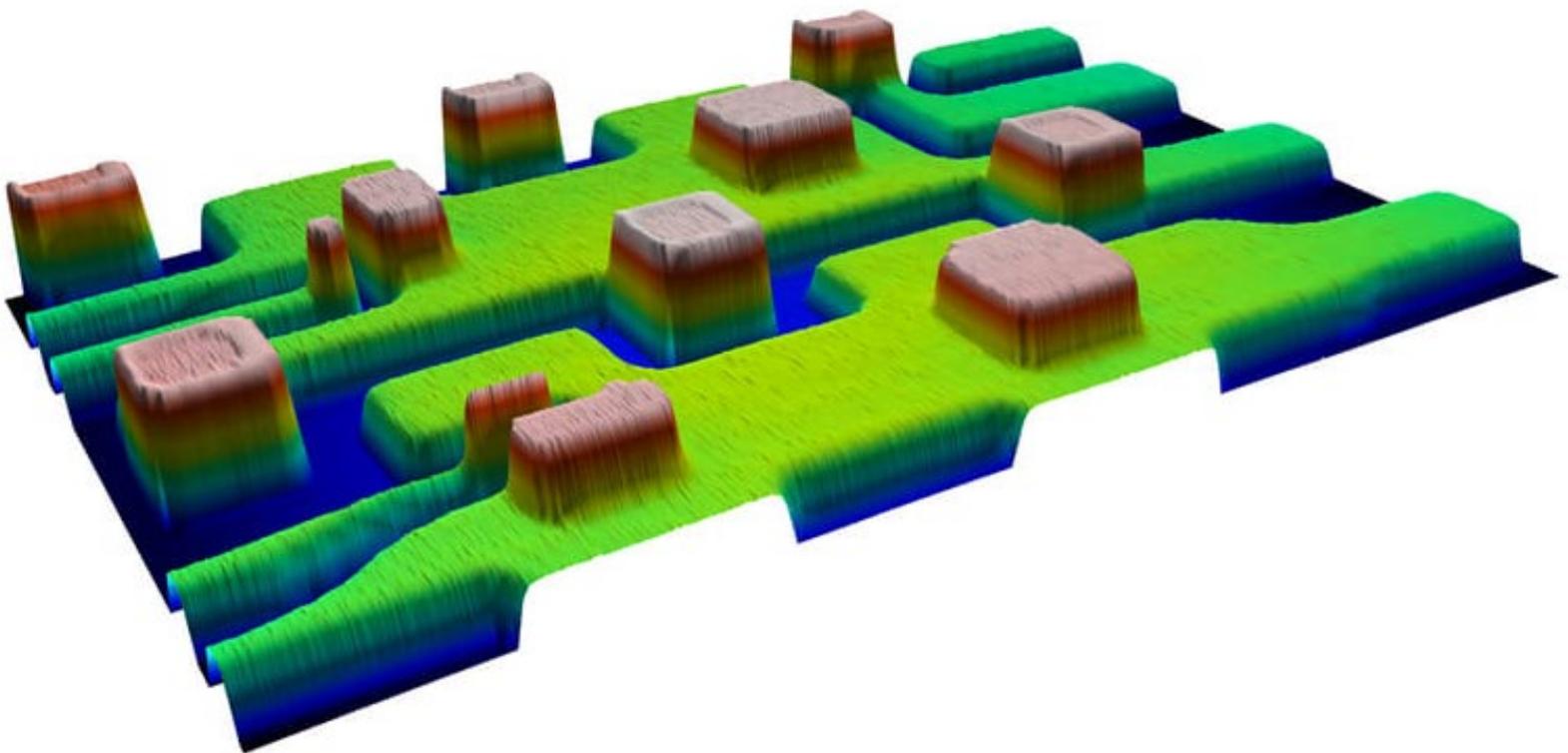


Alpha-Step[®] D-600

Stylus Profiler



Advantages

- Excellent repeatability and reproducibility
- Direct, material-independent measurements
- Low force control for measuring soft materials
- Keystone correction removes distortion due to side view optics
- Arc correction compensates for arc motion of stylus

Applications

- 2D/3D scanning of surface topography
- Step heights from nanometers to 1.2mm
- Roughness and waviness of smooth and rough texture
- Bow and radius of curvature
- Thin film stress using Stoney's equation

