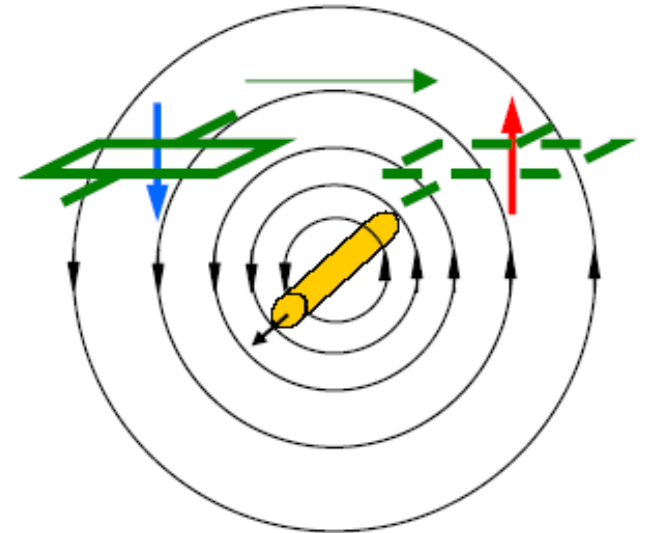
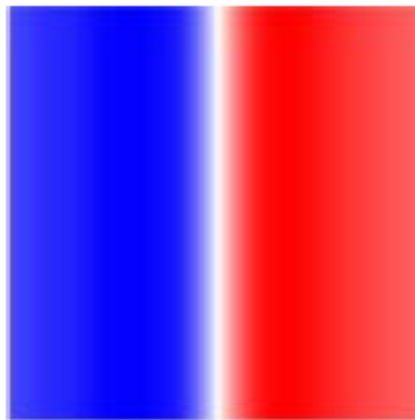


# **SQUID** - Superconducting Quantum Interference Device

Cheryl Tulkoff  
February 7, 2014

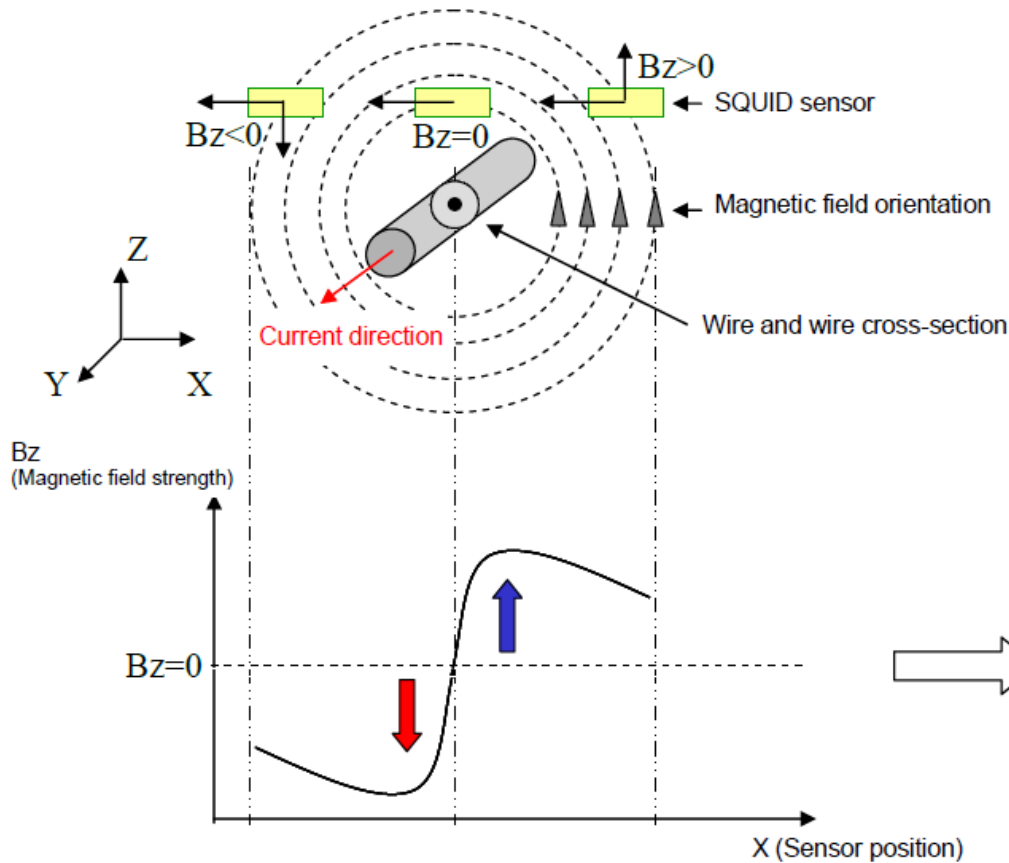
# SQUID Microscopy

- Current flow in devices produce a magnetic field
  - SQUID uses a highly sensitive magnetic detector (superconductor) to resolve these fields
  - Magnetic field image is converted to a current density image, allowing for fault location
- Resolution
  - 500 nA, 300 nm
  - Dependent on working distance (requires a flat sample)



