theta-SE specification

The theta-SE is a table-top spectroscopic ellipsometer for characterizing thin film uniformity featuring Dual-Rotation ellipsometry technology and a variety of advanced features that enhance mapping capabilities.

theta-SE specification
Features

Dual-Rotation™ Technology
The theta-SE is equipped with Dual-Rotation ellipsometry technology, featuring a rotating compensator on the source unit and rotating analyzer on the detector unit. This technology provides access to high accuracy and Mueller matrix measurements in a single optical cycle.

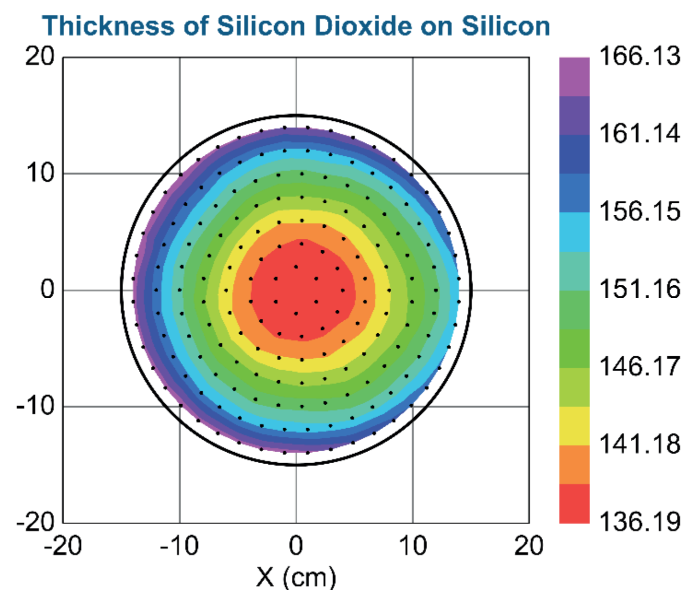
Dual-Theta Sample Translation
The patented, Dual-Theta rotation stage enables full, 300 mm mapping in a small, table-top instrument. The instrument footprint is only slightly larger than a 300 mm wafer.

CCD Detection System
The theta-SE uses a CCD detector for simultaneous measurement of 190 wavelengths. This allows measurement from 400 nm to 1000 nm in less than a second.

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.

Focused Measurement Beam
Focused measurement beam enables higher resolution spatial measurements and edge exclusion for measurements taken near the edge of the sample.

CompleteEASE® Software
CompleteEASE is the world's leading ellipsometry software and the perfect interface for real-time data acquisition, monitoring, and control. Includes prebuilt models for beginners, comprehensive measurement capabilities, and advanced data analysis features.



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theta-SE specification
System specification

System Configuration (in order)
Light source
Fixed polarizer
Rotating compensator
Sample
Rotating analyzer
Fixed analyzer
Spectrometer and detector

Angle of Incidence
65° (nominal), fixed for all measurements

Spectral Range
400 nm to 1000 nm (190 wavelengths)

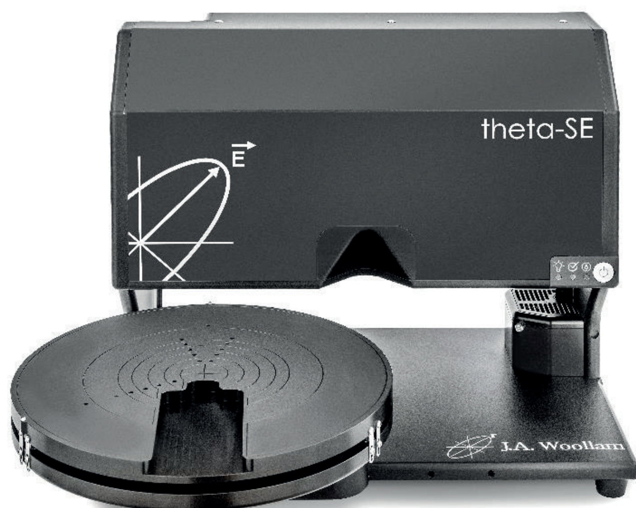
Spectral Resolution Bandwidth
3.2 wvl. spacing; ~10nm bandwidth FWHM

Light Source
Quartz Tungsten Halogen (QTH)

Data Acquisition Rate
0.610 seconds (fastest)
1-2 seconds (typical)

Spot Size
Approximately 250 x 600 μm

Sample Size
The theta-SE accommodates samples up to 300 mm diameter and 12 mm thick.



Measurable Quantities
Ellipsometry: Ψ (0°-90°) and Δ (0°-360°)
Depolarization: % Depolarization
Mueller Matrix: 11 normalized elements of the Mueller Matrix (normalized to m11). Useful for samples that are both anisotropic and depolarizing.

