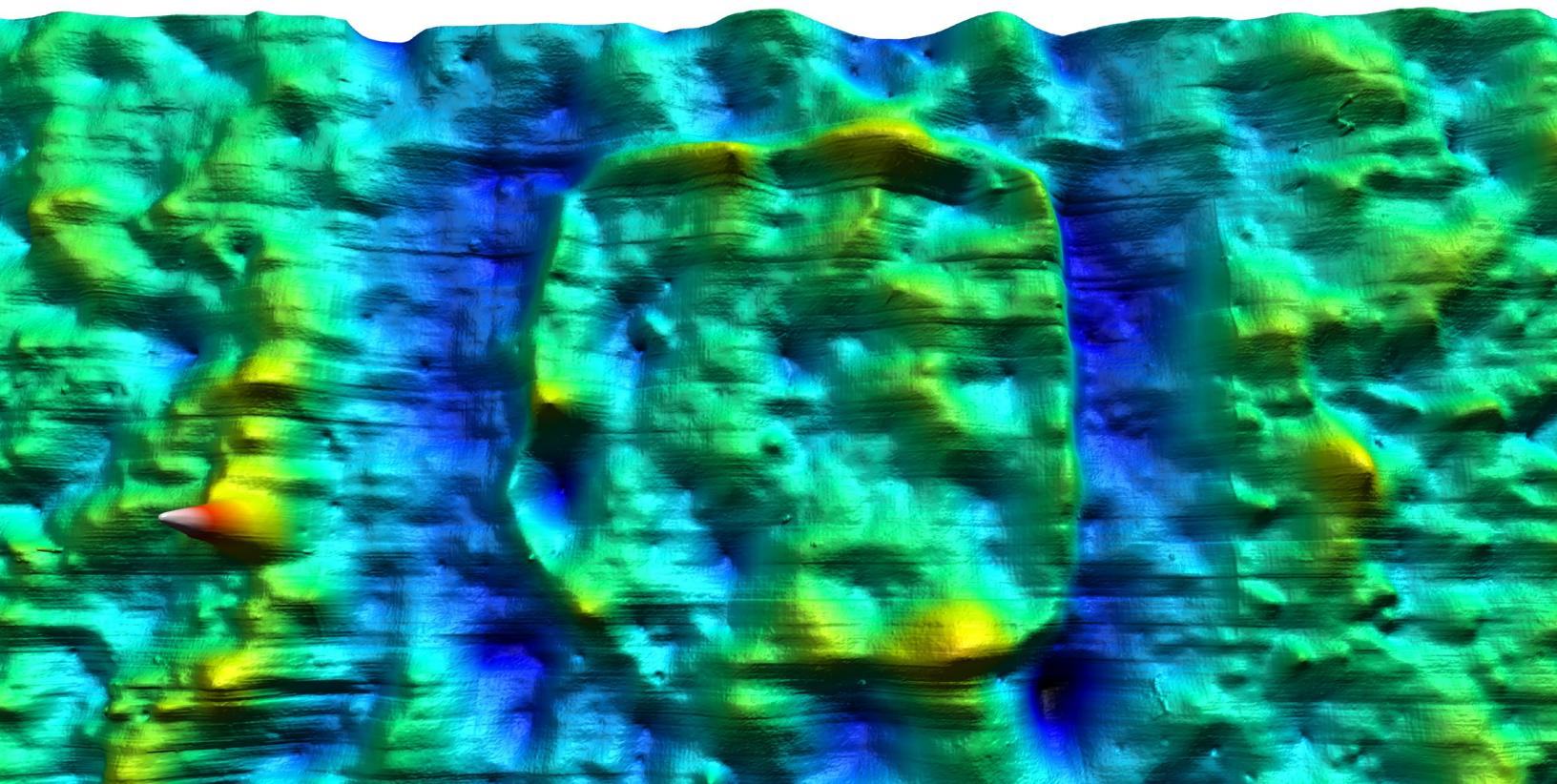


Tencor™ P-7

Stylus Profiler



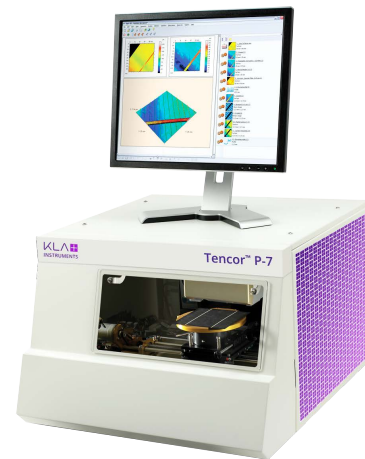
Advantages

- Excellent repeatability and reproducibility
- Measures up to 150mm scan length without the need for stitching
- Direct, material-independent measurements
- Automatically maintains the applied force regardless of the feature height
- Pattern recognition enables automated measurements, increasing productivity
- SECS/GEM enables automated sequencing, results reporting and recipe database control

