AI Semiconductor Metrology

Next-Generation Glass Defect Inspection using AI

BpT CLARITY PRO™
GDI + UnɪEeye

Glass Defect Inspection with sub-micron capability

GDI Clarity Pro redefines precision in glass defect inspection with cutting-edge optics and advanced surface scanning. Capable of detecting defects as small as sub-micron levels with a resolution of 2.5 μm, it delivers unmatched edge and through-surface defect analysis. Defect classification & measurement done real-time, with no throughput overhead.

The system offers:

- Production Mode: 35 Panels per Hour, Edge inspection Top & Through Surface 10mm using 3 Probes
- Advanced R&D mode with 2D and 3D inspection capabilities with Z-axis resolution of <1 nanometer
- Full-panel macro-surface scanning for holistic defect identification
- 30mm edge-detection range for surface inspection

Engineered for Semi Conductor industries demanding the highest quality, GDI Clarity Pro brings absolute transparency to defect detection.
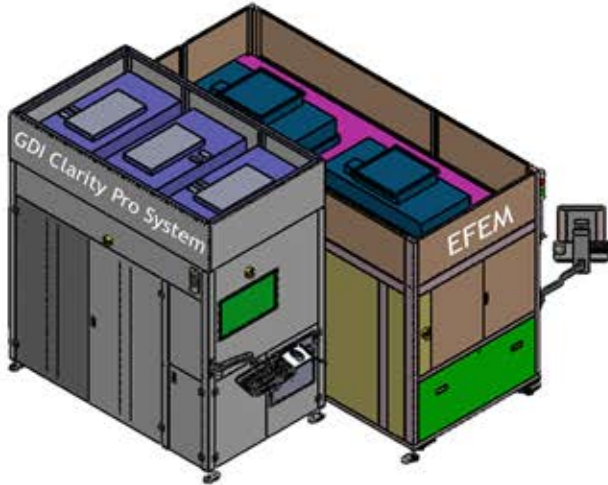
GDI RIGHT ISOMETRIC VIEW

Train the AI model to automatically measure and classify Substrate images as within specification or with the optional AI module

- **Data Preparation:** Use annotated images of golden standard and or defects on substrates to train the AI model.
- **Model Training:** Automated routines assist in training models to identify specific defects such as Edge defects, Cracks, Scratches, FM(foreign material), Stains, Surface Pitting.
- **Real-Time Detection:** As Substrate images are captured, the AI module can assess images realtime detection and classification of defects.
- **Custom Defect Categories:** Tailor the AI logic to meet your unique compliance standards
- **Continuous Improvement:** As more images are processed over time, the AI model continuously improves the accuracy and reliability of the analysis.

GDI Clarity Pro System Performance Specs

Types of Defects and Detection Size
Chips <1 µm
Edge defects <1 µm
Cracks <1 µm length and ≥5 µm depth (in Z)
Scratches <1 µm length and <5 µm depth (in Z)
FM (foreign material) <1 µm
Surface Pitting <1 µm
Stains and FM are classified separate from other defect types
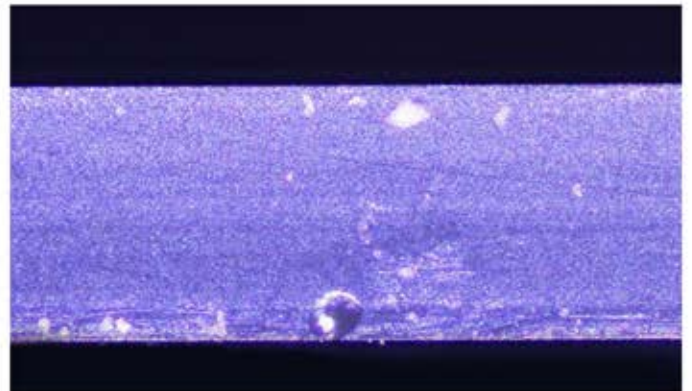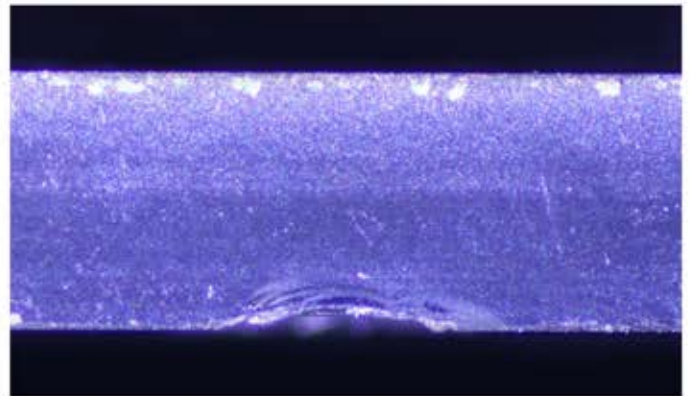**Classification** >5 µm

E-MCBF$_p$* > 20,000 cycles with uptime >95%

Supplier dependent scheduled downtime <1%

Substrate Form Factor Size(s) Less than 520mm

Production Run Rate 35 full substrates/hour

Automatic Defect Classification (ADC) Yes

Image Processing Fully Trained AI

Defect Size Repeatability 3-sigma < 10%
Same defect measured at least 20 times to calculate 3-sigma.

Defect Image Capture
Variable magnification review image automatically saved for visual defect review/classification.

