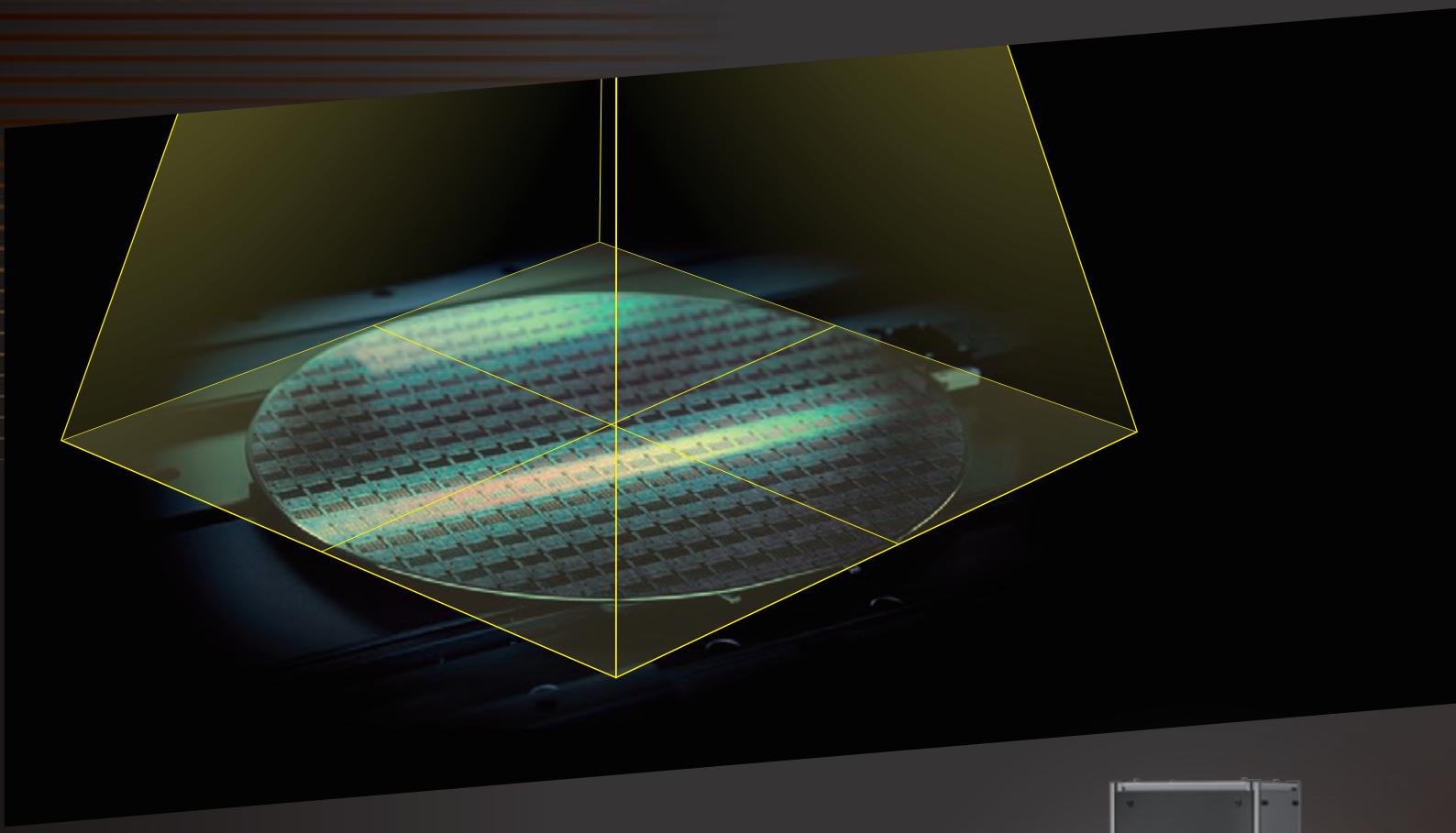
NEW

Hyper Gauge®

Thickness measurement system C17319-11



Measure thickness distribution of a 300 mm wafer

In only 5 seconds

HAMAMATSU

PHOTON IS OUR BUSINESS

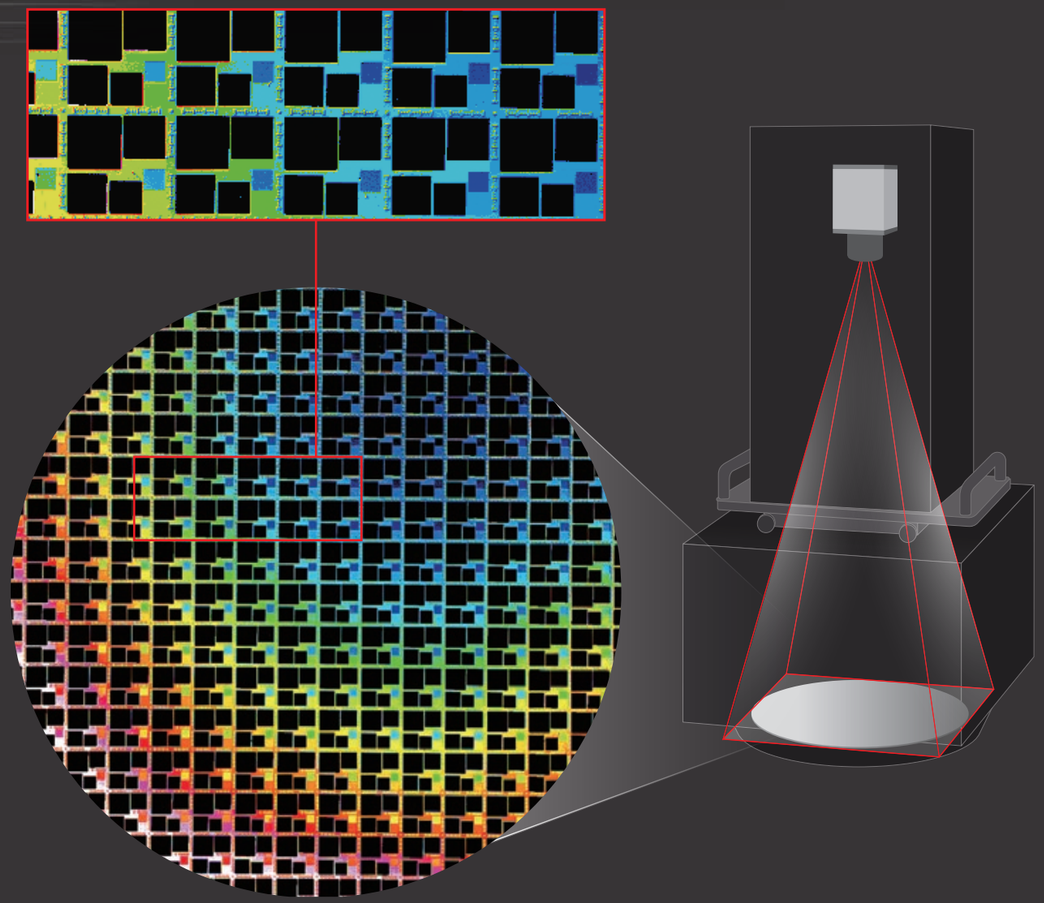
Snapshot of in-plane thickness distribution

The HyperGauge Thickness measurement system C17319-11 employs a spectroscopic interference method for precise film thickness measurement. Equipped with the λ-Capture®* technology, which detects wavelength shifts using high-sensitivity cameras without a spectrometer, it can measure the entire film thickness of up to 300 mm wafers in as little as 5 seconds. Compared to point sensor systems, it delivers dramatically faster acquisition of thickness distribution.

Combining high spatial resolution with excellent measurement repeatability, the system achieves the accuracy required for inspecting not only bare wafers but also patterned wafers.

