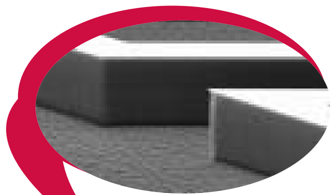
HORIBA JOBIN YVON

TDM-200 Camera

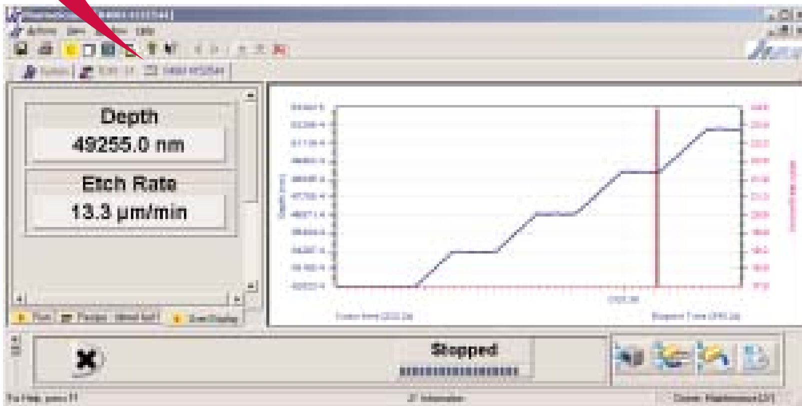
MEMS Trench Depth Monitor

Excellence in Advanced Process Control

Accurate Deep Trench Con



Introducing the Revolutionary



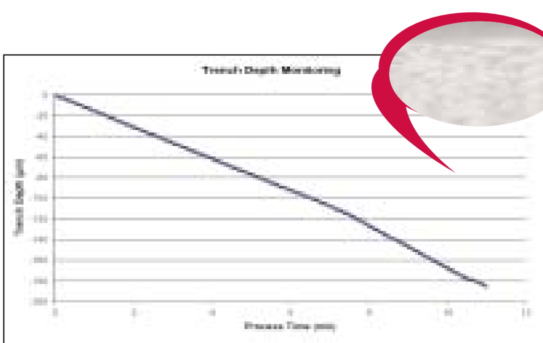
Bosch® process monitoring showing multiple etch / passivation cycles.

Proven Accuracy, Proven Stability

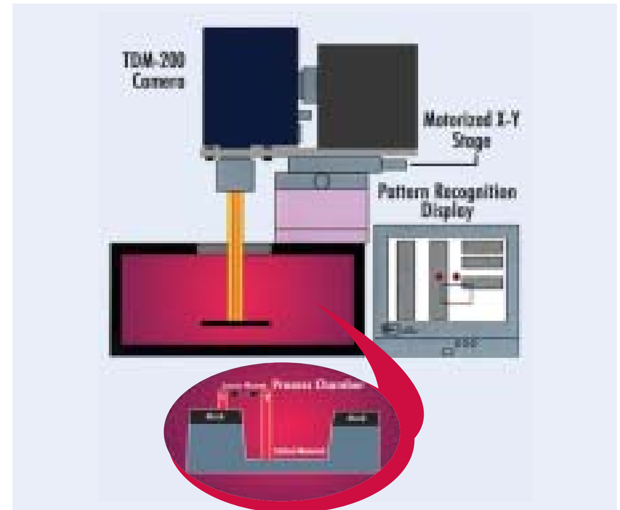
The TDM-200 is the perfect tool to improve efficiency in MEMS manufacturing by eliminating the need to monitor tool performance using test wafers, and by ensuring repeatable device performance. Expensive and time consuming ex-situ metrology is not necessary any more as high system stability guarantees superior quality control for high volume production.

	TDM-200 (µm)	Profilometer (µm)	Accuracy (%)
Sample 1	55.4	55.3	0.2
Sample 2	506	504	0.4

Trench depth comparison between the TDM-200 and a Dektak® profilometer. Silicon etching with oxide mask using standard rate Bosch® process.



Excellent correlation between the TDM-200 and SEM. The TDM-200 enables fast etch rate monitoring when trench bottom roughness becomes relatively significant.



- **Absolute, real-time trench depth measurement for switched and continuous dry etch processes for instantaneous etch rates in excess of 100 µm/min**
- **Accurately measures down to several hundred microns in-depth without losing shallow etch capability of < 100 Å**
- **Removes the limitations for monitoring Bosch® and continuous deep etch processes exhibited by conventional laser interferometry**
- **May be mounted on any etch tool with direct top view of the wafer, simple chamber interface**
- **Simple integration into the HORIBA Jobin Yvon multi-sensor platform**

TDM-200 Camera

Simple Control of Deep Trench Etches

The TDM-200 measures the trench depth from the phase shift generated between two laser microspots. One laser spot is positioned on the mask and the other on the trench. These spots are typically 25-60 µm in diameter, depending on the wafer to camera distance.

The direct nature of the measurement means that calibration against a reference sample is not required.

A real-time digital CCD image of the wafer surface from the integrated frame grabber or optional video monitor, allows accurate positioning of the two laser beams using a manual or motorized XY stage. This process can be automated using pattern recognition software.

