

# theta-SE



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Ellipsometry Solutions



# Capabilities

The theta-SE is a push-button spectroscopic ellipsometer for characterizing thin film uniformity. It features advanced ellipsometry instrumentation in a compact package at an affordable price.

## Why theta-SE

### Fully Integrated

The theta-SE comes equipped with 300 mm sample mapping, small-spot measurement beam, fast sample alignment, look-down camera and our latest Dual-Rotation ellipsometer technology. The theta-SE has everything you need to measure the spatial uniformity of your film thickness and optical properties.

### High Speed

Sample throughput is optimized by using fast, point-to-point translation, high-speed sample alignment and Dual-Rotation ellipsometer technology for continuous data collection.

### Compact

The patented, Dual-Theta rotation stage enables full, 300 mm mapping in a small, table-top instrument. The instrument footprint is only slightly larger than a 300 mm wafer.

### User Friendly

Automated data analysis and built-in reporting enables push-button operation and quick access to measurement results.

### Affordable

The theta-SE delivers the power of spectroscopic ellipsometry and 300 mm uniformity mapping at a reasonable price.



# Features

The theta-SE combines many of the latest advancements in ellipsometry instrumentation to provide uniformity maps of your thin films. Spectroscopic ellipsometry is perfect for measuring film thickness and optical constants. The theta-SE scans the uniformity of these film properties over your entire wafer.

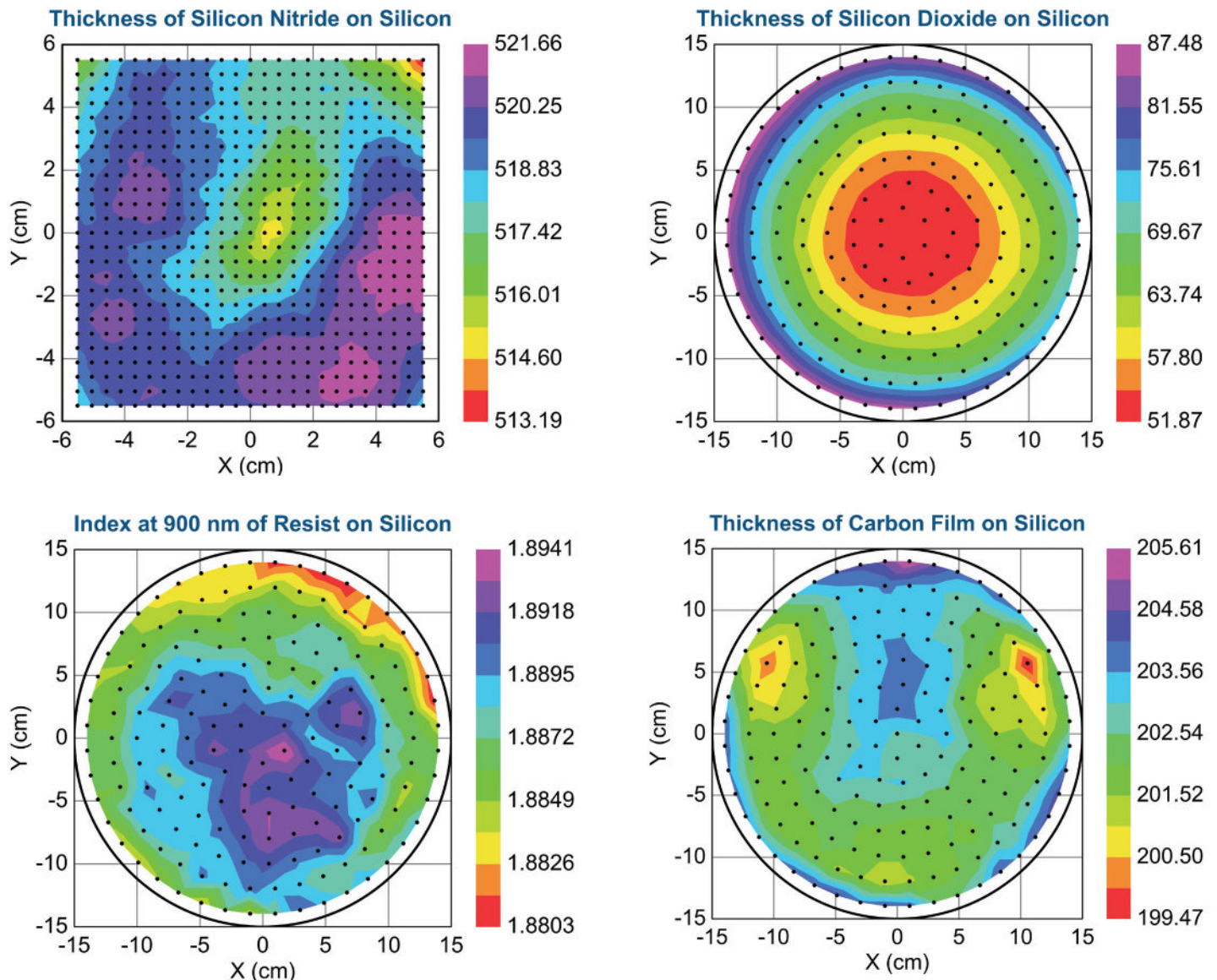


Figure 1. Thickness and refractive index uniformity maps

## Ellipsometry Advantages

**Sensitivity:** Spectroscopic ellipsometry measurements provide sensitivity to a variety of material properties such as composition, conductivity, surface conditions, etc. In addition, ellipsometry is sensitive to thickness changes at the sub-angstrom level. The theta-SE leverages the sensitivity of ellipsometric measurements in combination with high-speed mapping functionality to provide non-destructive characterization across a sample.

