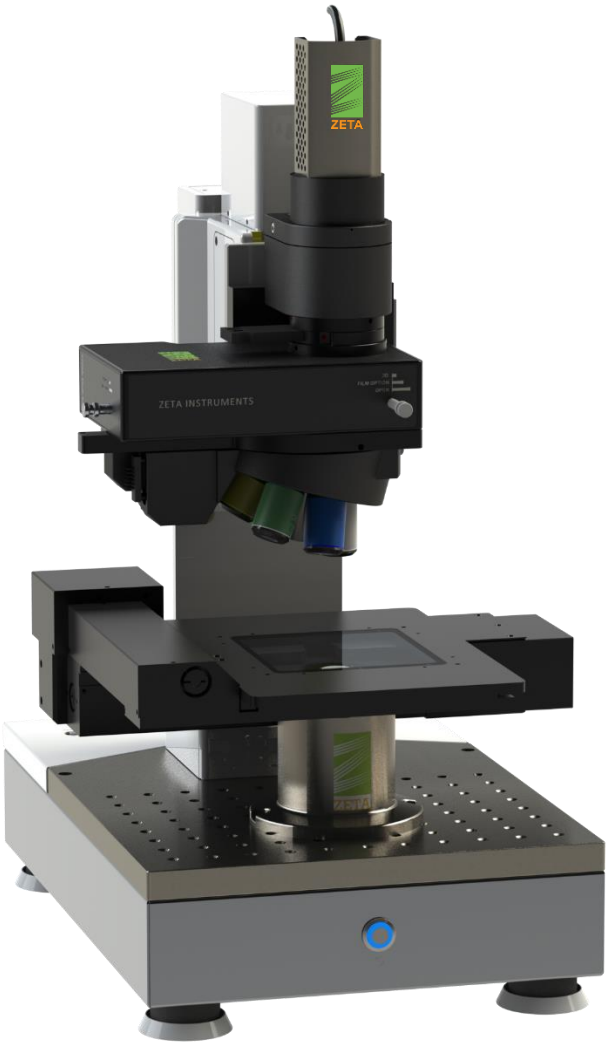
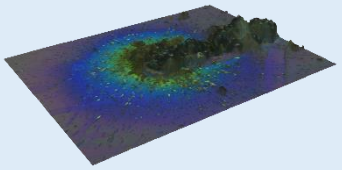
Zeta3D OPTICAL PROFILER

Zeta-20

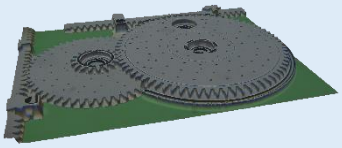


IMAGING THE IMPOSSIBLE

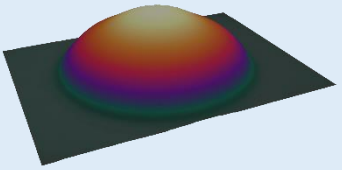
TRUE COLOR 3D ● DIC ● BRIGHT FIELD ● DARK FIELD ● POLARIZED LIGHT IMAGE ● THROUGH TRANSMISSIVE IMAGE ● WHITE OR BLUE LED LIGHT SOURCE ● THIN FILM THICKNESS ● DIAMOND SCRIBE ● HDR IMAGING ● MULTI-SURFACE IMAGING ● AUTO FOCUS ● AUTO SEQUENCE ● AUTOMATED DEFECT INSPECTION ● WIDE AREA STITCHING



