HAMAMATSU
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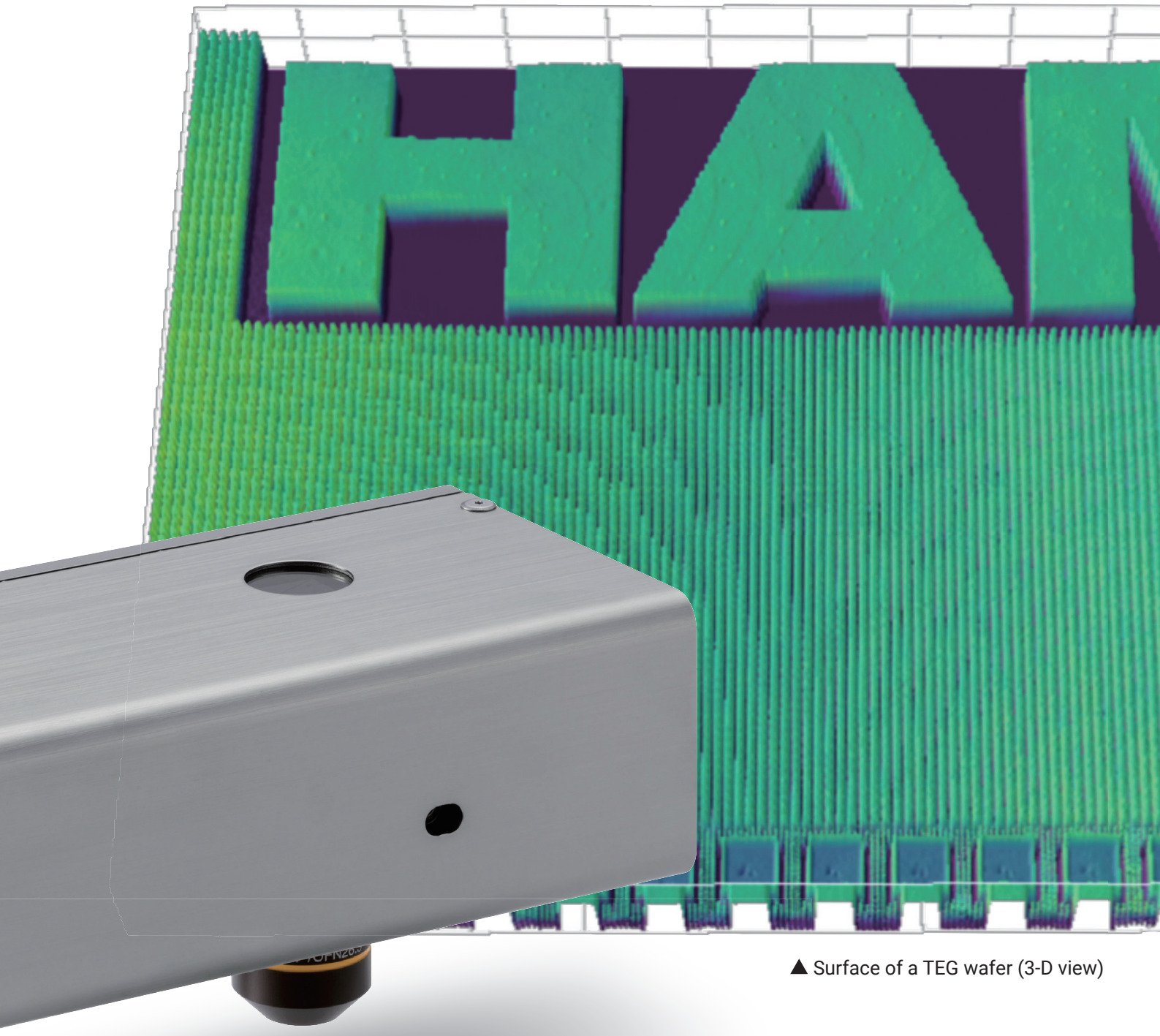
QPM optical module C16999 series

In-line compatible high-speed interference microscopy to detect surface defects



▲ Surface of a TEG wafer (3-D view)

