DirectScan™ delivers **design-aware VC inspection** at over 4 billion hotspots per hour.

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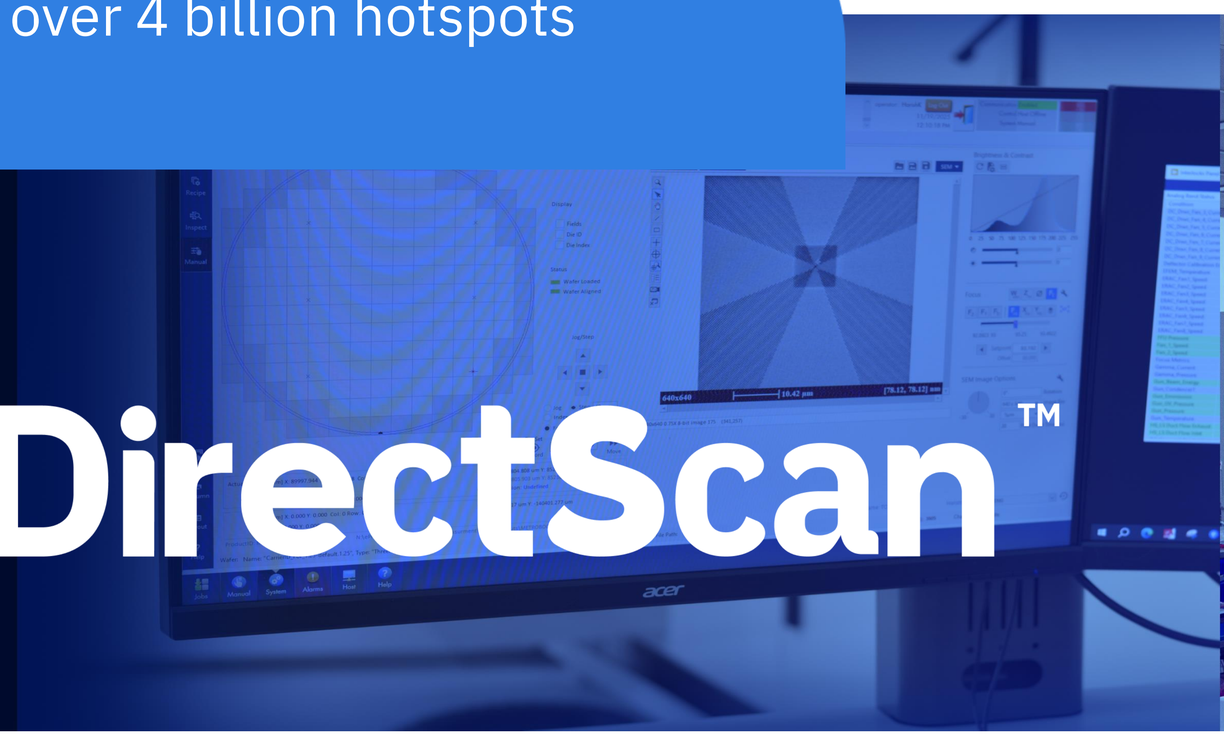
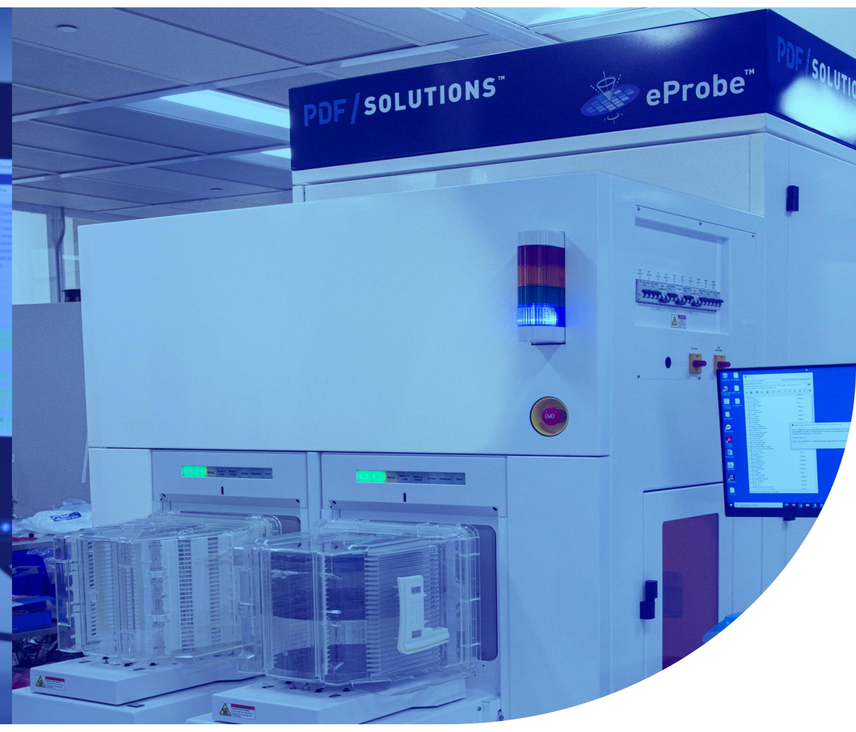
DirectScan™