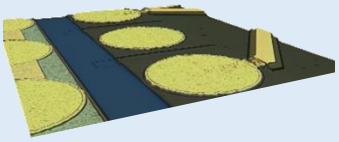
Laser Ablation on Si with Film



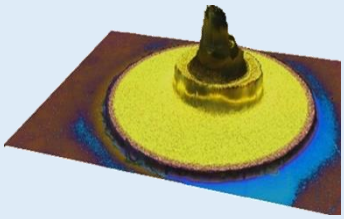
MEMS Device



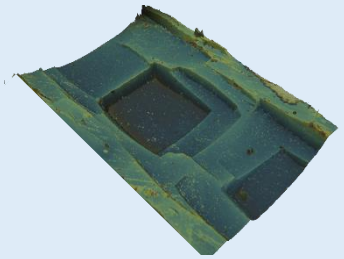
Micro Lens



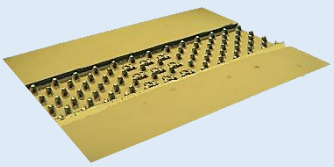
IC Structure



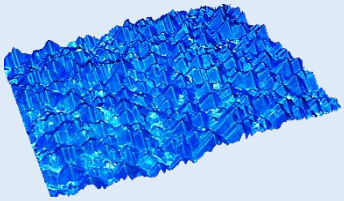
Gold Bump on IC



Crystalline Si for Solar Cells



Microfluidic Structure

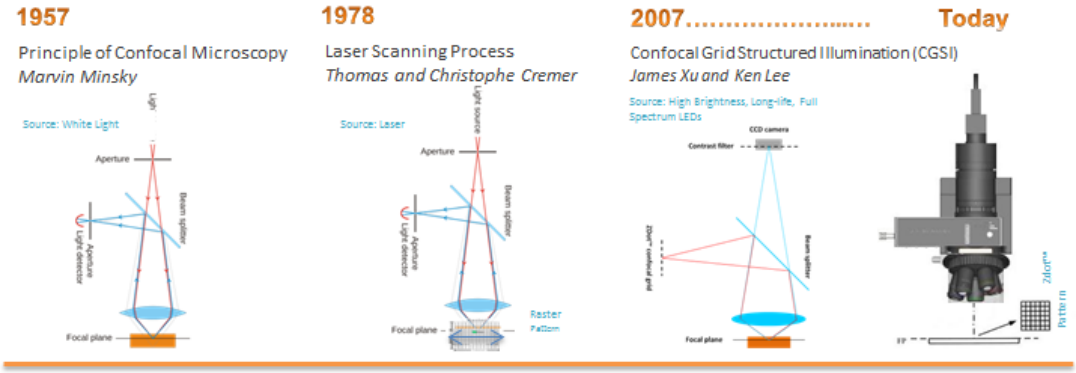


Nitride coated Si Pyramids

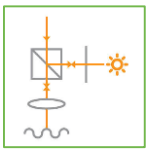
TECHNOLOGY TOOLKIT

Developed in 2007, the revolutionary **Confocal Grid Structured Illumination** (CGSI) is the powerful technology in all Zeta Optical Profilers… but in a Zeta, it's called a **ZDot™**.

Evolution of Confocal Optical profiling technology

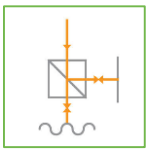


Zeta pioneered the science of multi-mode metrology, packing five powerful techniques into one compact optical package.



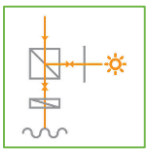
ZDot

Zeta's proprietary 3D imaging technology combines innovative optics with powerful software algorithms to produce great results on a variety of surfaces



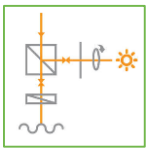
ZX5 &ZX100

Vertical Scanning Interferometer optics enables wide area measurements with a high Z resolution



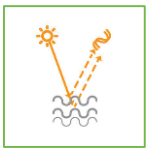
ZIC

Zeta's unique interference contrast technique providing enhanced & quantitative images of sub-nanometer level roughness



ZSI

Convert any standard objective into a shearing interferometer to provide very high Z resolution images



ZFT

Integrated broad-band reflectometer for thin film thickness and surface reflectance measurements

HARDWARE OPTIONS

Imaging Options

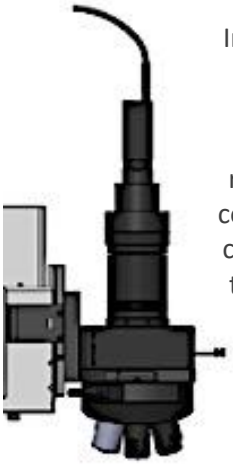
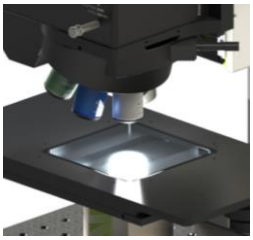