In-line compatible high-speed interference microscopy to detect surface defects

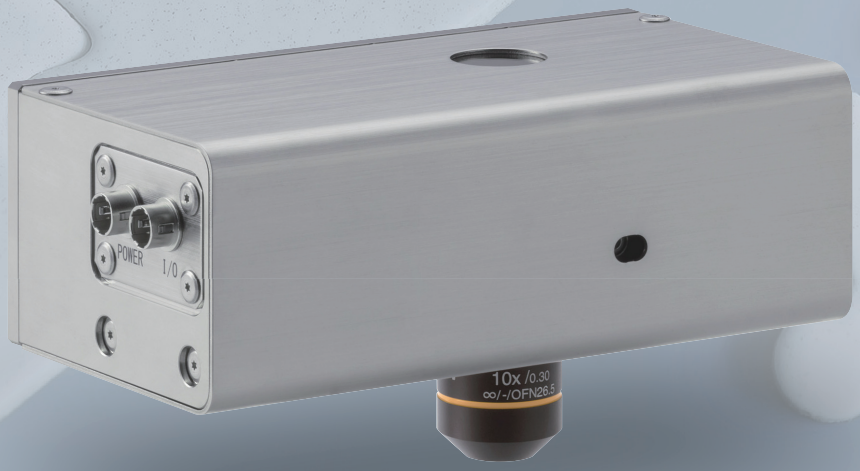
This is an optical module for building interference microscope, "QPM (Quantitative Phase Microscopy)" which provides nano-scale vertical resolution.
Our proprietary technology enables a compact and lightweight module that is capable of high-speed and real-time measurement.
Incorporated into 3D metrology system, it enables in-line application that leads to cost reduction.

Features

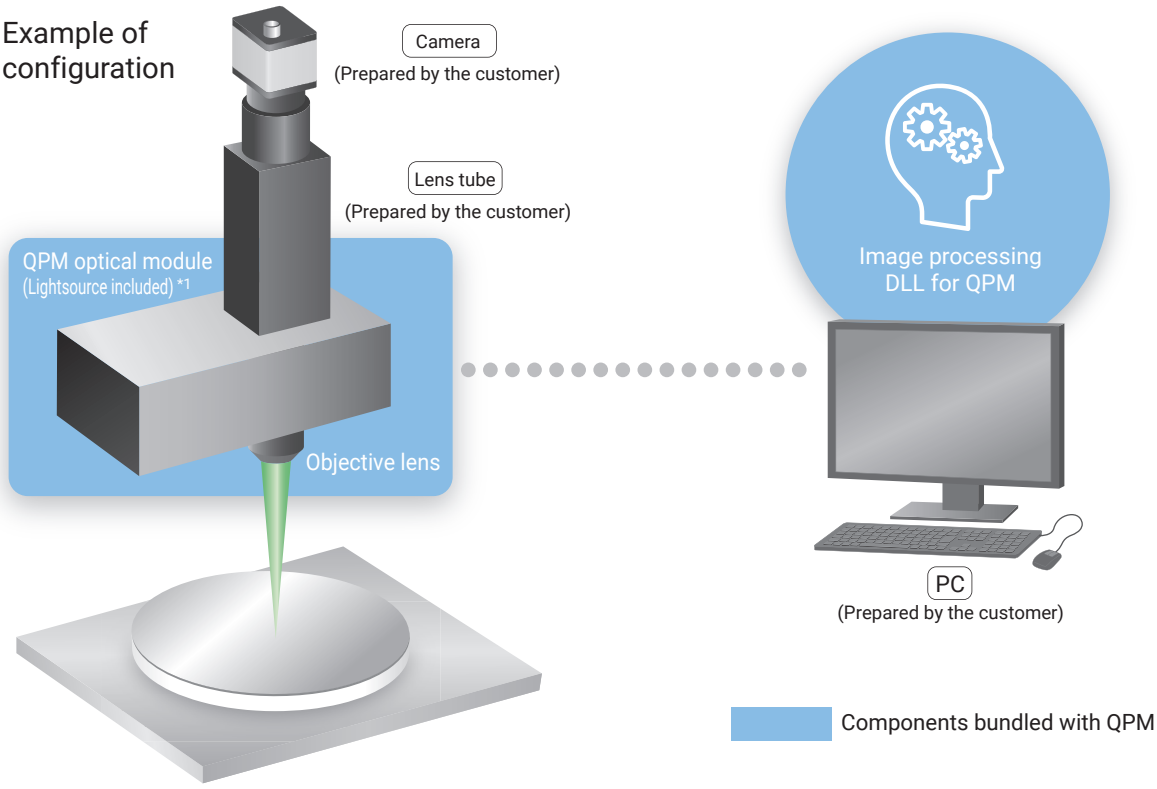
- Compact and lightweight
- Compatible with in-line configuration (for embedded applications)
- High-speed and real-time measurement
- Reduced total cost

Applications

- Defect inspection on semiconductor surface
- Microparticle inspection



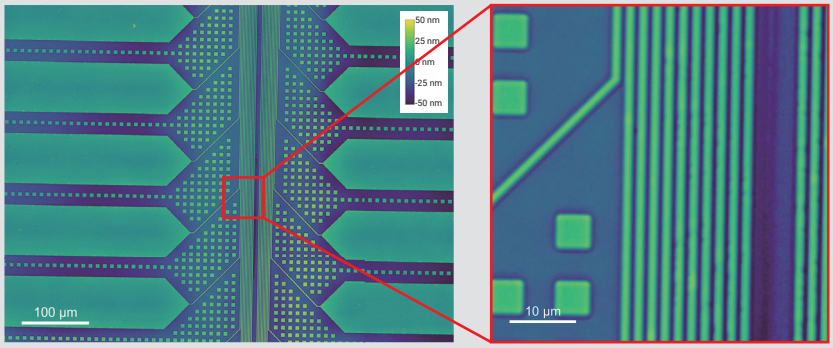
Example of configuration



*1: Power Supply: DC 24V / 1A (Prepared by customer).