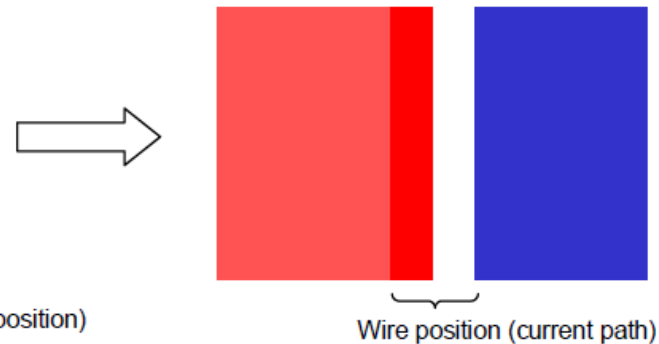
DfR Solutions

# SQUID Microscopy



Detection of Magnetic Field Strength from a Wire

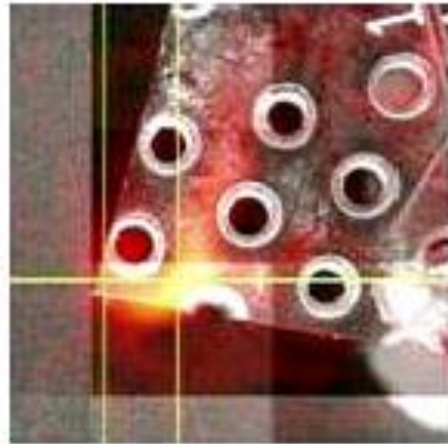
The SQUID sensor acquires the magnetic field strength and plots it on a graph. The magnetic field strength is zero in the Z direction directly above the wire. The magnetic field strength  $B_z$  is simulated using color. Blue is displayed when magnetic field strength  $B_z > 0$ , and red when  $B_z < 0$ .



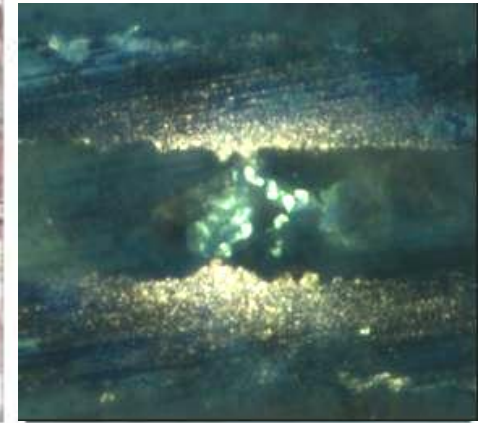
Graphical Presentation of Magnetic Field

# SQUID Microscopy

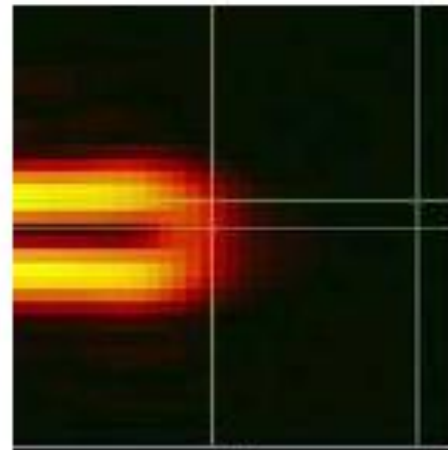
- Critical technology for detecting package level electrical shorts
  - Much more rapid failure site resolution
  - Absolute confirmation of shorting path
  - Thermal imaging induces damage



