

Temperature measurement solutions for the semiconductor industry

**EXACTUS**[®]

Optical thermometers

Semiconductor temperature measurement solutions

BASF Exactus® optical thermometers provide critical semiconductor process temperature information that drives better process yields and increases profitability. Exactus technology stands out because of its industry-leading capabilities.

Low temperatures (25°C and higher) are measured using short wavelengths. Exactus probes deliver high precision, with resolution up to 0.001°C, accuracy of 1.5°C and extremely low measurement drift.

With speeds up to 1,000 readings per second, and a broad dynamic range at any given wavelength, Exactus temperature measurement solutions are well suited for the semiconductor industry.

Practical, user-friendly design

Exactus instruments offer a complete temperature system in each sensor head, with state-of-the-art technology that allows for custom-tailored integration to specific customer applications. In addition, the entire product line is designed specifically with ease-of-use in mind, with features such as:

- A readily configurable sensor housing that facilitates integration and saves valuable clean room real estate.
- A flexible design which allows for easy system expansion with additional channels.
- Customizable hardware, software, optics and probes.
- RS232 and RS485/422 output from sensors for improved closed loop control.
- Microsoft® Windows®-based graphical interface for easy configuration, testing and servicing.
- Independent sensor heads with digital output eliminate the need to change out optical cables.
- Software that is easily upgradeable in the field.

Semiconductor application examples

- | | |
|-----------------------|-----------------------|
| ■ Process development | ■ CVD |
| ■ PVD | ■ Plasma assisted CVD |
| ■ RTP | ■ MOCVD |
| ■ Etch | ■ Crystal growth |
| ■ CMP | ■ MBE |



(shown actual size)



Semiconductor process control advantages

BASF's innovative technology offers numerous advantages in controlling wafer-to-wafer uniformity in both temperature and film thickness. The highly sensitive electronics and advanced optics mean shorter wavelength detectors can be used to measure radiant energy. This decreases errors from both wafer transmission and emissivity. Compact size and digital output allow Exactus sensors to be placed directly on or around a process tool, eliminating the need for fiber cables and improving process repeatability. Fiber cables are a primary source of measurement errors. In addition, the instrument's high speed and high resolution provide better control and noise suppression. The result is better monitoring of wafer temperature and improved process results.

Product specifications

Total range: 25°C to 4000°C. Many options for wavelengths and photo detectors are available, including Si, InGaAs, and patent pending BASF custom detector.

Speed: Up to 1,000 readings per second.

Resolution: From 0.001°C to 1°C.

Drift: 0.1°C per year.

Accuracy: 1.5°C. Calibration traceable to ITS-90 blackbody freeze points.

Outputs: Digital (RS232 and RS485/422)
Analog (4-20ma, 0-10volt)
Ethernet and custom outputs available

Inputs: Up to 16 Lightpipes or Pyrometer Lens Systems.

Component dimensions

Electronics housing: Diameter 1" (25.3mm)
Length 5" (127mm)

Lens (pyrometer): Diameter 1.38" (35mm)
Length 7" (178mm)