Image parameters such as field of view (FOV) and lateral resolution are determined by the combination of camera, coupler and objective choices. A variety of color and black & white cameras, designed specially for the Zeta system, are available; a popular option for research labs is the 2.8 MPix software programmable multi-resolution color CCD camera. Combined with an extensive suite of objectives and coupling lenses, the flexibility of configuring the Zeta optics means that the same tool can be used to image a FOV as small as 45x35 µm all the way up to 9.5x7.5 mm. Broadband white light or 405nm monochromatic high brightness LED light sources are available. Surfaces can be imaged in bright field, dark field or differential image contrast modes. ZDot™ technology eliminates the need for expensive objectives by using standard objectives.

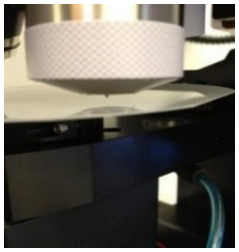
Comprehensive Set of Objectives:
Standard, Long, Ultra-long, Immersion and Refractive Index Corrected

Stage and Sample Handling Options

The Zeta-20 can be equipped with a manual or a motorized XY stage. It can be configured to accept samples as large as 14-inches x 7-inches. Specialty stages include tip-tilt stages (course and fine adjustment) and motorized piezo Theta 360 degree stages. Chucks options include manual rotary, tilt, vacuum chucks, square and circular glass options for transmitted illumination (backlight for transparent substrates), and special apparatus for wire, magnetic and solar applications.



Transmitted Illumination: High brightness LEDs are used to illuminate transparent samples for through transmissive imaging.

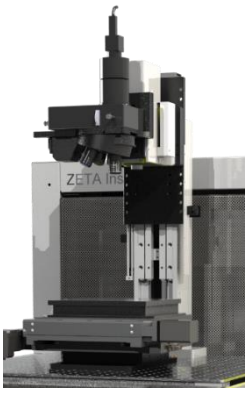


Diamond-Scribe: Precision diamond tipped scribe to mark features of interest for further analysis on AFM, SEM or other tools.

Advanced Hardware Options

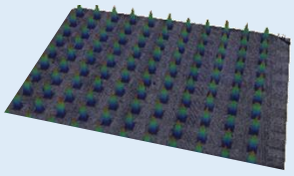
The Zeta Optical Profilers can be easily upgrade to meet your measurement requirements. Shown below are some application specific hardware configurations.