Applications

- High resolution 2D and 3D scanning of surface topography
- Step heights from nanometers to 1mm
- Roughness and waviness of smooth and rough textures
- Bow and radius of curvature
- Thin film stress using Stoney's equation
- Defect characterization using KLARF files and the Defect Review application

Tencor™ P-7 Stylus Profiler

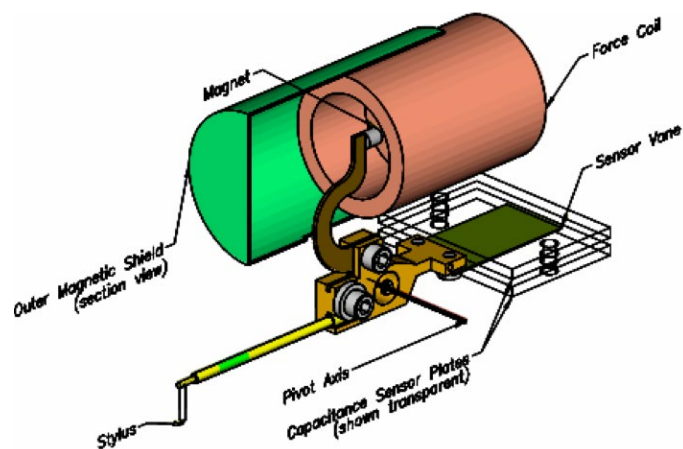
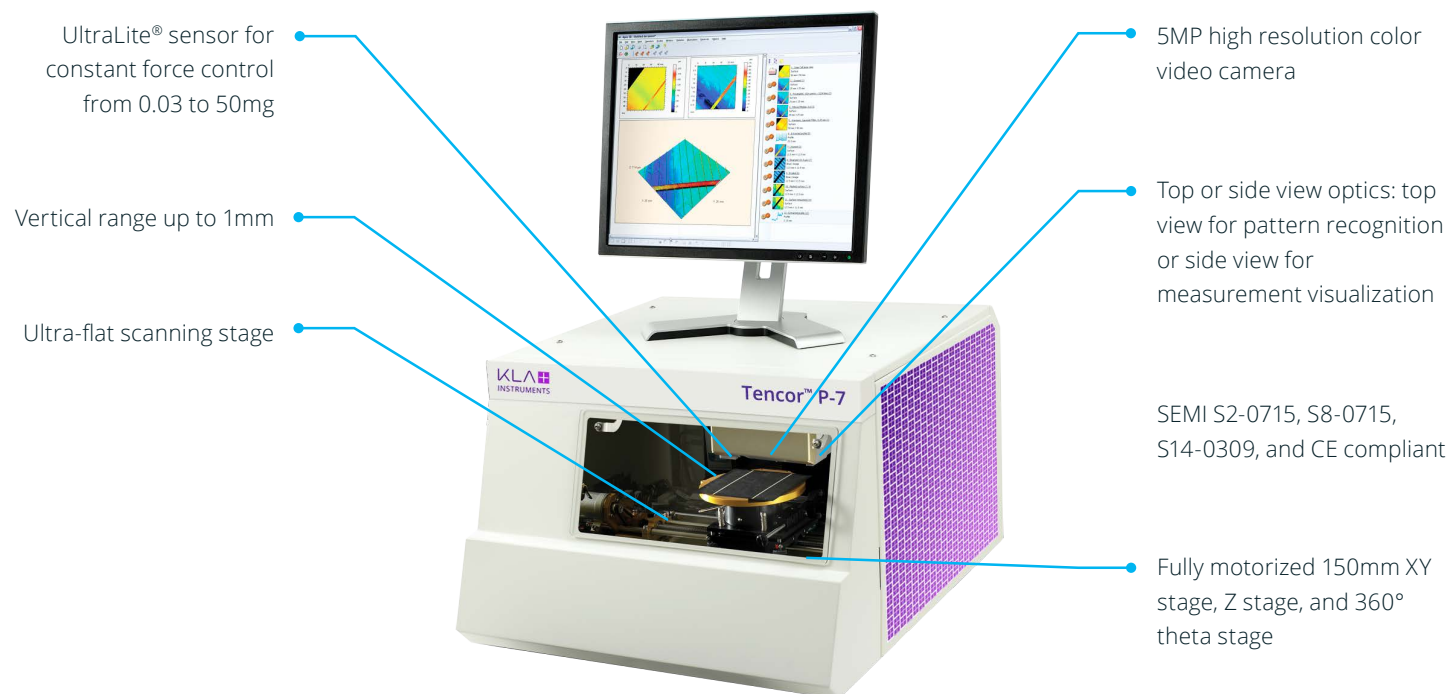