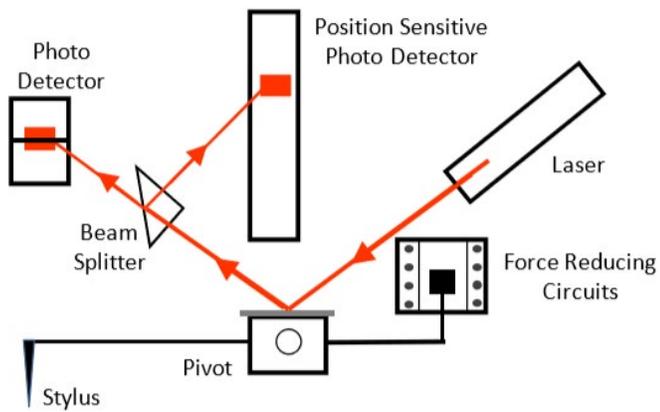
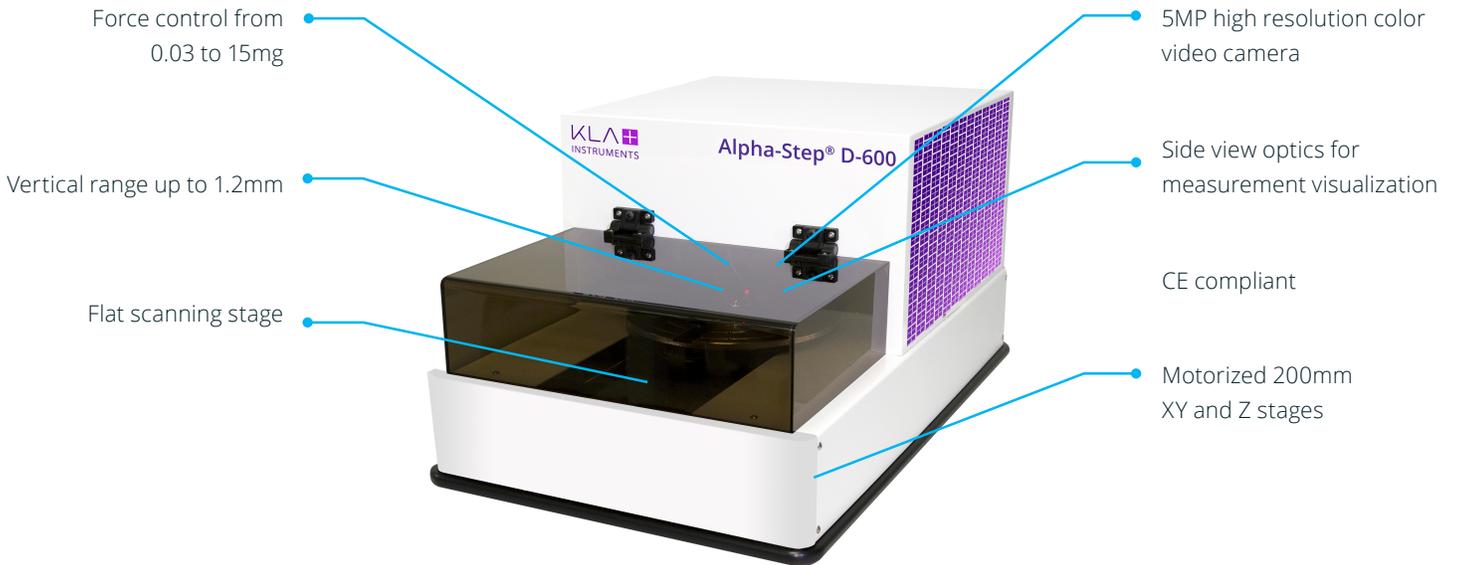
Alpha-Step® D-600 Stylus Profiler



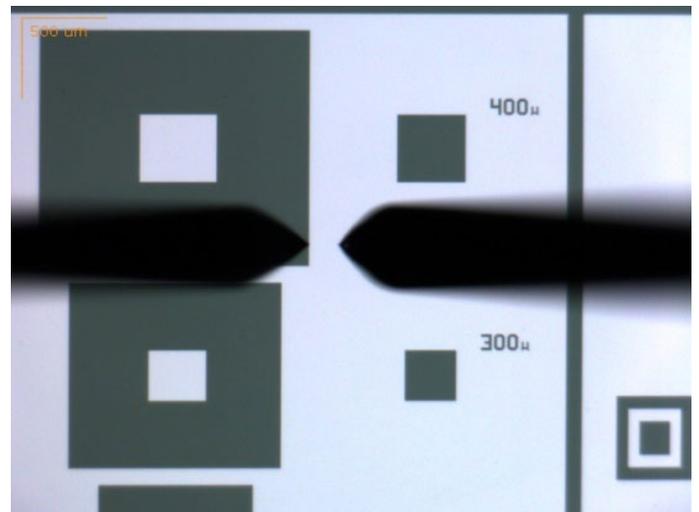
The Alpha-Step® D-600 is the latest generation of the Alpha-Step stylus profiler. The innovative optical lever sensor technology offers high resolution measurements, large vertical range and low force measurement capability. An advantage of the stylus measurement technique is that it is a direct measurement, independent of material properties. Adjustable force and choice of stylus enable accurate measurements of a wide variety of structures and materials. These features enable quantification of feature topography to determine the amount of material added or removed, and measurement of roughness and stress caused by changes in structure of the material.