It is ideal for applications such as observing thickness variation in wafers, evaluating ultra-thin films, and analyzing structures on patterned wafers—covering the entire wafer surface with versatility.

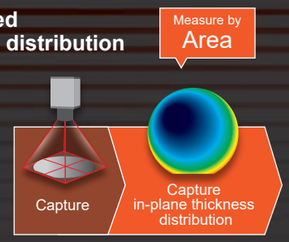
* λ-Capture is a patented wavelength detection technology developed by Hamamatsu Photonics.



Acquire thickness distribution in only 5 seconds

By adopting Hamamatsu's proprietary wavelength detection technology, λ-Capture, combined with high-sensitivity cameras, the system enables area-based thickness measurement. It captures the in-plane thickness distribution of wafers up to 300 mm in diameter in as little as 5 seconds. Since the entire wafer surface is imaged at once, it simplifies measurement point selection and alignment compared to point sensor systems.

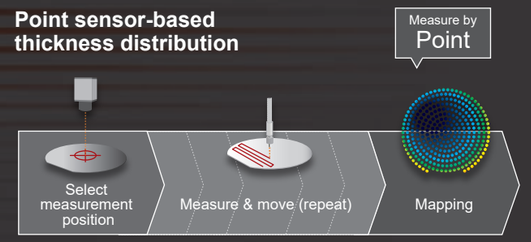
Area-based thickness distribution



Advantages of measuring the entire surface at once:

1. Acquire in-plane thickness distribution
2. Extract thickness values at any point from the camera image

Point sensor-based thickness distribution



Acquire thickness data while scanning along the X-Y axis. After scanning is completed, obtain a 2D map and check thickness variation.

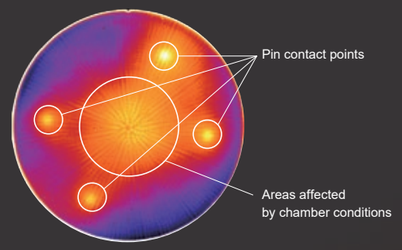
Boost productivity with fast uniformity measurement

In semiconductor manufacturing processes, variations in film thickness can occur on wafers due to factors such as pin temperature inside the chamber. These thickness non-uniformities negatively affect product quality, making it essential to equalize film thickness between process steps.

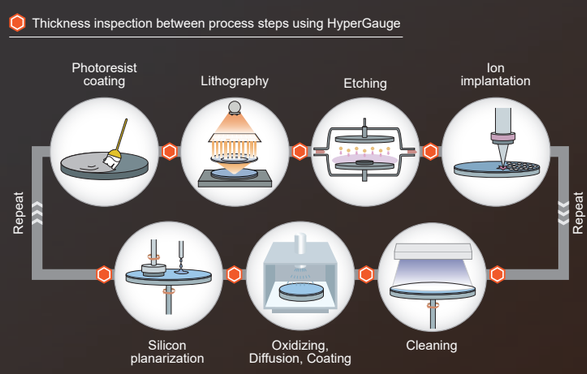
With point sensor systems, the number of measurement points is limited by time constraints, making it difficult to fully capture in-plane thickness distribution. By adopting an area-based approach, our system measures in-plane thickness distribution from approximately 750 000 points in only 5 seconds.

This enables shorter process times for improved productivity and better yield through comprehensive thickness distribution analysis. Fast in-plane uniformity measurement significantly contributes to both productivity and quality in semiconductor manufacturing.

