

Zeta-20 Optical Profiler

Product Specification



Exceptional 3D Imaging and Metrology

Based on proprietary ZDot™ technology, the Zeta-20 images and analyzes surface features on samples of all types: smooth to rough, low reflectivity to high reflectivity, transparent to opaque. Hardware and software options customize the Zeta-20 for specialized measurement needs. All hardware is easy to install and easy to use.

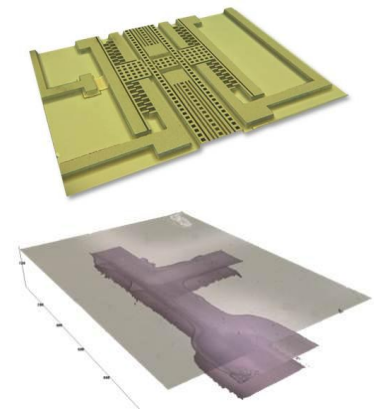


- **Zeta-20 ZDot System** – With 15 nm Z resolution, excellent for general purpose analysis. Standard software provides True Color imaging, 2D and 3D image control, and analysis of step height, roughness, and dimensions, even on samples with transparent materials and highly variable reflectivities.
- **Zeta-20 Quantitative Differential Interference Contrast System (qDIC)** – Optimized for small features on very flat surfaces, such as wafers.
- **Zeta-20 Interferometer System** – Perfect for analyzing features with a large field of view and high Z resolution.

	ZDot™ (standard)	qDIC (Nomarski)	Interferometer
Roughness > 40 nm	✓		
Roughness < 40 nm		✓	
Large area with small features			✓
0.1 μm to 25 mm step height	✓		
0.02 μm to 0.1 μm step height			✓
< 0.02 μm step height		✓	

Performance Specifications

	Standard system	Performance configuration
Z resolution	15 nm	0.2 nm (piezo Z stage)
Z range	40 mm	> 100 mm (extended range option)
Minimum step height	70 nm	10 nm (piezo Z stage)
Step height accuracy	± 1%	± 1%
Step height repeatability	0.025 μm	0.006 μm (piezo Z stage and active isolation)
Minimum roughness	< 1 nm	< 1 nm
Maximum roughness	> 1 mm	> 1 mm
Roughness repeatability	0.1 nm	0.1 nm



Optical System Parameters

Specifications for standard objectives are shown below. Other options available: long working distance objectives, immersion objectives, and through transmission materials objectives; 0.63X and 1X couplers. *XY resolution is nominal.

	NA	Working distance (mm)	Z resolution (μm)	XY resolution (μm)*	Optical resolution (μm)	FOV with 0.35X coupler		FOV with 0.5X coupler	
						1/3" camera	2/3" camera	1/3" camera	2/3" camera
2.5X	0.08	10.7	22	3.60	4.20	5364 × 4024	9394 × 7044	3788 × 2840	6614 × 4960
5X	0.15	20.0	5.9	1.80	2.20	2682 × 2012	4697 × 3522	1894 × 1420	3307 × 2480
10X	0.30	11.0	1.5	0.90	1.10	1335 × 1000	2327 × 1745	944 × 708	1644 × 1233
20X	0.45	3.1	0.5	0.45	0.75	668 × 500	1169 × 877	468 × 351	822 × 616
50X	0.8	1.0	0.1	0.18	0.42	267 × 200	466 × 349	189 × 142	328 × 246
100X	0.9	1.0	0.04	0.09	0.37	133 × 100	234 × 175	93 × 70	164 × 123
150X	0.9	1.0	0.04	0.06	0.37	88 × 66	156 × 116	62 × 46	109 × 82

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Measurement System

Standard Zeta-20 ZDot System

- Infinite depth imaging microscope
- ZDot based Optical Profiler
- Dual high brightness white LED light source
- True color CCD camera (1/3"), 1024 x 768 pixels
- 30 frames/sec data acquisition
- One coupler, choice of four options
- 5-lens manual objective turret
- Auto focus

Hardware and Software Options

- Standard objectives: 2.5X, 5X, 10X, 20X, 50X, 100X, 150X
- Special purpose objectives: LWD, TTM, immersion
- Interferometer package: X5 objective, piezo stage, and leveling stage
- Nomarski (qDIC) package: prism, polarizer, and analyzer
- Spectrometer for film thickness measurements
- Automatic objective detector
- 5-lens auto turret
- Back light LED for transmitted light applications
- High resolution camera (2/3"), 1280 x 1024 pixels
- Couplers: 1X, 0.63X, 0.5X, 0.35X

Stages and Chucks

- Manual XY stage (100mm x 100mm)
- Motorized Z stage (15nm steps) with high precision closed loop scanner
- Configurable stage platform (breadboard design)

- Manual 150 mm x 150 mm stage
- Motorized 100 mm x 100 mm stage
- Piezo Z stage (0.2 nm steps, 100 µm range)
- Extended Z range: > 100 mm
- Coarse tip/tilt stage (± 20 deg)
- Fine tip/tilt stage (± 6 deg)
- Manual R-theta stage
- Wafer chucks: 2 in to 8 in round, 5 in or 6 in square
- Hard disk chucks: 65 mm to 95 mm
- Back light compatible chucks
- Custom chucks for other applications, such as biotech

Software

- Noncontact measurements of step height, surface roughness, feature diameter, area, and volume
- Measurements on very low reflectivity (<0.5%) to very high reflectivity (>85%) materials within the same scan
- Measurements on transparent materials
- Analysis of layers within transparent structures
- Analysis of high roughness and high aspect ratio structures
- Several leveling modes, including leveling-free measurement in ZDot™ mode
- Ra, Rq, Rz, Rsk, Rk and other ISO4287 parameters
- Sa, Sq, Sz, Ssk, Sk and other ISO25178 parameters
- Color or height based region analysis
- 3D display software, with image processing filters, true and false color options, and annotation
- Customizable reports
- Easy file management and data export in a variety of formats
- Time to data: 40 sec typical

- Wafer shape measurement (bow) up to 4 in diameter
- Film thickness spectrometer, visible light (film thickness 30 nm to 10 µm)
- Stitching for large area images
- Sequences
- Advanced analysis package
- Off-line software
- Custom applications recipes:
 - Patterned sapphire substrate measurements
 - Diamond wire measurements
 - Diamond (for CMP pads)
 - Solar pyramid (wafer texture)
 - Solar contact finger metrology

Workstation

Processor: Intel Dual Core
 Operating system: Windows 7, 64-bit
 Memory: 4GB RAM (16GB available), ≥320 GB HDD
 Monitor: 24-inch LCD standard, 1920 x 1200 pixels

Support

Warranty: One year parts and labor
 Software: Two years free upgrades
 User manual: Upon delivery
 Service manual: With optional service training
 Calibration: Step height and film thickness standards available
 CE mark certification

Vibration Isolation

Built-in vibration isolation suitable for most applications
 Optional passive or active vibration isolation tables available for noisy environments
 Optional acoustic isolation case available

Facilities

Power: 100 – 230 VAC, 2 A
 Operating temp: 18 – 30 C, non-condensing
 Vacuum (optional): 600 mm Hg
 Tool dimensions (W x D x H): 31 x 41 x 56 cm
 Workstation dimensions: 52 x 66 x 51 cm
 Weight: 29.5 kg
 All cabling included with tool

