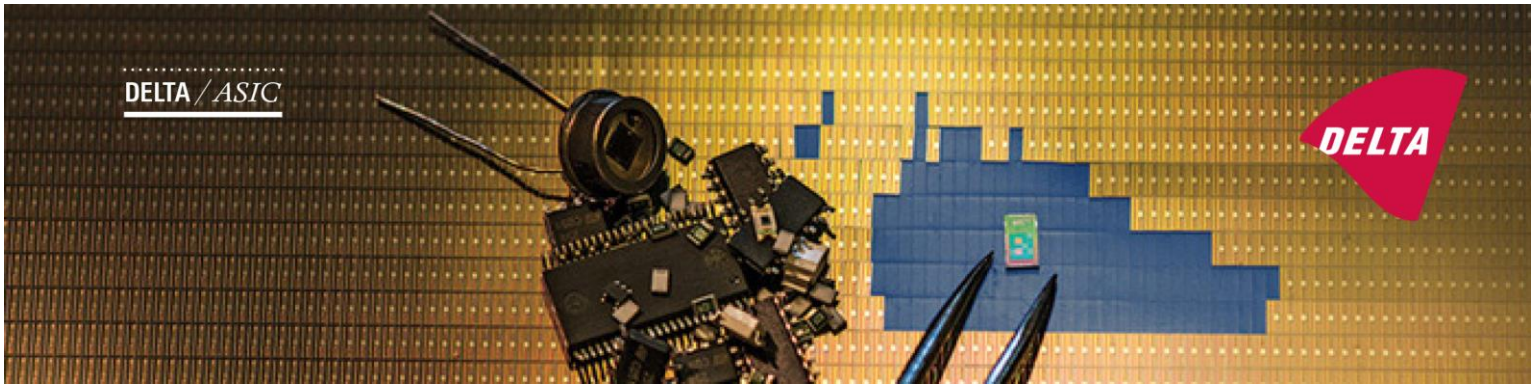

Get the best of microelectronics and optics

A newly developed, ultra-precise optical sensor ASIC can be used for a wide range of applications

Using laser light, two arrays of optical photodiodes and a micro-lens array developed in collaboration with Risø (a Danish research institute), the sensor ASIC sets a new standard for precision in optical microelectronics.

Normally, specially optimised and expensive silicon processes are used for making optical components. This optical sensor is produced in a standard 0.18 µm CMOS process, which paves the way for various applications and commercial products.

The sensor ASIC has on-chip photodiode arrays, transimpedance amplifiers, differential amplifier and sample hold. It can for example be used for optical positioning, colour or luminance detection, or controlling backlight in displays.

Unique features

- 0.5% accuracy
- 2 digital signals, 4 detectors and 75 lenslets
- vs 400 digital signals from 400 detectors
- 3600 CPI vs 800
- Low power consumption
- Patented technology

Examples of applications

- Quality control and production monitoring
- Colour mark detection and colour measurements
- Precision photometry
- Proximity sensing
- Laser monitoring
- Optical power metering
- Portable colour reader for consumer and industrial applications
- Display colour adjustment and backlight/contrast control
- System calibration
- Detector for various light sources, mood lighting, solar tracking, solar panel alignment
- Eye wear such as sun glasses, ski goggles, motorcycle helmets

Specification

Parameter	Value
Small diode area	90µ x 70µ
Large diode area	185µ x 145µ 185µ x 145µ
Reversed bias voltage of diodes	1.20V
Photons/s per diode	3.25E11 photons/s
Efficiency of diodes	40% to 50%
Transmission efficiency of insulator stack	65% to 85%
Quantum efficiency of diodes	60% to 80%
Dark current	Much below 0.3nA
Wavelength of incoming light	850nm/630nm
Typical DC photocurrent on TIA input	104nA
Typical AC photocurrent on TIA input	10.4nApp
Noise floor on input of TIA	0.3nA

"Integrated photodiodes that are sensitive to both visible and infrared light are not commonly seen in standard CMOS processes.

To get the best possible sensitivity of the photodiodes, we have discussed the solution development process with a professor of optics, Albert Theuwissen, from the University of Delft, The Netherlands."

Erik Elmer Rasmussen, ASIC designer at DELTA

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