Swivel Head

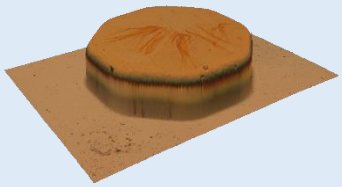


280mm Extended Z Range

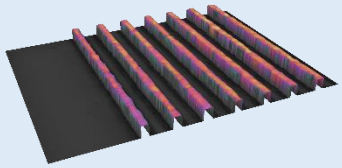
Chamfer / Edge Inspection



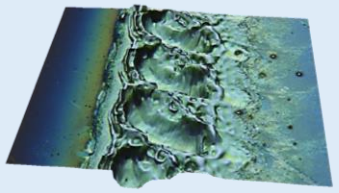
Microneedles for Drug Delivery



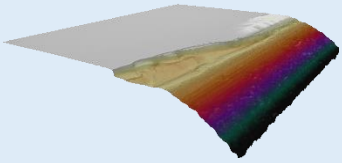
Bump for WLCSP



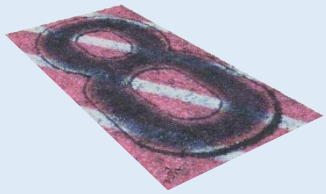
2µm RDL for FOWLP



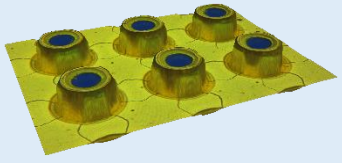
Laser ablated thin film surface



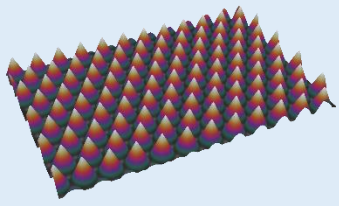
SiC Wafer Edge Defect Profile



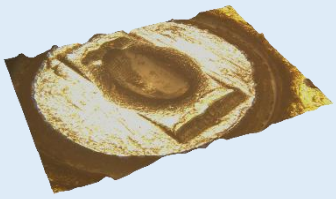
Feature on Currency Note



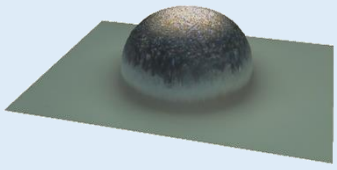
VCSEL Device



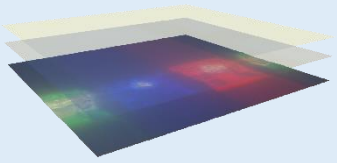
PSS – Patterned Sapphire



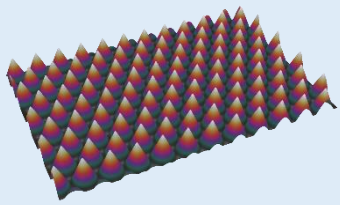
Firing Pin mark on a casing



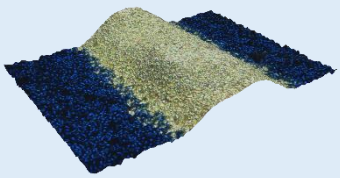
FOWLP Bump over Passivation



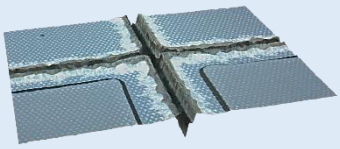
RGB pixels inside a smart phone



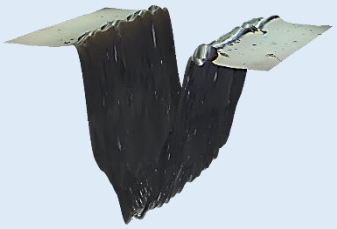
Patterned Sapphire Substrate



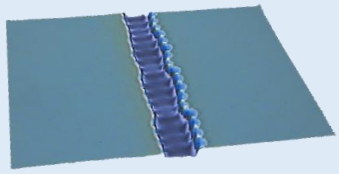
Contact line on a solar cell



Laser dicing on a LED wafer



Deep trench in PDMS



Isolation trench on solar cell

SOFTWARE OPTIONS

Fastest Time to Usable Data

Preparing samples and equipment for data acquisition should be ***fast***. The ease of use and automation features of a Zeta3D™ enables the user sees the fastest 'time to usable data'. Image Acquisition Options include:

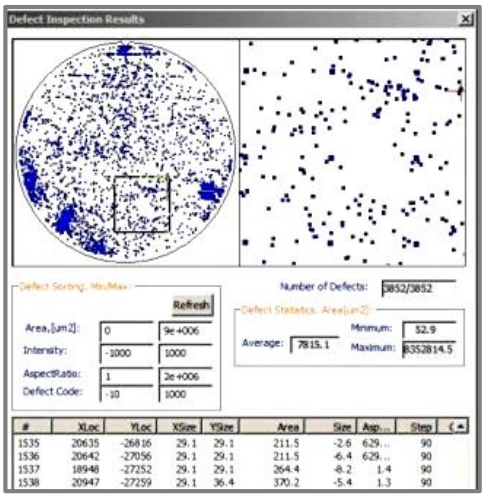
- Automatic illumination control
- Auto-focus
- Software selectable field of view
- Auto-sequence for multiple sites
- Time delay acquisition
- Multiple-layered acquisition (up to 8 layers)
- Wide area stitching
- Pattern recognition for automatic detection and scanning
- High dynamic range (HDR) for surfaces with high contrast variation
- User manager with password protected recipe access

