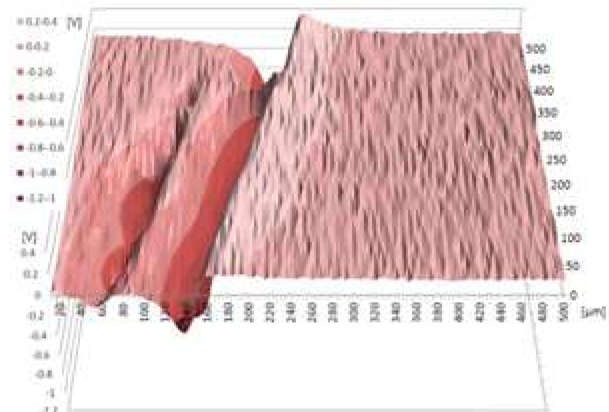
Trek Model 1100TN Electrostatic Force Microscope (EFM)

Electrostatic Voltage Distribution Measurement System

The Trek Model 1100TN Electrostatic Force Microscope (EFM) enables voltage distribution measurements with a very high spatial resolution – better than 10µm – which is well beyond the capability of typical electrostatic voltmeters. Trek's EFM can also measure voltage distribution across a much larger surface area as compared to a scanning probe microscope when operated under atmospheric conditions. Trek's EFM employs a feedback voltage to the detector which is equal to the measured voltage thus preventing arcing between the detector and the surface under test.

Key Specifications

- Voltage Range: ±1 kV
- Voltage Sensitivity: Better than 100 mV
- Accuracy: Better than 0.5% of full scale
- Incremental Step: 1 µm, minimum (detector)
- Detector Tip: 5 µm X 5 µm
- Measurement Area: 5 mm X 5 mm



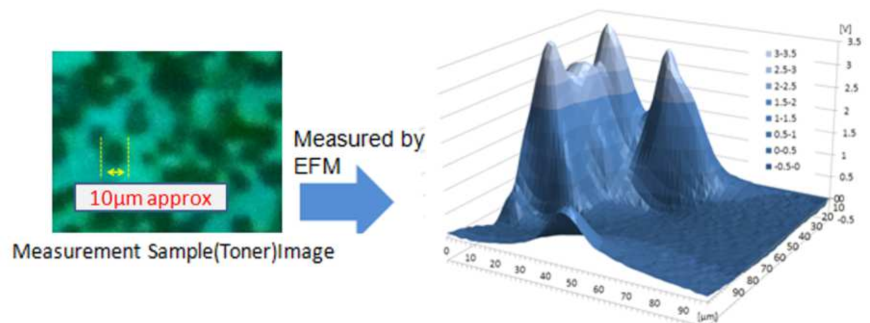
Measurement Sample of the Antistatic Bag (500 µm X 500 µm)

Typical Applications Include

- Measurement of antistatic bags, Si wafer
- Electrophotography material testing
- Photovoltaic materials evaluation
- MEMS testing

Features and Benefits

- Can be used in atmosphere conditions
- Spatial resolution is better than 10 µm
- Three measurement modes:
  - Static
  - Line Profile
  - 3D Mapping



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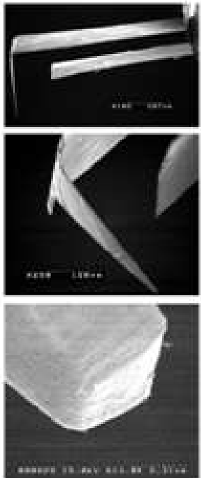
Model 1100TN Specifications

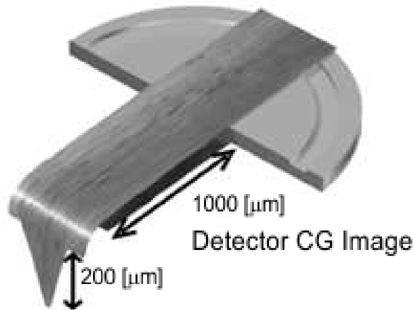
Performance

Measurement Range	0 to ±1 kV DC
Spatial Resolution (Reference to input voltage with comb-shaped electrode	60% of signal strength for 10 µm width 70% of signal strength for 20 µm width
Separation between Detector Tip and Surface Under Test (Controlled with piezo stage in Z axis)	Typically 5 µm
Accuracy	Better than 0.5% of full scale
Voltage Sensitivity	Better than 100 mV
Sampling Speed	30 ms to 0.1 ms per data sample
Scanning Area	
X and Y Axis	±15 mm with 1µm resolution
Z Axis Range	0 to 5 mm
Z Axis Piezo Stage Range	0 to 80 µm with 1 µm accuracy

Features



SEM pictures of detector



Material: Nickel with 5 µm thickness
Detector tip size: 5x5 µm²

Detector (Computer Generated Image)

Features (cont.)

Three Measurement Modes	Static Line Profile 3D Mapping
Video Camera	For observing actual point of measurement
Note	DC to bias voltage controlled by PC to surface test available

Optical System

Laser Unit for Detecting Cantilever Distortion	Laser Diode 670 nm with detector photodiode
Observation for Actual Measurement Point	
Light Source	Green LED
Camera	CCD with 380k pixels
Object Lens	10X lens for 500 µm square under the monitor camera

Optional Accessories

Photoreceptor Drum Installation Holder	Contact the factory for the Model Number
Laser System for Exposure	Contact the factory for the Model Number
Clean Booth	Contact the factory for the Model Number

Additional Information

For additional information, please refer to "A New Field Nullification Method for Electrostatic Force Microscope (EFM) for Unknown High Voltage Measurement," a paper co-authored by Trek and Nihon University presented at the Imaging Science & Technology's Digital Printing Technologies Conference (IS&T/NIP27) on Wednesday, October 5, 2011 during NIP Track 2 Photoelectronic Imaging Materials and Devices session, in Minneapolis, Minnesota.

http://www.trekinc.com/pdf/EFMPaper.pdf

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