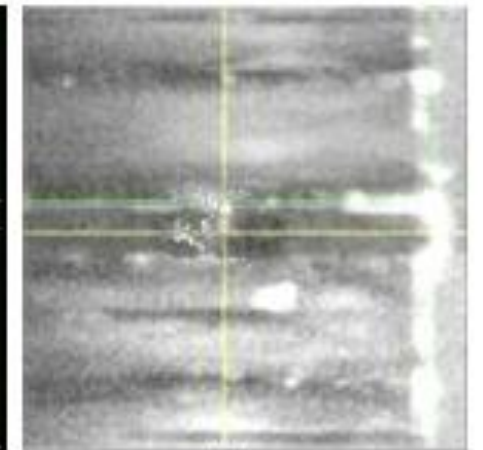
(a)



(b)



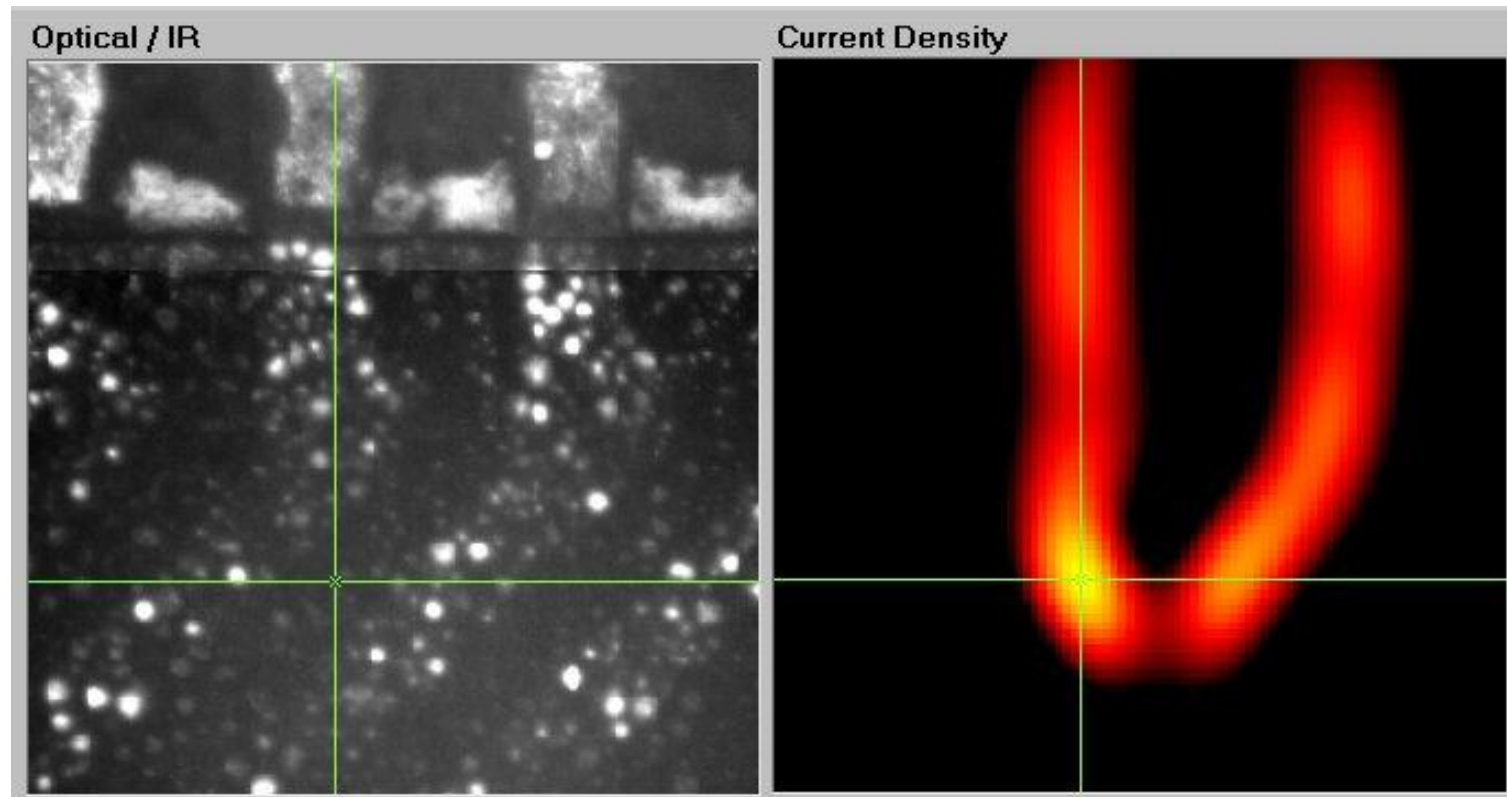
(c)



(d)