R&D Applications
3D-Profile(Mapping) with Z-Height Measurement (>1nm)
Active Area Surface 10mm Inspection Sampling

Equipment Matching/Calibration
Calibration done using Polystyrene or Glass Spheres

Maximum substrate warpage 5mm

Substrate thickness range :
200 microns to 10mm thickness

Automated loading 520mm substrates.
Manual loading <520mm substrates.
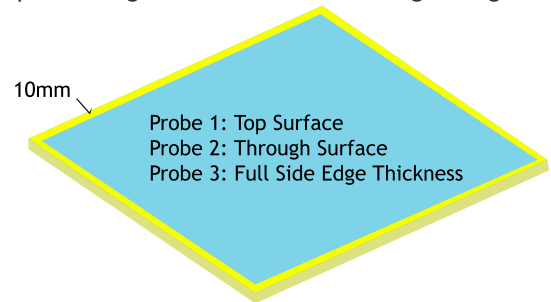
Cleanroom Requirement
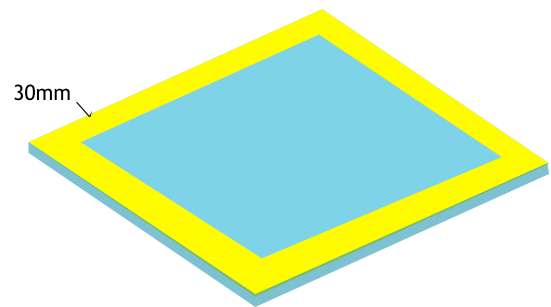Class 100

Equipment internal
Class 10

Electrostatic Discharge (ESD)
Ionizer performance ±3V

Scan Type 1

Production Mode: 35 Panels per Hour
Top & Through Surface 10mm from edge using 3 Probes

10mm

Probe 1: Top Surface
Probe 2: Through Surface
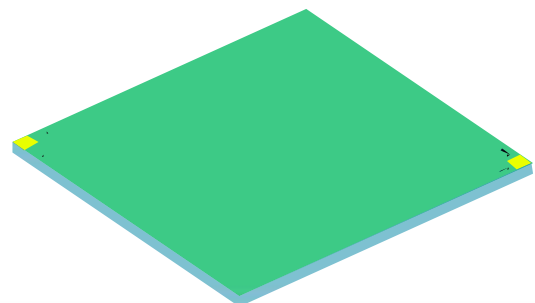Probe 3: Full Side Edge Thickness

Scan Type 2

R&D DF Mode: 30mm from the Edge Probe

30mm

Scan Type 3

Full Surface Inspection in DF Mode
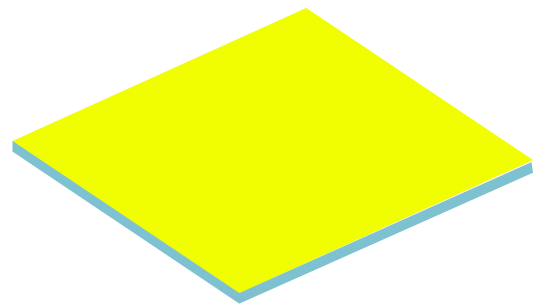
Scan Type 4

R&D Mode - 3D Measurement over 10mm FOV on the whole surface

FACILITIES & ELECTRICAL SPECIFICATIONS

Voltage	208 V AC
Number of Phases	1 Phase
Wiring Configuration	3 Wire, 1 Line, 1 Neutral, 1 Ground
Frequency	50/60 Hz
Full Load Current	36 Amps
Non-Continuous Current	12 Amps
Continuous Current	24 Amps
Machine OCP Device Rating	50 A
Ampere of Largest Load	20 A
Air	100 Psi
Vacuum	-85 Kpa
SemiConductor Fab Host	Fully SEMI Compatible

EQUIPMENT SEMICONDUCTOR INDUSTRY STANDARDS

The equipment complies to SEMI standards

SEMI E5-0821, SEMI Equipment Communications Standard 2 Message Content (SECS II) [semi.org]

SEMI E30-0520, Generic Model for Communications and Control of Manufacturing Equipment (GEM) [semi.org]

SEMI E37-0819, High Speed SECS Message Services (HSMS) [semi.org]

SEMI E37.1-0819 – High-speed SECS Message Service Single Selected Session Mode (HSMS-SS or HSMS-SSS) [semi.org]

SEMI E84-1109, Standard for Enhanced Carrier Handoff - Parallel I/O Interface [semi.org]

SEMI E87-0921, Standard for Carrier Management (CMS) [semi.org]

SEMI E87.1-0921, SPECIFICATION FOR SECS-II PROTOCOL FOR CARRIER MANAGEMENT (CMS)

SEMI E90-0921, Specification for Substrate Tracking (STS) [semi.org]

SEMI E90.1-0921, SPECIFICATION FOR SECS-II PROTOCOL SUBSTRATE TRACKING

SEMI E40-1218, Specification for Process Job Management (PJM) [semi.org]

SEMI E40.1-1218, SECS-II SUPPORT FOR PROCESSING MANAGEMENT STANDARD

SEMI E94-0819, Specification for Control Job Management (CJM) [semi.org]

SEMI E94.1-0819, SPECIFICATION FOR SECS-II PROTOCOL FOR CONTROL JOB MANAGEMENT (CJM)

SEMI E116-0518, Specification for Equipment Performance Tracking (EPT) [semi.org]

SEMI E142-0921, Specification for Substrate Mapping

SEMI E142.1-0921, XML Schema for Substrate Mapping

SEMI E142.2-1016, SECS-II Protocol for Substrate Mapping

SEMI E172-0320 Specification for SECS Equipment Data Dictionary (SEDD)