
- **Automatic tilt compensation:** The system can automatically measure the tilt of the sample, if any, and compensate to ensure high-resolution, non-contact imaging.
- **Multiple scan methodologies:** Imaging can be conducted in light contact, non-contact, or constant height modes to ensure optimal results.
- **Image stitching function:** Allows creation of blended optical images with fields of view up to 20 times larger than a standard single optical image, for navigation and image registration.
- **Flexible data display:** Display results in a number of different color schemes, using 2D or 3D projections, and with variable color scales.
- **Image comparison and subtraction:** A simple GUI interface facilitates comparison of multiple magnetic field or current density images.
- **Standalone analysis package:** Can be installed on any standard PC for the analysis and viewing of data files.
- **Export images:** Automatically save any image into .TIF or .BMP graphics files or print a hard copy of results on any standard printer.
- **Export data:** Automatically export numerical results into ASCII, Excel, and other common data formats.
- **Digital zoom:** Allows additional image magnification of up to 10X with respect to optical zoom image.
- **Data annotation:** Automatic annotation of data and associated images is accomplished simply and intuitively.
- **Calibration suite:** Easy-to-use calibration wizards can be used to automatically verify key system parameters and benchmarks.



Scan data is presented in real time and scan parameters are controlled from the scan page.



Optical/IR navigation and image overlay are accomplished automatically using a standard second monitor.



System parameters and options can be controlled and verified from the system status page.

Specifications

Sensor.....	Patented magnetic tunnel junction (MTJ) or giant magnetoresistive (GMR)
Peak spatial resolution (GMR).....	60 nm
Field noise equivalent (MTJ).....	5 nT/rtHz (50 µG/rtHz)
Equivalent current noise (MTJ)	125 nA/rtHz
Range of travel.....	100 mm standard 300 mm optional
Positioning resolution.....	10 nm (XY) 500 nm (Z)
Sample level sensing resolution.....	< 500 nm
Navigation options.....	High-resolution optical Stitched optical/NIR Near infrared (optional) CAD layout (optional)
Optical magnification range.....	90X - 900X
Optical pixel size.....	0.31 µm min.
Optical field of view.....	320 x 240 µm min.
Stitched field of view.....	25.9 x 19.4 mm max.
Frequency bandwidth.....	0-100 kHz 0-3 MHz optional
Integration time.....	3 ms typical
Typical scan time.....	3-5 min. (1x1 mm; 5 µm step)
Footprint.....	1.8 (l) x 1.0 (w) x 1.7 (h) m
Weight.....	approx. 350 kg
Power supply.....	110 VAC, 50/60 Hz
Operating temperature.....	10-37.8° C (50-100 F)
Operating humidity.....	10-90%, non-condensing



Circuit Scan™ CS1000

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