The P-7 stylus profiler builds on the success of the market leading P-17 benchtop stylus profiling system. It includes the superior measurement performance of the P-17 technology in a platform that offers a great price-to-features ratio for a benchtop stylus profiler.

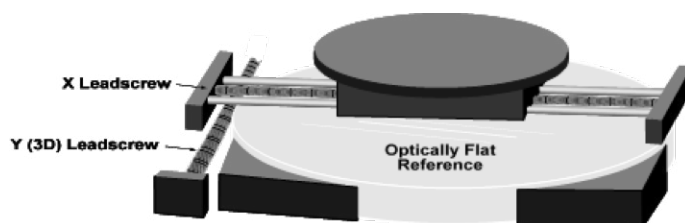
The P-7 system benefits include a 150mm scan stage for measurement of the entire substrate without the need to stitch. An UltraLite® sensor assembly combines a large, linear vertical range with constant force control to measure a wide variety of materials and topographies. Top view optics enable easy site teaching and pattern recognition, or the user can configure the system with side view optics to enable visualization of the stylus during a measurement.

The P-7 combines automation with high reliability for addressing production applications where a wafer handler is not a requirement. These applications include step height, roughness, and stress metrology for AlTiC, GaAs, Si, SiC, and sapphire wafers for use in semiconductors, power devices, wireless, LED, and data storage.

Features and Options Overview

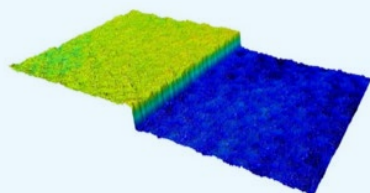


Linear Variable Differential Capacitor (LVDC) design generates no heat or friction



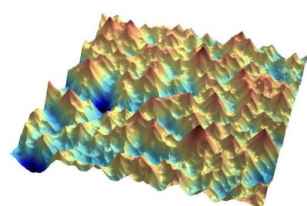
Optical reference flat and decoupled leadscrew motion achieve ultra-flat scans, improving measurement precision

Applications



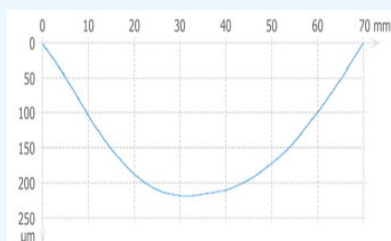
Step Height

Measure 2D and 3D step heights from nanometers to 1mm, depending on the sensor assembly dynamic range. Quantify the material deposited or removed during etch, sputter, SIMS, deposition, spin coating, CMP and other processes.



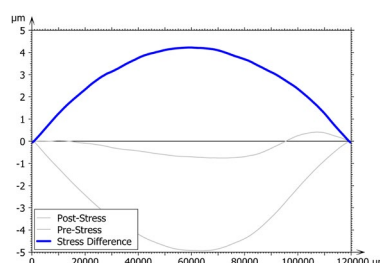
Texture: Roughness and Waviness

Measure 2D and 3D texture while quantifying the sample's roughness and waviness. Distinguish between roughness and waviness components using software filters and calculate parameters such as the root mean square (RMS) roughness.



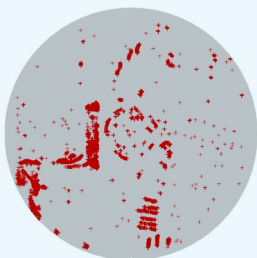
Form: Bow and Shape

Measure the 2D shape or bow of a surface, including wafer bow resulting from layer mismatch during the device fabrication process, such as deposition of multiple layers in the production of semiconductor or compound semiconductor devices. Quantify the height and radius of curved structures, such as a lens.