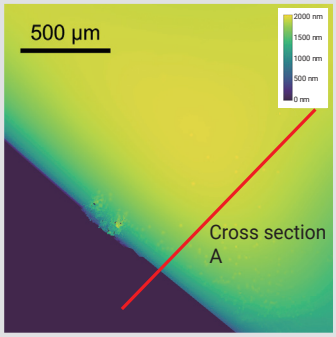
QPM image examples

Suface of a TEG wafer

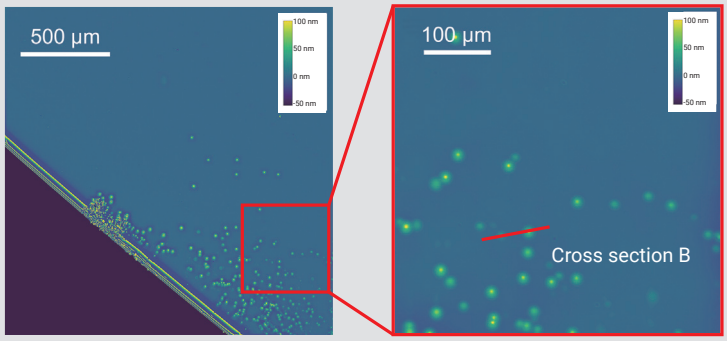


Surface of a semiconductor wafer (around the edge)

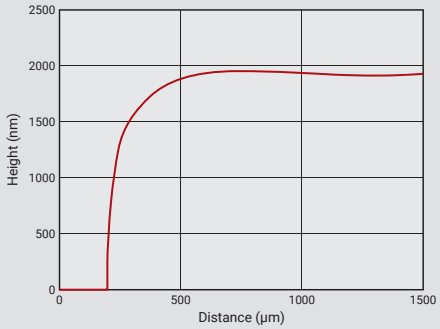
- Nanometer scale bump-shape defects



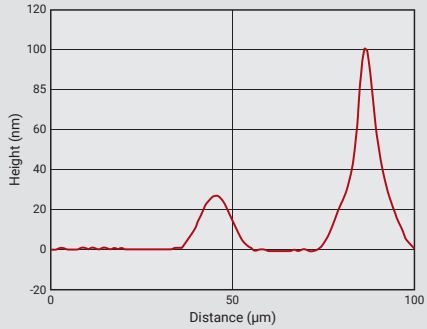
Distortion removal and contrast enhancement were applied



Profile of cross section A

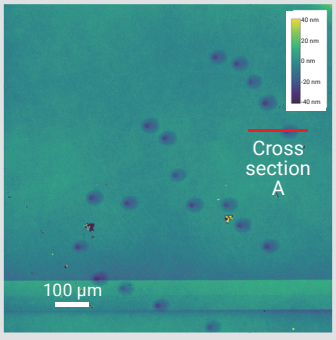


Profile of cross section B

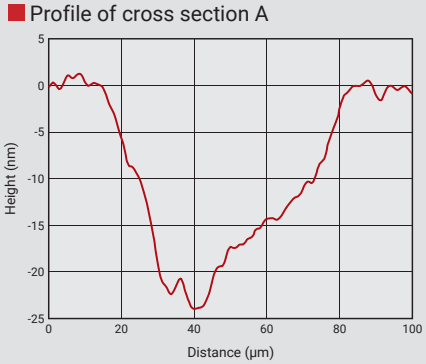


Surface of a compound semiconductor wafer

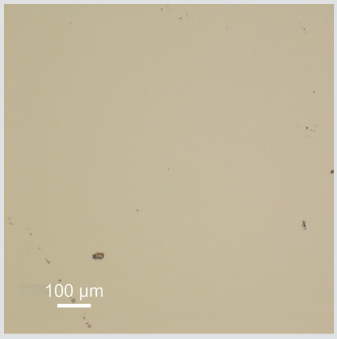
- 20 nm to 30 nm depth pit defects



Profile of cross section A



Cross section A



Microdefects are not detectable.

