

# E-Reticle™

## In-Situ Electric Field Measurement System

### ARE YOUR RETICLES AT RISK?

*Damage to reticles from electrostatic discharge and electric field migration of chrome is a serious concern that is growing in significance as the industry moves to smaller technology nodes.*

*Benchmark Technologies' E-Reticle™ is the the only commercially available test reticle that can measure and record the magnitude of electric fields to which production reticles are subjected during manufacture within the mask shop, or while in use at the wafer fab.*

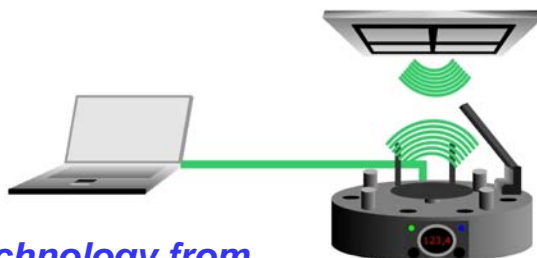
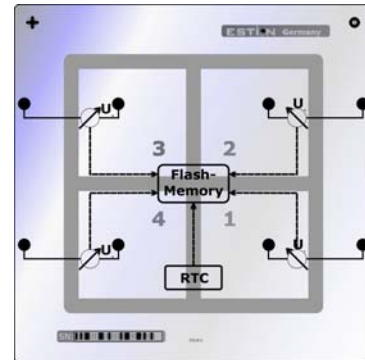
*Fabricated in a standard 6 inch reticle form factor, the E-Reticle™ can be run through many of the mask shop manufacturing, metrology and cleaning tools to determine areas of potential risk. The E-Reticle™ can also be loaded on to scanner lithography tools from ASML, Canon or Nikon as the required tool marks have been incorporated into the reticle design*



E-Reticle™ and Docking Station

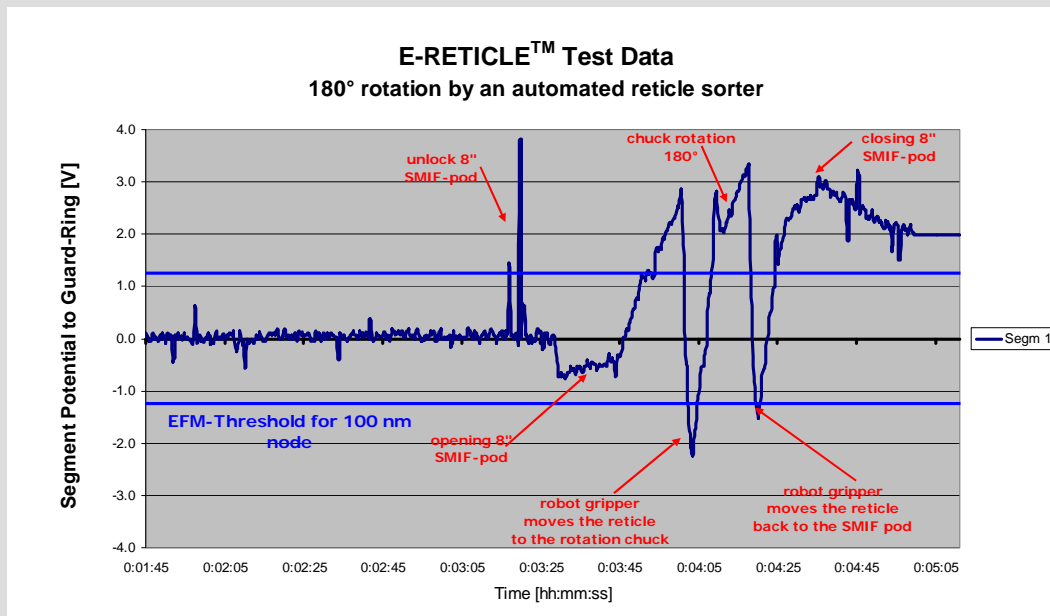
Within the *E-Reticle™* fused silica glass casing, there are 4 electrostatic voltmeters which measure the electric potential difference between each of the 4 internal segments and the outer chrome ring.

A real-time clock in the device assigns the clocktime to the measured values. The measured values along with the clock times assigned to them are loaded into memory with a selectable sampling rate of 5-20 Hz.



A wireless LAN transceiver pair is located within the *E-Reticle™* and its docking station for transfer of measurements to a support computer via USB interface. The docking station also serves as a calibration device and battery charger via induction and illumination. Optional docking station integrated into a SMIF box available.

# E-Reticle™ Example Test Data



## Possible Test Areas – Mask Shop

- Position And CD Metrology
- Reticle Defect Inspection and Repair
- Reticle Cleaning
- Pellicle Mounting/Unmounting
- Reticle Packaging

## Possible Test Areas - Wafer Fab

- Reticle stocker systems
- Reticle transport systems
- Scanner Loading robotics
- Scanner reticle stage movement
- Exposure Pulse effects

## Reticle Assembly

- Dimension: 152,0 mm x 152,0 mm x 6,35 mm (+/- 0,2 mm)
- Chrome thickness: 100 nm ( $\pm 15$  nm)
- Material: Quartz glass
- Weight: 245 g
- Range:
  - external homogenous field strength:  $\pm 40$  kV/m
  - potential differences at chrome level:  $\pm 200$  V
- Resolution:
  - external homogenous field strength: 100V/m
  - potential differences at chrome level:  $\pm 5$  V

- Sampling rate: adjustable 5, 10 or 20 Hz
- Accuracy: ~ +/- 5%
- Environment: -5 to +55 °C, 0 - 100 % r.h.
- Ingress Protection: IP 66
- Control: magnetic switch / W-LAN / Software via docking station
- Battery: rechargeable polymer lithium-ion battery
  - 3.7 V, 2 x 600 mAh
  - operating time ~ 6h
  - charge time ~ 4 h
- Certification: CE

## Docking Station

- Dimension: 250 mm diameter, 190 mm height over all
- Weight: 2,4 kg
- Environment: -5 to +55 °C, 0 - 85 % r.h.
- Ingress Protection: IP 54
- Power supply: 90 - 264 VAC, 127 - 300 VDC
- 47 - 440 Hz 55 W
- Calibration output: +/- 20 - 200 VDC
- Certification: CE

## Software

- Standalone application – platform independent
  - Windows
  - Linux/Unix
  - MAC
- Graphical User Interface Database & Analysis
  - Track ESD History
  - SPC