Chamber-induced thickness variation



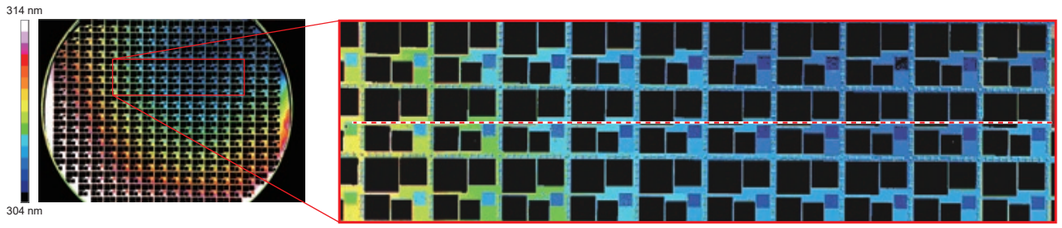
Thickness inspection in semiconductor process



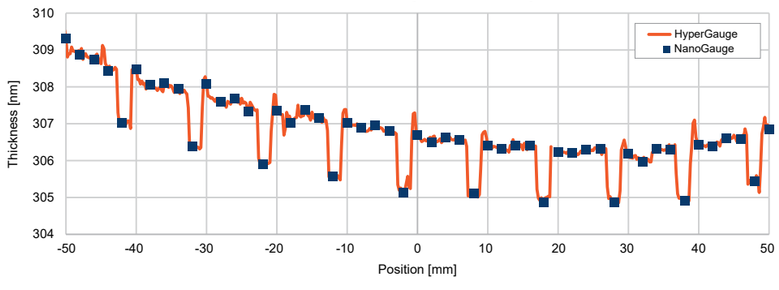
Measurement example

Pattern evaluation (comparison of thickness distribution profiles) Sample: SiOx 300 nm

We acquired the thickness distribution between patterns and compared the thickness distribution profiles of Optical NanoGauge, which uses a point sensor method, and HyperGauge, which uses an area-based method.
The results show that HyperGauge can measure film thickness with accuracy comparable to the point sensor method.



Thickness distribution profile comparison



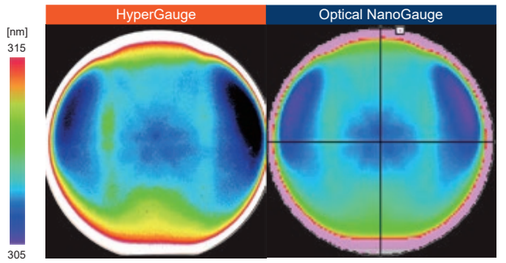
POINT

High repeatability

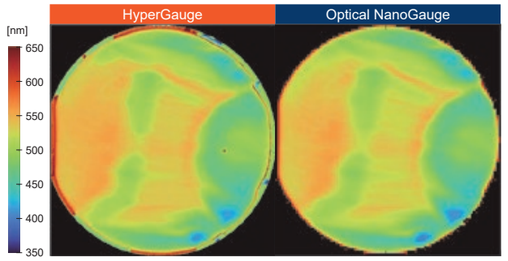
The measurement repeatability of wafer batch measurement using HyperGauge is as high as ±0.1 %*1, and its spatial resolution of 0.3 mm/pixel makes it suitable not only for bare wafers but also for patterned wafer inspection.

*1 Film thickness: 100 nm to 1000 nm, 96 integrations.

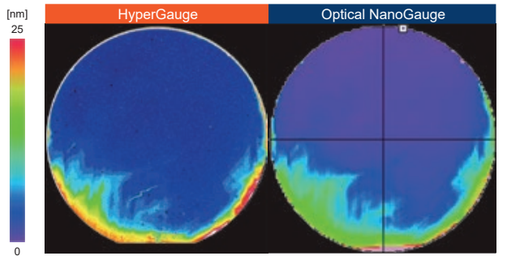
Large non-uniformity Sample: SiO_2 300 nm



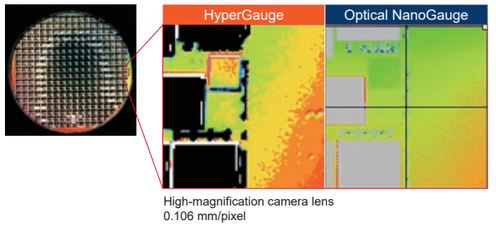
Small non-uniformity Sample: SiO_2 500 nm