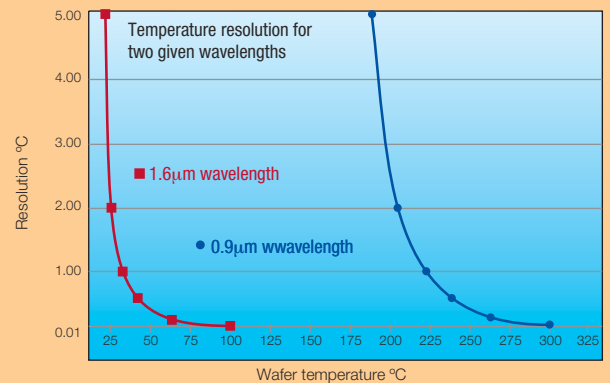
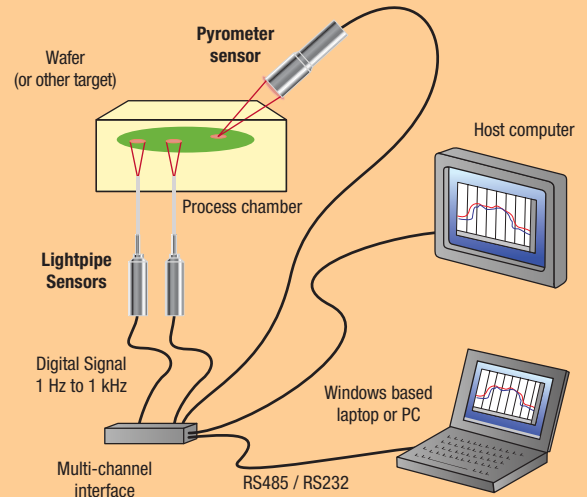
Lightpipes: Diameters: 1.2mm, 2mm, 3mm, and 4mm

Length: Customized to application

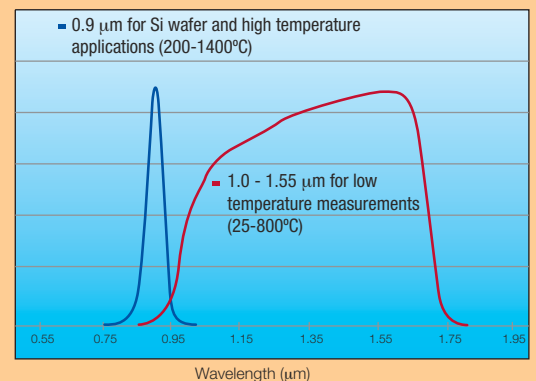
Materials: Quartz, Sapphire, and proprietary material

Sheaths: Quartz, Sapphire, Stainless, Platinum and others

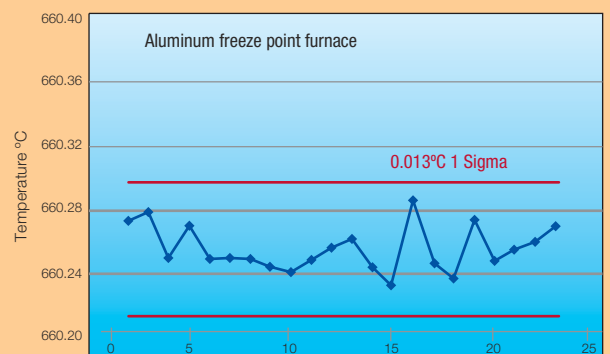
Optical cables: Available in a variety of lengths and diameters



The Exactus line offers unsurpassed temperature resolution.



Detector wavelengths selected based on needs of application.



High repeatability is a hallmark of BASF instruments.

Superior quality

Exactus[®] optical thermometers are manufactured in a state-of-the-art facility in Fremont, California. Extraordinary care is taken to ensure that every instrument is manufactured with the highest degree of quality. The instruments are then tested and calibrated against exacting standards using ITS-90 traceable freeze points and Statistical Process Control (SPC). This ensures accuracy and maintains repeatability from instrument to instrument. Detailed records are kept on every product before it leaves our ISO 9002 certified facility. BASF also maintains a world-class R&D and calibration lab in Portland, Oregon dedicated exclusively to optical thermometry. Highly experienced staff scientists work to ensure exacting standards are maintained, in addition to supporting customers and developing new breakthrough products. Please contact us to learn more about how BASF ingenuity can help you meet today's – and tomorrow's – challenges.

About us

BASF's Catalysts division is the world's leading supplier of environmental and process catalysts. The group offers exceptional expertise in the development of technologies that protect the air we breathe, produce the fuels that power our world and ensure efficient production of a wide variety of chemicals, plastics and other products, including advanced battery materials. By leveraging our industry-leading R&D platforms, passion for innovation and deep knowledge of precious and base metals, BASF's Catalysts division develops unique, proprietary solutions that drive customer success.

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