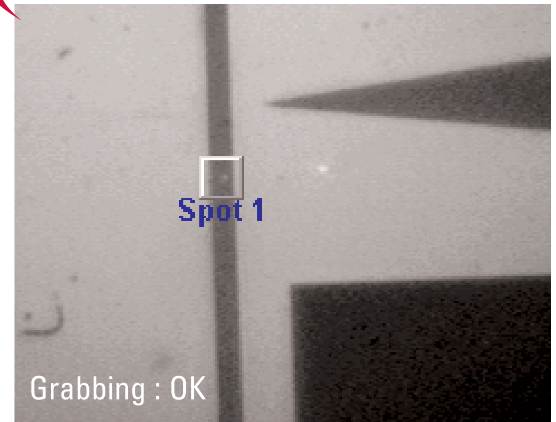
Powerful Analysis and Automation Software

The TDM-200 is controlled using a simple recipe editor, sharing the same platform as all HORIBA Jobin Yvon endpoint tools. The definition of only two parameters (target depth and estimated etch rate) allows the TDM-200 to provide accurate depth monitoring and end pointing of the process.
A GUI interface provides an immediate display of process etch depth and rate.

An integrated SQL database provides quality data management that may be integrated into a FAB network for powerful APC functionality. The software integrates wafer-level control, real-time data output and comprehensive reprocessing capabilities along with remote access to all wafer information, measurement settings and results.

The automation, speed, reliability and ease of operation of the TDM-200 make it ideal to explore the diversity of MEMS applications.

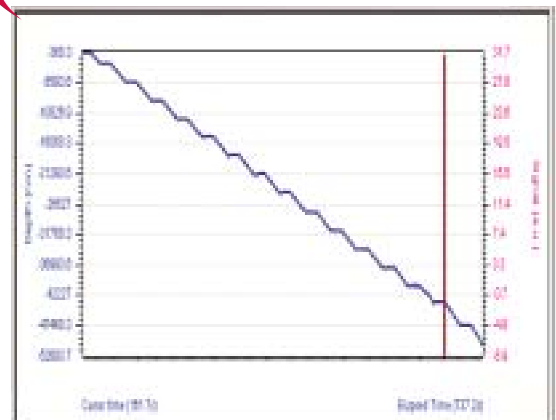
Step - 1 **Set Measurement Position**



Step - 2 **Set Target Depth**

R...	Properties	Unit	Value
	Run Name		MEMS_4355
	Estimated Etch Rate	µm/mn	50.00
	Target Depth	µm	500.000
	Mask on Spot		1
	Shallow Pattern		No

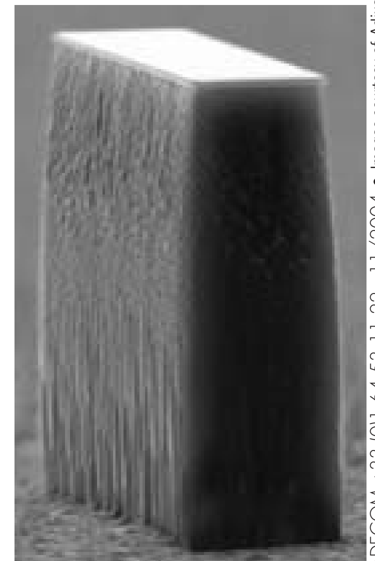
Step - 3 **Run**



TDM-200 Camera Specifications

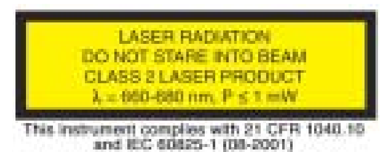
Standard Configuration	
Light source	Laser diode
Wavelength	675 nm
Spot size*	From 25 to 60 µm
Camera to wafer distance	100 mm to 700 mm
Distance between the two spots*	250 µm
Detector	Solid State Photodiode
Manual XY translation stage	16 mm x 16 mm
Frame grabber	For real-time imaging of the sample
System Performance	
Sampling frequency	Up to 20 Hz
Maximum in-situ trench depth monitoring	> 500 µm
Depth resolution	Down to 3 nm
Maximum etch rate	Up to 100 µm/min
Layout	
Dimension (w x d x h in mm)	135 x 330 x 222
Options	
Motorized XY stage	25 mm x 25 mm Accuracy ± 2 µm
Pattern recognition system	Cognex® software
Frame grabber	For pattern recognition
MEMS Key Applications	
Processes	Continuous and switched (Bosch®)
Materials	Mask: oxide, resist, metals (Al, Cr, CrO) Etched: Si, SOI, SiO_2, SiN Buried layer
Feature sizes	From 1 x 1 mm down to 50 x 50 µm 1D, 2D diffraction gratings

** Depending on the wafer to camera distance*



Worldwide Customer Support

HORIBA Jobin Yvon manufactures state-of-the-art thin film characterization and optical instrumentation, and is today the leading supplier of thin film metrology and optical solutions to original equipment manufacturers (OEMs). Our instruments are manufactured under a strict quality assurance program and are supported by a worldwide network of strategically located facilities in the United States, Europe and Asia that are ready to provide assistance when and where it is needed.
Our staff of highly trained service and application specialists install and certify instrument performance, and conduct technical and application user training for smooth and efficient commissioning of the instruments.
This commitment to product excellence and continued support is part of the HORIBA Jobin Yvon culture.



HORIBA JOBIN YVON

(All HORIBA Jobin Yvon companies were formerly known as Jobin Yvon)

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