Design-Aware E-Beam Inspection Platform

DirectScan combines **eProbe PointScan**, FIRE layout analysis, and Exensio® analytics to deliver **voltage contrast inspection** of electrically relevant defects, scanning only design-identified hotspots at over 4 billion per hour.

Problem with Status Quo

Optical inspection misses buried 3D defects.

Raster e-beam scans everything blindly, including **dielectrics with no signal**, without design context, wasting throughput on **uninformative pixels**.

Solution Highlights

- Target only **design-identified defect hotspots**
- Detect **buried VC defects** across FEOL, MOL, BEOL
- Translate inspection signals into **yield learning**

Components

PointScan Technology
Scans **one pixel per hotspot** via **continuous stage motion**, eliminating settle time.

FIRE Layout Analysis
Pre-mines **layout attributes** per DUT, enabling **attribute-based fail rate analysis**.

eProbe VC Tool
Non-contact **e-beam VC tool** detecting buried defects across **FEOL, MOL, BEOL, BSPDN**.

Exensio Analytics
Links **inspection data** to process records for **attribute-driven yield learning**.

FIRE Layout Analysis
GDS hotspot mining
Attribute ID mapping

→ **eProbe PointScan**
1 pixel/hotspot · >4B/hr
Continuous stage scan

→ **Exensio Analytics**
Attribute fail rates · SPC
Yield correlation

→ **Process Optimization**
Recipe refinement
Yield ramp · NPI

Hotspot coordinates
Layout attribute IDs

VC signals per DUT
KLARF + attribute data

Fail rates by attribute
Root cause insights

DirectScan = eProbe (PointScan) + FIRE + Exensio , Design-Aware Voltage Contrast Inspection for Advanced Nodes

Use Cases

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DRAM Storage Node Inspection

A leading-edge DRAM manufacturer used **DirectScan™** to detect storage node shorts, impossible for raster e-beam. **PointScan's controlled charge-and-sense** charged alternate wordline contacts to excite floating nodes, enabling island-to-island short detection with high signal purity.

Challenge

DRAM storage node shorts on **floating island nodes** cannot be isolated by raster e-beam due to uncontrolled cross-charging.

Result

Controlled charge-and-sense enabled **storage node island short detection** impossible by any other e-beam method.

Challenge

Mx Buried Via Opens create **electrical opens** invisible to optical inspection and undetectable without e-beam inspection.

Result

Defectivity reduced **six orders of magnitude**; process optimization completed in three split cycles.

Metal Void Yield Recovery

A top tier fab deployed **DirectScan** to detect Buried Via Open defects at Mx, invisible to optical methods. **PointScan** identified that smaller islands failed disproportionately, enabling targeted process optimization that drove defectivity down **six orders of magnitude**.

up to 100×
faster than conventional

down to 1%
of contacts required

>4B
hotspots inspected/hour

results based on typical customers

Key Customers

Intel®

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