Ultra-thin film Sample: SiO_2 10 nm

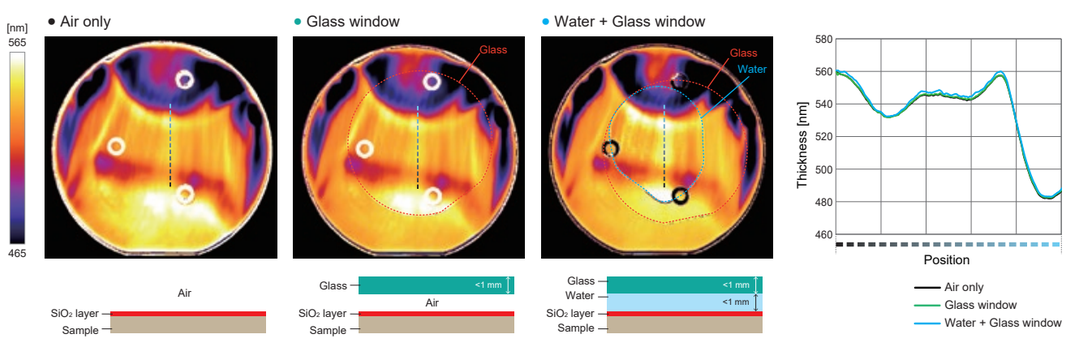


Pattern evaluation Sample: SiOx 300 nm



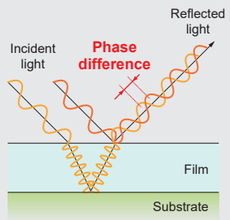
High-magnification camera lens
0.106 mm/pixel

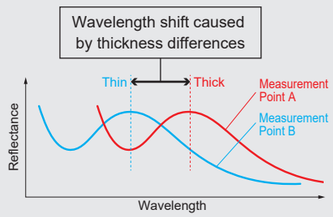
Through water & glass Sample: SiO_2 500 nm



Measurement principle

HyperGauge employs spectroscopic interferometry. This method analyzes the reflections from thin-film samples to measure film thickness. The interference spectrum shifts depending on the film thickness.

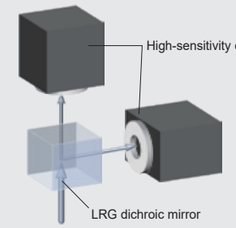




λ-Capture technology for high speed wavelength measurement

λ-capture is a proprietary technology capable of detecting small wavelength shifts without using a spectrometer. By utilizing two high-sensitivity cameras, it measures wavelengths across an area, allowing high-speed wavelength shift measurement of the entire wafer surface.

For more details, please visit our website.
https://www.hamamatsu.com/all/en/product/manufacturing-support-systems/thickness-measurement-system/C17319-11.html