The Alpha-Step D-600 configuration includes a motorized stage with a 200mm sample chuck and advanced optics with enhanced video controls. The Alpha-Step combines time-tested technical capability with the smallest system footprint for a benchtop stylus profiler. Designed for universities, research labs and institutes, the Alpha-Step provides step height, roughness, and stress metrology for semiconductor and compound semiconductor devices, LEDs, solar, MEMS, automotive and medical devices.

Features and Options Overview

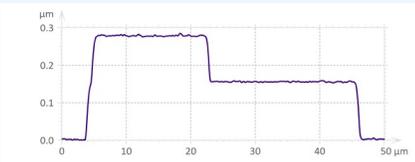


The optical lever design is adapted from AFM technology and enables a fast response to topography changes



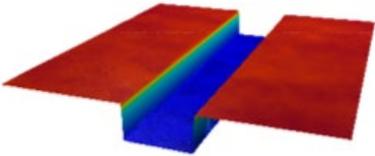
Keystone correction removes the distortion from the side view angle of the optics

Applications



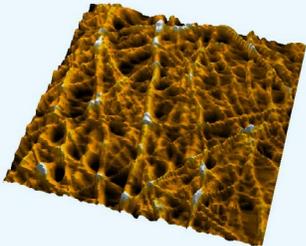
2D Step Height

Measure 2D step heights from nanometers to 1200µm. Quantify the material deposited or removed during etch, sputter, SIMS, deposition, spin coating, CMP and other processes. The Alpha-Step has low force capability that enables measurement of soft materials.



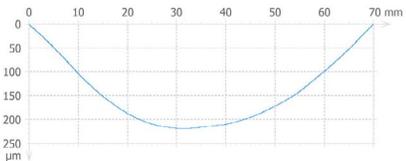
3D Step Height

Measure 3D step heights from nanometers to 1200µm. Quantify hole and trench depth or map surface topography variation and feature structure. The Alpha-Step file format is supported by both ProfilimOnline and Apex analysis software to allow the user to level, filter and quantify 3D measurement results.



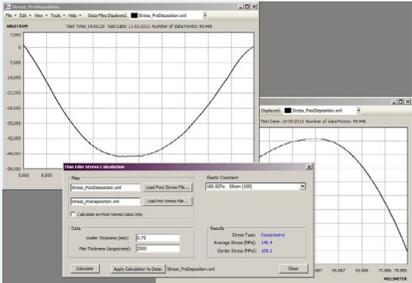
Texture: Roughness and Waviness

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

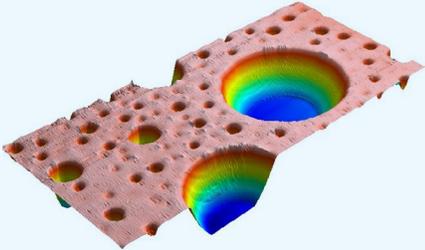
Measure the 2D shape or bow of a surface, including wafer bow resulting from layer mismatch during the device fabrication process, such as the deposition of multiple layers in the production of semiconductor or compound semiconductor devices. Automated 2D stitching increases the total scan length to measure the diameter of a 200mm sample. Quantify the height and radius of curved structures, such as a lens.



Thin Film Stress

Measure 2D stress induced during the manufacture of semiconductor or compound semiconductor devices having multiple process layers. The bow of the sample is accurately measured using a stress chuck to support the sample in a neutral position, and the change in shape is used to calculate the stress by applying Stoney's equation.