Simple Scan Setup

Image Analysis Software Included, with Options

Zeta3D comes with a comprehensive software package, offering a complete suite of analysis functions and recipes. Some of the highlights are:

- Roughness analysis based on ISO standards
- 2D and 3D roughness
- 2D and 3D step height analysis
- Single & multiple cross section analysis
- Automatic feature detection
- CD measurement of detected features
- Bow and shape measurement
- Automated defect inspection (optional)
- Texture analysis (optional)
- Contact line analysis
- Film Spectrometry (optional)

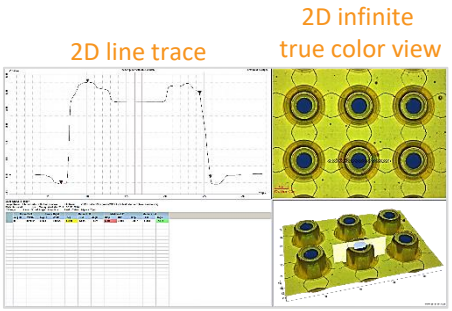


Automatic Optical Inspection (AOI)

Communicating Results

Advanced functionality allows for easy reporting – from exporting data to run in your favorite image processor, or simply taking a screenshot to drop into a presentation. Advanced Options include:

- Custom report format
- Offline Analysis License
- Additional analysis package – ZMorf
- Compatibility with 3rd party packages
  - MATLAB, SPIP



Simple and Effective Analysis Report

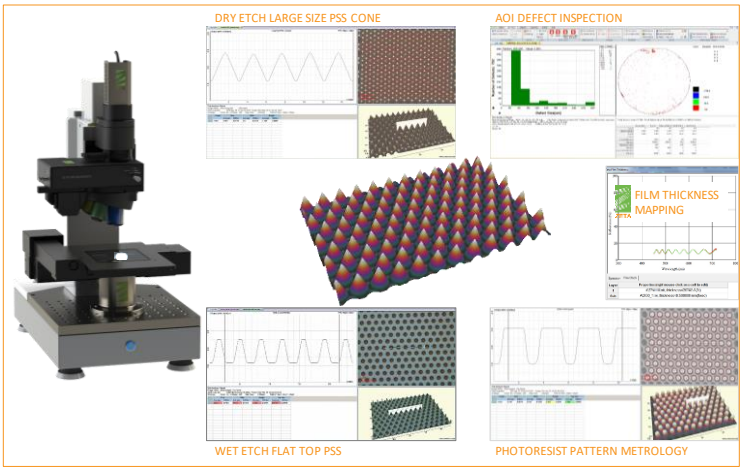
APPLICATIONS SOLUTIONS

Zeta Instruments creates turn-key metrology solutions for a variety of applications. We combine multi-mode optics, advanced electronics and data analysis algorithms to create 'one-button' production ready packages.

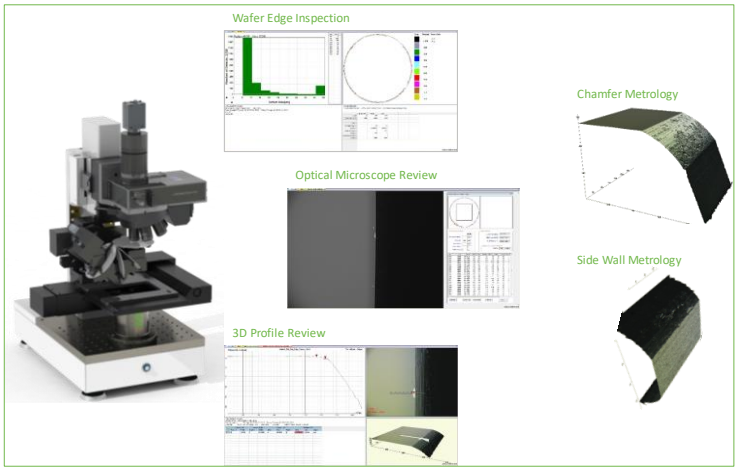
High Brightness LED (PSS)