Specifications

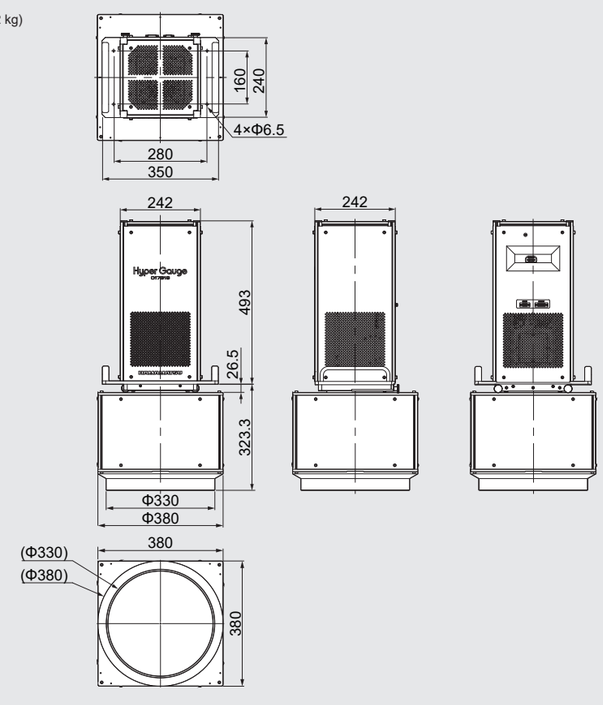
Specifications

Product number		C17319-11
Measurement film thickness range		10 nm to 1000 nm
Measurement accuracy	Film thickness 10 nm to 100 nm	±1 nm
	Film thickness 100 nm to 1000 nm	±1 %
Measurement reproducibility	Film thickness 10 nm to 100 nm (96 integrations)	0.1 nm
	Film thickness 100 nm to 1000 nm (96 integrations)	±0.1 %
Stability	Temperature dependence: Environmental temperature variation +20 °C to +30 °C	±1 %
	Height dependency: 5 mm height variation	±1 %
	Long-term stability: 1 hour after startup	±0.5 %
Field of view		Full 300 mm wafer surface
Spatial resolution		0.3 mm/pixel
Working distance	Field lens bottom-to-sample surface distance	30 mm to 100 mm
Analysis		λ-Capture analysis
Measurement time (including analysis time)*1		5 seconds
External communication interface		Camera Link, RS-232C
Power supply voltage		DC 24 V
Power consumption		Approx. 40 W

*1 Depends on measurement and analysis conditions.

Dimensional outlines (Unit: mm)

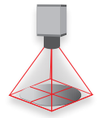
C17319-11 (Approx. 29.2 kg)



Comparison with related products

Feature comparison

Area-based



Measure by Area

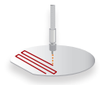
Ideal for acquiring in-plane film thickness distribution

- Enables acquisition of in-plane film thickness distribution in just 5 seconds*1
- Measurement points can be selected based on measurement results
- No alignment or additional mechanisms required for measurement
- Supports inline operation*2

*1 Approximate time for acquiring in-plane film thickness distribution of a 300 mm Si wafer.

*2 For more details, please contact us.

Point sensor-based



Measure by Point

Ideal for high-accuracy partial measurements

- Supports a wide wavelength range
- Capable of high-accuracy measurement even for multilayer structures
- Compact design for easy integration into inline systems

Key products

HyperGauge
C17319-11

Key products

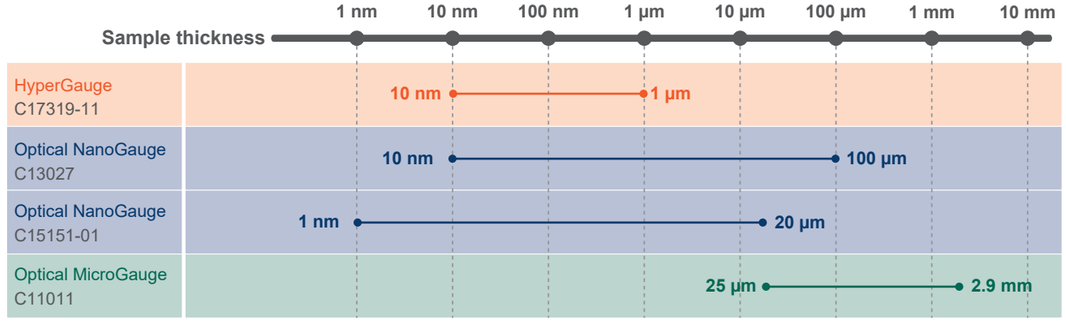
Optical NanoGauge
C15151-01

Optical NanoGauge
C13027

Optical MicroGauge
C11011

Measurement film thickness range

• The refractive indices in this catalog are 1.5 for glass.



Examples of materials measurable by HyperGauge

Film materials

SiO_2, SiN, metal films, amorphous silicon, resist films

Substrate materials

Silicon, glass

HAMAMATSU

PHOTON IS OUR BUSINESS

HAMAMATSU PHOTONICS K.K.

Visit our website for product and contact information.
www.hamamatsu.com

Cat. No. SSMS0069E02
Dec. 2025 HPK
Created in Japan