Thin Film Stress

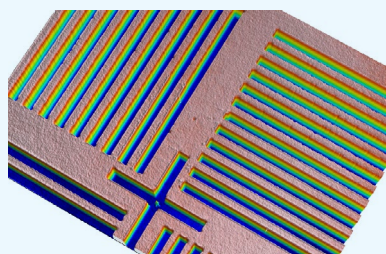
Measure 2D and 3D stress induced during the manufacture of semiconductor or compound semiconductor devices having multiple process layers. 2D stress mode uses a single scan across the sample diameter whereas 3D stress mode rotates the theta stage between 2D scans to measure the full sample surface.



Defect Review

Measure the topography of defects, such as the depth of a scratch. Import KLARF location coordinates from a defect inspection tool to automatically navigate to a specific defect. Select individual defects for 2D or 3D measurement using the Defect Review application.

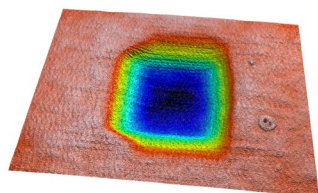
Broad Range of Industries



Zero Layer Alignment Pattern

General Purpose Applications

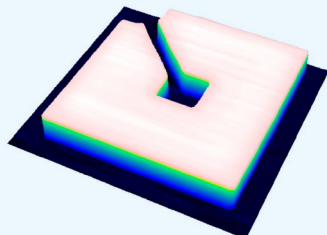
Use the P-7 stylus profiler in a wide range of industries for production or R&D. Examples include measurement of textile security features or roughness correlating to absorbency. Biomedical examples include the measurements of catheter surface texture, medical stent reservoir depth, and the topography of metal cardiac implants. Consumer electronics applications include measurement of touch screen topography or measurement of thin film step heights on glass screens.



SIMS Crater

SIMS Craters

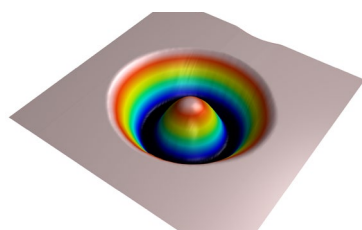
Measure SIMS (Secondary Ion Mass Spectrometry) crater depth with high precision to determine ion concentration as a function of crater depth. Measure the roughness of the bottom surface of the crater to provide information on beam scan uniformity. Use the top or side view optics to optimize the scan position.



MESA Step Height

LED and Power Devices

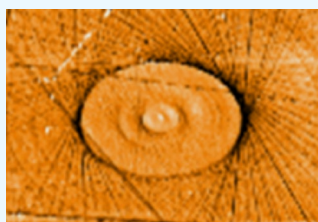
Measure step heights for patterning processes including MESA step height, ITO step height, and contact depth. Measure substrate roll off, bow, epitaxial roughness, and epitaxial thin film stress that can lead to cracks and defects. Use the Defect Review application to distinguish between a nuisance or a killer defect.



Microlens 3D Profile

MEMS and Optical Electronics

Measure step height, radius of curvature and 3D topography for macro and micro lenses. Measure etch depth and surface roughness for wave guide and dense wavelength division multiplexing (DWDM) structures.

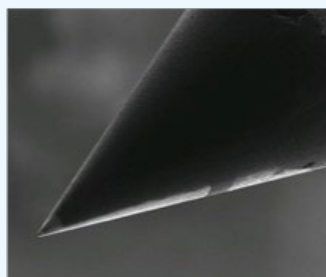


Backside Wafer Thinning

Semiconductor and Compound Semiconductor

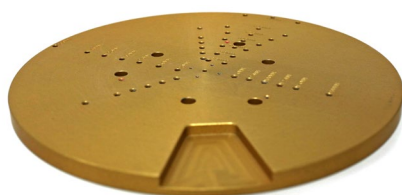
Measure surface topography for front end through back end and packaging processes. These applications include the measurement of the photoresist thickness, etch depth, sputter height, post-CMP topography, roughness, sample bow and stress. Measurement precision is optimized using pattern recognition and automated analysis for improved production process control.