Application Suite:

Film Thickness
CD Measurements
Dry Etch PSS Height
Wet Etch PSS Height
Defect Inspection
Defect Review
3D Imaging of Defects



Extreme OD (XOD)



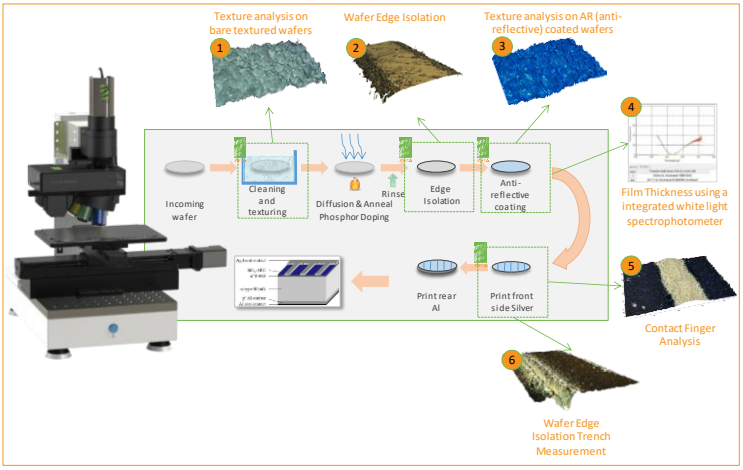
Application Suite:

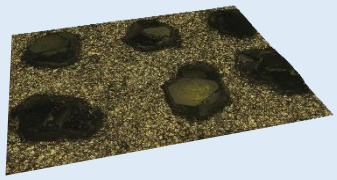
Wafer Chamfer Shape
Wafer Chamfer Roughness
Side Wall Shape
Top Edge Defect Mapping
Side Wall Defect Mapping
Defect Review
3D Imaging of Defects
Diamond Scribe Marking

PV Solar Cell

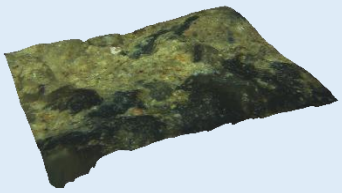
Application Suite:

Bare Wafer Texture
Edge Inspection
Nitride Wafer Texture
Film Thickness
Contact Line Height
Edge Trench Depth