**Accuracy:** Spectroscopic ellipsometry measurements calculate the change in polarization of light reflecting off a sample. This change in polarization is traditionally described with two measured parameters, Psi and Delta. In addition to providing two measured parameters at each wavelength, this self-referencing technique results in excellent measurement accuracy.



**Dual-Theta Mapping Translation:** Our patented translation stage enables ellipsometry measurements across samples up to 300 mm diameter with a small, table-top instrument. The compact ellipsometer heads and integrated electronics all result in a significantly reduced instrument footprint.

**Focused Spot:** A focused measurement beam parallel to the wafer edge produces excellent edge exclusion.

**Fast Camera Alignment:** The fast camera alignment uses machine vision and image recognition to precisely align the sample in a fraction of the time compared to traditional alignment techniques. The camera also provides sample visualization to locate specific areas of interest for measurement.

**Dual-Rotation Technology:** Measurement times for multi-point maps are minimized by reducing the translation time between points, using our fast camera alignment and taking advantage of Dual-Rotation technology that captures high-accuracy measurements in half the time.



Figure 2. Patented camera-based alignment

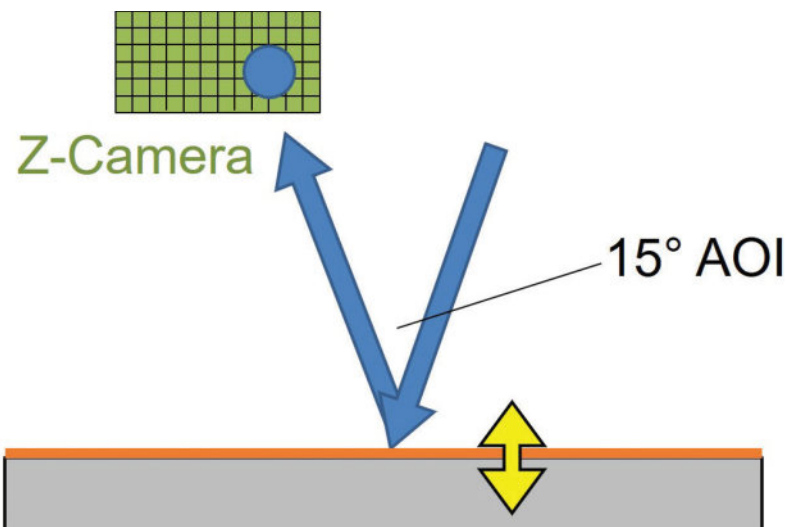


Figure 3. Schematic demonstrating the camera-based-alignment principle

**Automated Data Analysis in CompleteEASE:** CompleteEASE is equipped with user-friendly features for surface uniformity measurements. Recipes that describe the data acquisition, measurement location and data analysis allow push-button operation.