Hardware Features



Stylus Options

The P-7 offers a variety of styli to support the measurement of step heights, high aspect ratio steps, roughness, sample bow, and stress. The tip radius ranges from 100nm to 50µm and determines the lateral resolution of the measurement. The included angle ranges from 20 to 100 degrees and determines the maximum aspect ratio of the measured feature. All styli are manufactured from diamond to minimize stylus wear and increase stylus lifetime.



Sample Chucks

The P-7 has a range of chucks available to support multiple applications. The standard is a universal vacuum chuck with precision locating pins for samples from 50 to 150mm. The universal chuck supports bow and stress measurements using 3-point locators to support the sample in a neutral position for accurate bow measurements. Additional options for solar samples, HDD disks, and 200mm universal chucks are available.



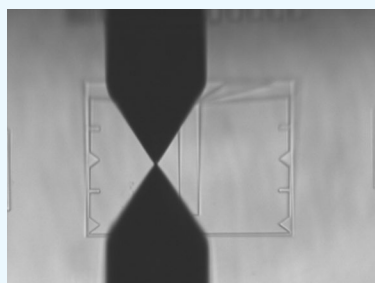
Isolation Tables

The P-7 offers both tabletop and free-standing passive isolation options. The tabletop Granite Isolator™ Series combine granite with high grade silicone gel; the Onyx Series tabletop isolation systems use pneumatic air isolators, and the TMC 63-500 Series isolation tables consist of a free-standing steel frame table with pneumatic air isolators.



Step Height Standards

The P-7 uses thin and thick film NIST-traceable step height standards offered by VLSI Standards. The standards feature an oxide step on a silicon die mounted on a quartz block, or an etched quartz step with a chrome coating. Available step height standards range from 8nm to 250µm.

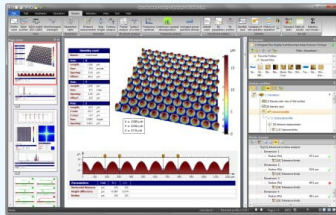


Top or Side View Optics

The P-7 can be configured with either top view or side view optics. The top view enables easy sample positioning with the stylus offset from the field of view, as well as pattern recognition. The side view provides real-time viewing for verification of the scan position. Both top and side views enable point-and-click operation and incorporate an automated stylus lift for increased sample protection.

Software Features

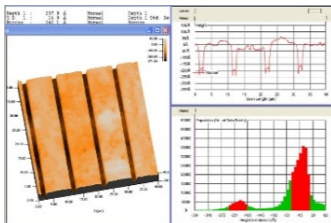
Apex Software



The Apex software platform extends the analysis and reporting capabilities of the P-7 system. Apex is fully integrated into the profiler software, with a simple and intuitive format that allows for easy creation of customized reports and automatic processing of data.

- Multiple language support
- Advanced filtering, leveling and analysis functions
- Over forty surface parameters including slope, flatness, bearing ratio and volume
- Extensive suite of roughness parameters supporting ISO, ASME and additional region-specific standards
- Histogram of the surface topography, including peak count distribution
- Annotation and pass/fail criteria on documents

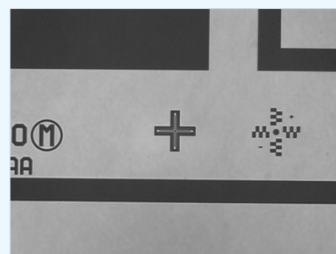
Offline Analysis Software



The P-7 software supports data analysis and recipe generation either on the system or on an offline computer.

- 2D and 3D step heights with cursors and histogram analysis
- 2D profiles and 3D views of the measurements
- 2D and 3D roughness and waviness analysis
- 2D and 3D filtering and leveling techniques
- Thin film stress and sample bow calculation

Productivity Options



Pattern recognition and advanced calibrations enable seamless recipe transfer while removing operator error by fully automating measurement and data analysis.

- Pattern recognition automatically aligns the sample
- Feature Detection automatically measures up to 30 steps in a single scan
- SECS/GEM communications for remote control and results reporting to host SPC systems

Optical and Stylus Profilers

Measure the topography of any surface with our range of benchtop and automated wafer handling optical and stylus profilers. Find out more at kla.com/profilers.



Profilm3D®
Profilm3D-200



Zeta-20



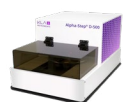
Zeta-300, Zeta-388



Tencor™ P-170
HRP®-260



Tencor™ P-7,
P-17, P-17OF



Alpha-Step® D-500
Alpha-Step® D-600



KLA SUPPORT

Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

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