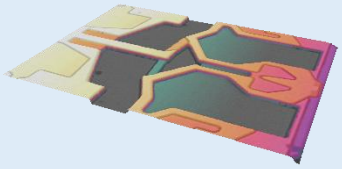


CMP Pad Conditioner

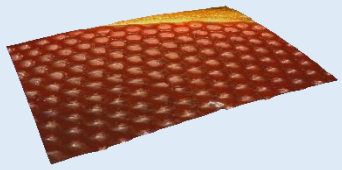


Asphalt Surface

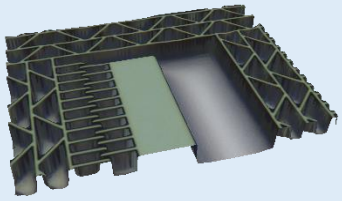
Microfluidic flow separator



Read/Write Head

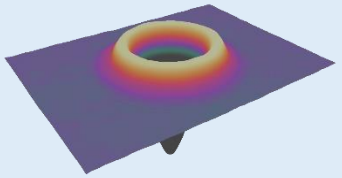


Eye of a Fly



MEMS Device

Diamond Wire for Si wire saw



Soft Laser Mark

Zeta-20 Optical Profiler

Zeta3D TECHNICAL SPECIFICATIONS

PERFORMANCE	
Z Resolution	0.1nm[1]
Z Repeatability (Step Height)	< 0.5%[2]
Z Accuracy (Step Height)	< 0.75%[3]
RMS Repeatability (Roughness)	0.05nm[4]
OPTICS & ILLUMINATION	
Multi-Mode Measurement & Imaging Capability	ZDot (Confocal Grid Structured Illumination), True Color, Standard ZFT (Thin Film Spectrometer), Option ZIC (Intereference Contrast Imaging), Option ZX5/100 (Vertical Scanning Interferometer), Option ZSI (Shearing Interfometer), Option
Illumination Optics	Triple optical path for Multi-Mode Optics Dual Ultra Bright LED, White, Standard Dual Ultra Bright LED, Blue, Option
Illumination Options	Bright Field, Standard Polarized Light, Option Through Transmissive (Bottom), Option Dark Field, Option Multiple Angle Side Illumination, Option
OBJECTIVES & IMAGING	
Objective Options	1.25X - 150X Normal Objectives Long Working Distance Objectives, Ultra Long Working Distance Objectives Through Transmissive Objectives, Liquid Immersion Objectives Vertical Scanning Interferometry Objectives
Field of View	From 9µm x 7µm up to 18mm x 14mm (objective dependent)
Turret Options	From 1-position up to 6-position Manual 6-position Automated
Camera	Color CCD camera, Software controlled, Variable image size: From 640x480 pixels up to 1920x1440 pixels (larger pixel formats also available for custom applications)
Total Magnification	5500 times optical / 66000 times digital
SCAN RANGE & SPEED	
Z Scan Range	Up to 25mm in a single scan
Z Scan Speed	> 150µm/sec
STAGE AND SAMPLE DIMENSIONS	
Z Scan Stage	40mm Standard, Closed loop with optical feedback control, 13nm resolution 240mm Extended Option, Closed loop with optical feedback control, 13 nm resolution 200µm Ultra High Precision Piezo Stage Option, 0.1nm resolution
XY Stage Options	Manual XY Stage: Up to 175mm x 350mm Motorized XY Stage: Up to 180mm x 200mm
Tip/Tilt Options	Precision & Coarse Tip/Tilt stage options up to 20° of tilt "CM" Option for disk and wafer edge measurements "Swivel Head" Option for tilting optical head around large samples
Sample Chuck	360° rotary chuck with vacuum connection Glass chuck for through transmissive imaging (backlight) Custom chucks and fixtures for specific applications
Sample Weight	Up to 15Kg, depending on XY stage selected >15Kg Option available for specific applications
Sample Size	XY Size : Up to 350mm depending on XY Stage Z Size: 125mm, Standard; 350mm with Extended Z-Stage Option (Custom extended staging options available)
SOFTWARE FEATURE SET	
Zeta3D	The comprehensive Zeta3D software package is a fully integrated data acquisition, analysis and reporting package. Step height, roughness, profile and area analysis based on ISO standards are all included in the Zeta3D software package.
Advanced Applications	CD - Critical Dimension, Feature detection, Multi-surface, Film thickness, HDR - high dynamic range, Bow/Warp Mapping, Wafer Edge Profile, AOI - Defect Inspection
External Applications & Controls	ZMorf, MATLAB, SPIP, TCP/IP, SECS/GEM
Automation Suite	Auto-illumination, Autofocus, Auto sequence, Auto deskew, Pattern recoginition, Auto-stitching
CALIBRATION	
Zeta Cailbration Reference	Includes 4 reference step heights for Z Calibration: Nominal 8, 25, 50 and 100 µm Varying Pitch patterns for XY Calibration and Patterns for Optical Resolution Testing
Zeta Film Reference	270nm oxide film standard
NIST Traceable Standards	Application specific Step Height and Film Thickness standards
DATA ACQUISITION AND DISPLAY	
PC	64-bit Windows 7 Multi-core Intel i7 16GB RAM / 1 TB HDD 3D Accelerator Card with 250MB VRAM
Display	24-inch LCD, Standard / 30-inch LCD, Option
VIBRATION ISOLATION	
Vibration Isolation	Vibration dampening feet included with system Optional active vibration isolation modules avaiable for high noise environments
WARRANTY	
Comprehensive warranty	1 year comprehensive warranty

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Capabilities of Zeta3D™ systems will depend on the configuration purchased