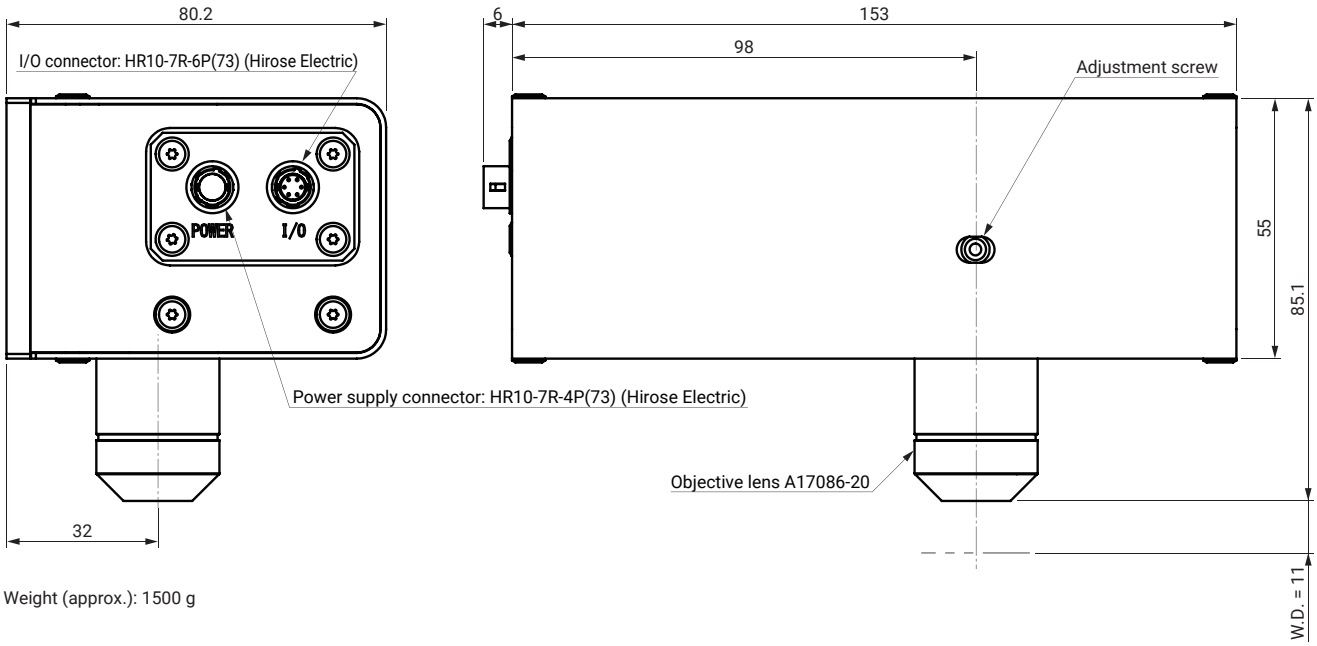
Specifications

Parameters	High magnification model			Low magnification model			Ultra-low magnification model	Unit
	C16999-10			C16999-20			C16999-30	
Objective lens (sold separately)	A17086-10	A17086-20	A17086-30	A17086-40	A17086-50	A17086-60	A17086-70	–
Lens magnifications	×20	×10	×5	×10	×5	×2	×1.25	–
Vertical resolution *1	0.5 or less							nm
Horizontal resolution	0.72	1.1	2.2	1.1	2.2	4.1	8.1	µm
Field of view	0.707 × 0.517	1.41 × 1.04	2.83 × 2.07	1.41 × 1.04	2.83 × 2.07	7.07 × 5.17	11.3 × 8.28	mm
QPM image acquisition rate *2	25							fps
Z measurement range	±1.3	±3	±12	±3	±12	±12	±15	µm
W.D.	3.1	11	20	11	20	6.2	5	mm

*1: Reproducibility of the optical path length measured for the level difference on a height-standard test chart.
*2: When shooting at a camera frame rate of 200 fps.
* The specifications are the optical performance when using each objective lens combined by our recommended camera and our recommended lens tube.

Dimensions (unit: mm)

Typical example: QPM optical modules C16999-10 + Objective lens A17086-20



Weight (approx.): 1500 g

● Information described in this material current as of August 2024. Specifications are subject to change without notice.

HAMAMATSU PHOTONICS K.K. **www.hamamatsu.com**

Laser Division, Business Promotion G.
314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539-62-5248, Fax: (81)539-62-2205

U.S.A.: HAMAMATSU CORPORATION: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218
Germany: HAMAMATSU PHOTONICS DEUTSCHLAND GMBH.: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de
France: HAMAMATSU PHOTONICS FRANCE S.A.R.L.: 19 Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr
United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court,10 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk
North Europe: HAMAMATSU PHOTONICS NORDEN AB: Torshamnsgatan 35, 16440 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: info@hamamatsu.se
Italy: HAMAMATSU PHOTONICS ITALIA S.R.L.: Strada della Moia, 1 int. 6 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it
China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201, Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn
Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 13F-1, No.101, Section 2, Gongdao 5th Road, East Dist., Hsinchu City, 300046, Taiwan(R.O.C) Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw

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