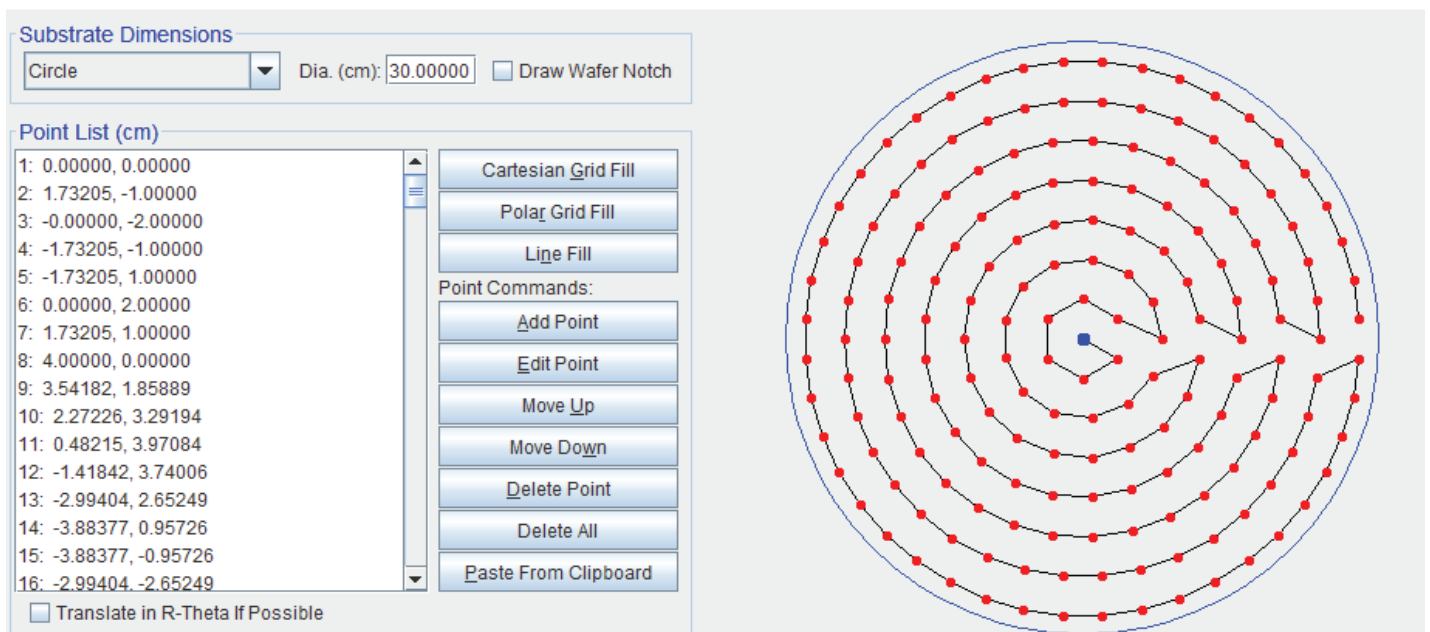


Figure 4. Software interface for creating uniformity map routines

# Specifications

## Spectral Range

400 nm to 1000 nm, 190 wavelengths

## System Overview

- + Dual-Rotation optical design
- + CCD detection
- + Fast sample alignment
- + Focused beam
- + 300 mm mapping stage



## Mapping Overview

Wafers up to 300 mm diameter

## Data Acquisition Rate

- + 0.61 sec. [Fastest]
- + 1-2 sec. [Typical]

## Spot Size

Nominal: 250 x 600  $\mu\text{m}$  on sample

## Data Types

Spectroscopic ellipsometry and advanced g-SE or MM-SE

## Angle of Incidence

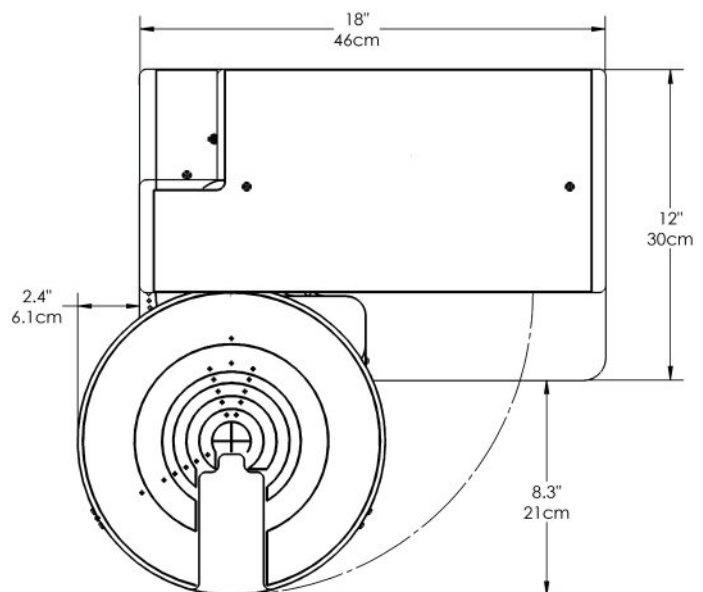
65° fixed for all measurements

## Light Source

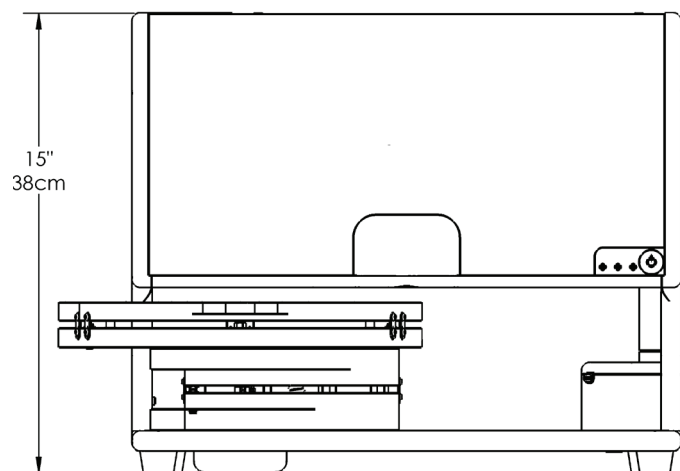
Quartz Tungsten Halogen (QTH)

## Power Requirements

100 - 250 VAC, 50-60 Hz, 2 Amps



Top View



Front View



# Fully Integrated

For more information:



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