Typical Repeatability
Thirty consecutive measurements of native oxide (nominally 2nm) or thermal oxide (nominally 25nm) on silicon with a warm system using ten second averaging with fixed sample:

δthickness < 0.009 nm
*1-standard deviation

Measurement Time
Measurement times are dependent on sample reflectivity and flatness. Optimal measurement times can be achieved by aligning the sample prior to measurements and fixing the filter wheel to the optimal setting prior to measurement.

Example times below were collected on a 100mm wafer using camera-based alignment at all points. The timing begins when the sample is aligned and in the measurement position.

Acquisition Time	10pt map	29pt map	49pt map
0.610 s	63 s	96 s	136 s
1.22 s	68 s	143 s	225 s
2.44 s	97 s	220 s	352 s

theta-SE specification
Facility requirements

Environmental Operating Range
Temperature: 10°C to 35°C
Humidity: 20% to 80% (non-condensing)

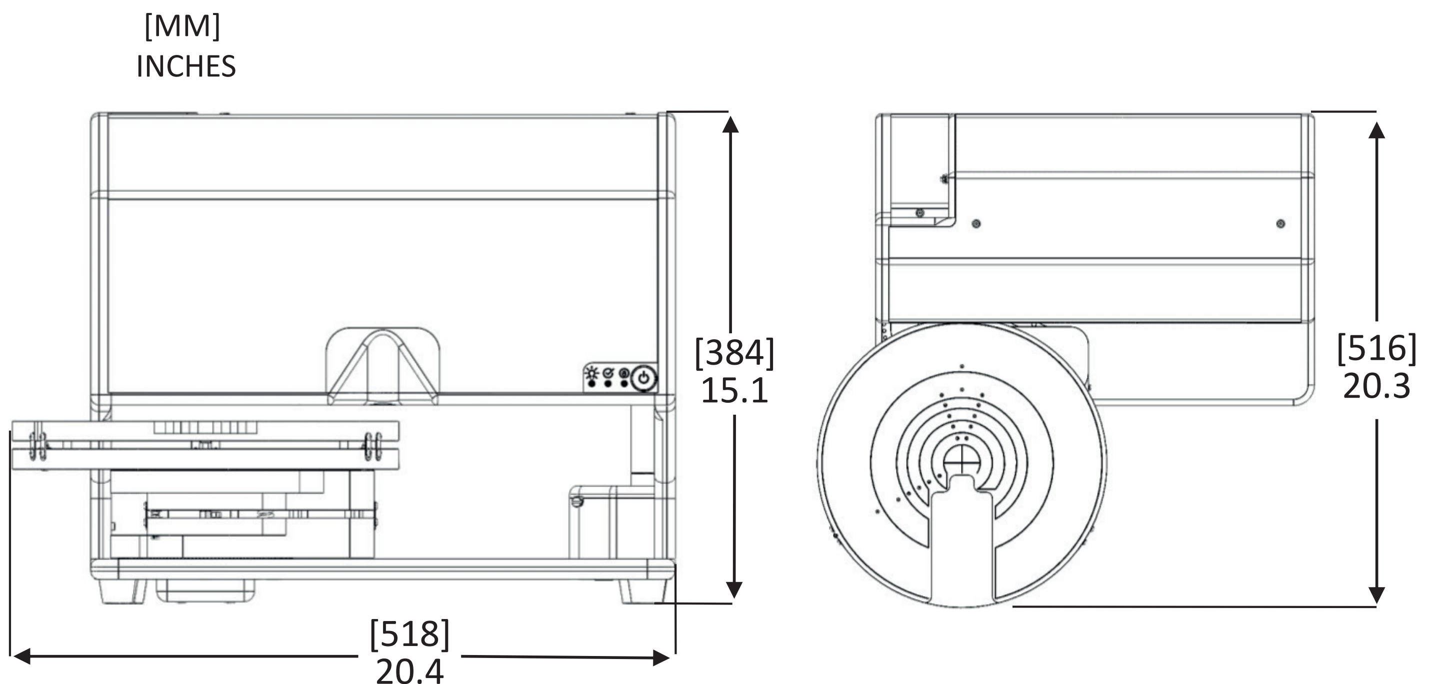
Power
90-264VAC, 50-60Hz, 2A Max.

Ambient Lighting
RCE technology allows accurate measurements under normal room light conditions.

Weight
58 lbs. (excluding computer)

Dimensions
Width 20.4”
Depth 20.3”
Height 15.1”

Table
Customer supplies sturdy table. Must support at least 58 lbs. plus computer. Dimensions should accommodate theta-SE and computer. Vibration isolation table is NOT required. Recommended size: Width 60”, Depth 30”, Height 36”.



System dimensions are shown with maximum stage extension.

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