DfR Solutions

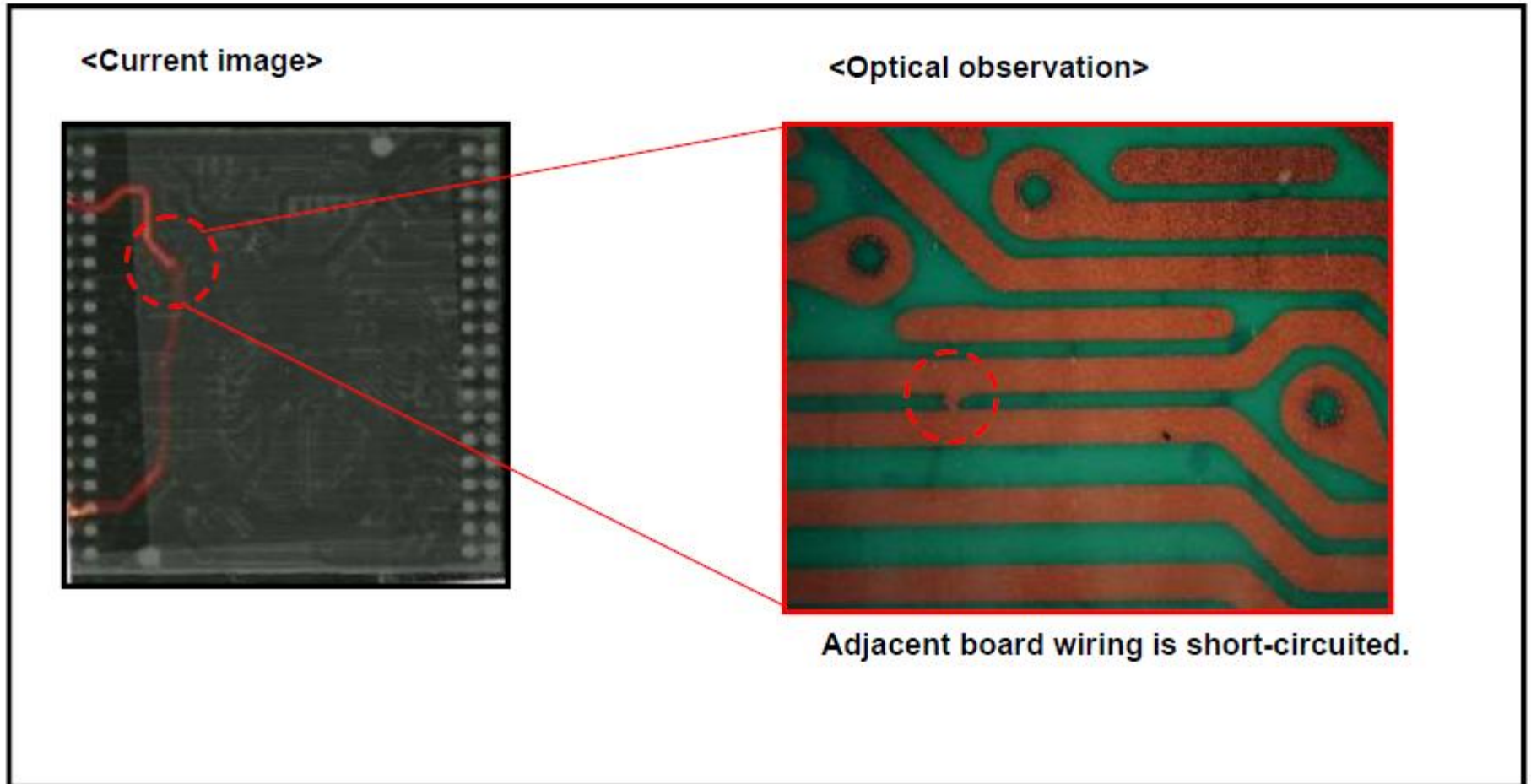
# SQUID Microscopy



- Extremely effective in locating failure site

# Scanning SQUID Microscopy to Detect Foreign Matter

- Images Courtesy of Sony



# Disclaimer & Confidentiality

- **ANALYSIS INFORMATION**

This report may include results obtained through analysis performed by DfR Solutions' Sherlock software. This comprehensive tool is capable of identifying design flaws and predicting product performance. For more information, please contact [DfRSales@dfrsolutions.com](mailto:DfRSales@dfrsolutions.com).

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*Best Regards,  
Dr. Craig Hillman, CEO*

**DfR Solutions** 