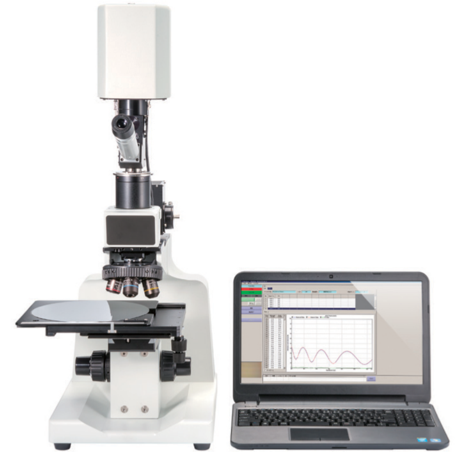
TOHO TECHNOLOGY

TohoSpec 3100

FILM THICKNESS
Measurement

The TohoSpec 3100 is a state of the art, small spot spectroscopic reflectometer, built on a simple-to-use tabletop platform. A reliable solid state linear diode array is used to ensure measurement speed and accuracy. Incorporating core technology acquired from market leader Nanometrics, this system is specifically designed for a wide variety of R&D applications. The TohoSpec 3100's Windows software interface is easy to use, and is supplied with a suite of measurement programs that handle most semiconductor films. The flexible software design makes it simple for the engineer to customize measurement programs and recipe jobs for more advanced applications. The TohoSpec 3100 delivers the same trusted results as its predecessors while offering the user enhanced versatilityand data management.



Standard Features

Comprehensive Measurements

The 3100 provides scanning from 380nm to 800nm and can measure single layer films such as oxide, nitride, and photoresist, as well as multiple layer film stacks of up to three layers simultaneously. Measurements can also be made on a wide variety of other substrates including silicon, aluminum and gallium arsenide.

Dynamic Software

The 3100 software platform allows forthe creation of unique single and multiple layer programs for proprietary films and film stacks utilized in modern semiconductor processes. With the ability to select film constants, scan ranges, and substrate types, the 3100 is the ideal tool for rapid measurement program development. Data management features, statistical analysis, histograms, and the ability to import and export data files are all standard.

Enhanced by W. Theiss SCOUT

Powerful and flexible SCOUT software provides increased measurement capabilities including:

Simultaneous measurement of optical constant (n, k)

Simple and advanced dispersion models for optical material characterization:

Cauchy: Transparent film (SiO2, SiN, PI, Photo Resist etc.)

OJL model, Tauc-Lorentz: Interband transition models with 'built-in' Kramers-Kronig relation

Extended Drude model: Conductive film, ITO, TiN etc

Optical models forfilm condition assessment:

EMA: Surface roughness and Interface roughness etc.

Graded: Nonhomogeneous in the direction of depth. Enhancement of the optical model for film condition.

Applications

The TohoSpec 3100 is designed to provide accurate film thickness measurements across a vast array of applications.

- LED
- Solar
- FPD / LCD
- OLED
- Photomask
- Power Device
- SOI
- Magnetic head for HDD

Films: All partially transparent films

Layers: Guaranteed 3 layer measurement and in some cases beyond 3 depending on parameters

Substrates: Most smooth or semi-smooth surfaces with some reflectance

Sample Info: Sequence of the film stack, film materials, nominal thickness of each layer

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Highly Configurable

With attention to versatility, the 3100 is highly configurable. Small spot size measurements can be performed with the 5x (φ50μm) standard lens. Higher precision measurements are possible with an optional 10x (φ25μm) and 50x (φ5μm) lens. With the 3100 T model, film layers as thick as 70 μm are measurable with an installed small-aperture system.

Streamlined Design for Ease of Use

The TohoSpec 3100 has been refined to produce the same trusted results with less time consumption than older models.

- Users are able to connect the tool to any computer via Ethernet port
- Si chip is embedded on the stage for convenient reference measurement
- Smaller footprint (280 mm x 472 mm)
- 5x standard lens. Smaller spot size

Specifications

Performance	
Film Stack / Number of Films	Up to 3 layers simultaneously
Wavelength Range	380 - 800 nm (Standard) 380 - 850 nm (Thick film)
Film Thickness Range[1]	
Standard Configuration (5x)	100 Å - 30 μm
Thick Film Configuration (5x)	100 Å - 70 μm
Repeatability	2 Å
Film Type / n & k values	Obtained
Measurement Time	0.1 to 2.5 seconds /site (3100) 0.01 to 2.5 second / site (3100 T)
Data Management	Statistical data analysis, Data export (ASCII)
Hardware Configuration	
WaferSizes	Stage handles 3, 4, 5, 6, 8 inch wafers
Head Unit	Reflectometer Linear Array
Optics / Spot Sizes	
5x (standard)	50 μm (15 μm for Thick film)
10x (optional)	25 μm (7.5 μm for Thick film)
50x (optional)	5 μm (1.5 μm for Thick film)
100x (optional for Thick film)	(0.75 μm for Thick film)
Optical Filters	
Yellow cutoff filter	480 nm (measured at 50% light transmission)
Orange cutoff filter	560 nm (measured at 50% light transmission)

Specifications subject to change.

Options

- 10x objective
- 50x objective
- 100x objective – 0.75 μm small spota
- Small aperture system for thick film measurement
- Color video camera
- Cleanroom operations manual (hard copy)
- NanoStandard film thickness standard wafer (6 or 8 inch)[2]

Notes

[1]Film thickness range assumes oxide on silicon. Ranges for other films may vary.

[2]NanoStandard® wafers are NIST-traceable film thickness standards consisting of six pads of different oxide thicknesses on silicon.