



Production Series

METROLOGY

P-7 Stylus Profiler

KLA-Tencor's P-7 stylus profiler provides advanced surface measurement and analysis capabilities. This mid-range platform is ideal for research and development and production environments offering the best features-to-value of any stylus profiler on the market.

The P-7 features industry leading step height repeatability due to superior sensor and scanning stage design.

	Steps \leq 1 μm	Steps $>$ 1 μm
Repeatability ¹	4 Å	0.10%
Reproducibility ¹	15 Å	0.25%

1. Repeatability and reproducibility are defined as standard deviation of 30 trials using best known methods on a well-defined step height.

The UltraLite[®] sensor is a linear variable differential capacitive (LVDC) sensor with the lowest mass, lowest noise, and highest resolution of any sensor available. It is the only sensor technology with constant force control over the entire vertical range.

	Standard	Low Force	Extended
Total Dynamic Range	327 μm	131 μm	1000 μm
Vertical Resolution	0.01 / 0.04 / 0.20 Å low / mid / high range	0.01 / 0.02 / 0.10 Å low / mid / high range	0.01 / 0.08 / 0.60 Å low / mid / high range
Stylus Force	0.5 – 50 mg	0.03 – 50 mg	0.5 – 50 mg
Force Control	constant	constant	constant
Vertical Linearity ²	\pm 0.5% $>$ 2000 Å 10 Å \leq 2000 Å	\pm 0.5% $>$ 2000 Å 10 Å \leq 2000 Å	\pm 0.5% $>$ 2000 Å 10 Å \leq 2000 Å
Sampling Rate	5 to 2000 Hz	5 to 2000 Hz	5 to 2000 Hz

2. Vertical linearity is measured by the maximum non-linearity component divided by the vertical range.

The P-7 is the only system available that offers a 150 mm scan length with no stitching required.

	2D Scanning	3D Scanning
Maximum Scan Length	150 mm – no stitching required	any rectangle inscribed within a 150 mm diameter circle
Lateral Resolution	0.025 μm	0.5 μm
Maximum Points per Scan	2 million	4 million
Scanning Speed	2 $\mu\text{m}/\text{sec}$ to 25 mm/sec	–

The P-7 has superior scan flatness over the entire scan length for excellent short scan, long scan, and stress measurements.

	Specification	Conditions
Scan Flatness	20 nm over 0.5 mm scan	1/20 λ , 150 mm optical flat
	30 nm over 2 mm scan	
	40 nm over 30 mm scan	
	75 nm over 60 mm scan	
	170 nm over 130 mm scan	
Bow Repeatability	0.1%	20 m radius mirror
Stress Repeatability	2.5%	with polynomial fit enabled

3. Contact KLA-Tencor for the best known recipe conditions.

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The P-7 has motorized X, Y and Z stages. The system includes manual theta stage with stops at 45° increments and optional fine theta adjustment of $\pm 5^\circ$.

	Stage Specifications
X and Y Stage	2 μm repeatability
Z Stage	soft touch stylus null

The P-7 microhead V offers top or side view optics (user preference), at the highest camera resolution.

	Optics Specifications
Top View: FoV	1700 x 1400 μm
Side View (optional): FoV	1050 x 850 μm
Camera	4.9 MP, color
Zoom	4x, digital

The P-7 offers a full range of styli, plus custom designs:

	Radius	Angle
Standard	2 – 50 μm	60°
Submicron	0.2 μm	> 90°
High Aspect Ratio	0.2 - 2 μm	20 – 45°

All P-7 systems include a vacuum chuck, with universal chuck design including movable stop and stress pins.

	Chucks
Standard	universal
Optional	solar

P-7 recipes offer enhanced productivity (standard):

- Feature Detection and Feature Find
- Manual and single site deskew sample alignment
- 20 measurement sites with site naming
- Multi-analysis, correlation scanning, link to Apex
- Automatic saving, export, printing

Productivity packages (optional):

- 1000 measurement sites with site naming
- Pattern recognition deskew alignment: XY and θ
- Site pattern recognition
- Sequence queue to run multiple sequence recipes

The P-7 complies with the latest industry standards:

- CE compliance; EC directives
- Harmonized safety and electromagnetic standards
- SEMI S2-0703, S8-0705, S14-0704
- RoHS compliance for computer and peripherals

P-7 computer specifications (minimum):

	Computer
Processor	3.0 GHz dual core
RAM	4 GB
Hard Drive	250 GB
Access	USB and Ethernet
Software	Win XP and MS Office
Monitor	23-inch optional secondary monitor

The P-7 dimensions:

	Dimensions
Height	43 cm
Width	57 cm
Depth	67 cm
Weight	80 kg

Best results using a solid workbench or isolation table.

	Environment
Relative Humidity	30 – 40% non-condensing
Temperature	16 – 25°C rate of change $\leq 2^\circ\text{C/hr}$
Floor Vibration	$\leq 250 \mu\text{-inch/sec}$ 1 to 100 Hz
Audio Noise	$\leq 80 \text{ dB}$ C-weighting scale
Laminar Airflow	$\leq 100 \text{ ft/min}$ down blowing

P-7 facilities requirements:

	Facilities
Electrical	90 – 260 V 50 – 60 Hz
Power	430 VA
Vacuum	500 mm Hg 27 liters/min

KLA-TENCOR SERVICE/SUPPORT

Customer service is an integral part of KLA-Tencor's portfolio that enables our customers to accelerate yield. Our vast customer service organization collaborates with worldwide customers to achieve the required productivity and performance at the lowest overall cost. K-T Services includes comprehensive contracts, time and materials, spares, asset management, customer training, and yield consulting.

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