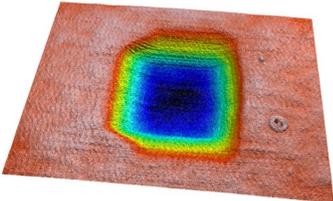
Broad Range of Industries



Patterned Glass

Universities and Research Labs

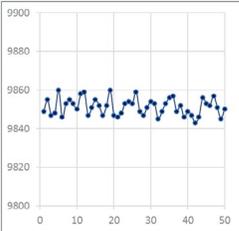
The Alpha-Step stylus profiler is a great addition to any university, government research, or general-purpose laboratory. The system provides direct, material-independent measurement to enable researchers to confidently measure the deposition thickness of any material, transparent or opaque. The Alpha-Step is very easy to use, allowing any researcher to quickly generate measurement data with minimal training.



SIMS Crater

SIMS Craters

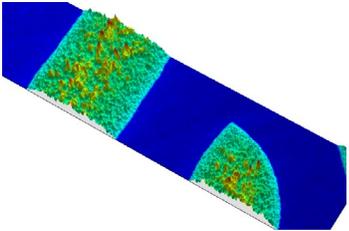
Measure SIMS (Secondary Ion Mass Spectrometry) crater depth with high precision to determine ion concentration as a function of crater depth. Measure the roughness of the bottom surface of the crater to provide information on beam scan uniformity.



SPC Chart of Step Height

Pilot Production

The Alpha-Step stylus profiler is ideal for low volume pilot production lines. The system supports automated sequencing to map any measurement variation across the sample surface. Alpha-Step software also supports tracking of the user, system and lot information to support production statistical process control. Typical applications include etch and deposition step height, and surface texture measurements.



Printed Circuit Silver Trace

General Purpose

Use the Alpha-Step stylus profiler in a wide range of industries for production or R&D. Examples include measurement of textile security features and roughness correlating to absorbency of the textile. Consumer electronics applications include measurement of touch screen topography, thin film step heights on glass screens, and step heights of silver traces on printed circuits.

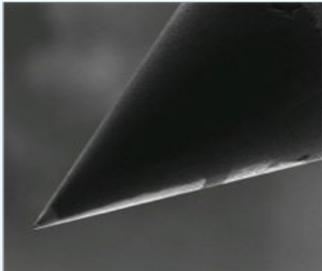


Ge on Si Step Height

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, and sample bow and stress for improved production process control.

Hardware Features



Stylus Options

The Alpha-Step 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 Alpha-Step has a range of chucks available to support multiple applications. The standard is a nickel-plated aluminum chuck for samples up to 200mm. A flat black chuck is available for transparent samples to minimize reflection from the chuck surface. A universal vacuum chuck includes precision locating pins for samples from 50-200mm. Both the standard and universal chucks support stress measurements with 3-point pin locators to hold the sample in a neutral position for accurate bow measurements.



Isolation Tables

The Alpha-Step offers both tabletop and free-standing passive isolation options. The Granite Isolator™ Series offers tabletop isolation systems that 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 Alpha-Step 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.

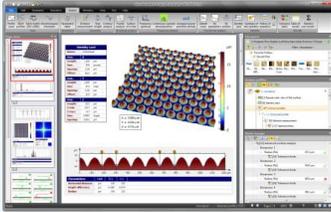


Windows 10 Upgrade

Upgrade your Alpha-Step D-600 system to Windows 10. The latest software on Windows 10 includes the option to upgrade to 32-bit or 64-bit operation and provides access to the most recent software features and future new feature development.

Software Features

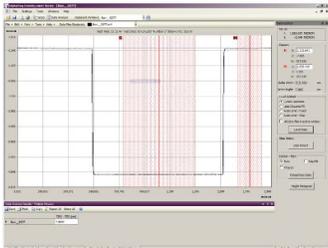
Apex Software



The Apex software platform extends the analysis and reporting capabilities of the Alpha-Step 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, and bearing ratio
- Extensive suite of roughness parameters supporting ISO, ASME and additional region-specific standards
- Histogram of the 2D/3D surface topography, including peak count distribution
- Annotation and pass/fail criteria on documents

Offline Analysis Software



The Alpha-Step offline software has the same data analysis and recipe creation capability that exists on the tool. This enables the user to create recipes and analyze data without using valuable tool time.

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



ProfilmOnline

ProfilmOnline is a cloud-based 3D data visualization and analysis platform developed as part of the Profilm software suite. ProfilmOnline is the place to share, store, view and analyze 3D data, whether on a computer or a mobile device. Applications for Android and iOS operating systems are available, and a wide variety of file formats is supported. Data can be encrypted for security.

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-170F



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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Printed in the USA
Rev 1_2020-7-21