

# NIRONE SENSOR

We designed the world's most intelligent and smallest spectral sensor to make material sensing easier. The **NIRONE Sensor** offers excellent performance fully comparable with the best laboratory instruments in a small package and at only a fraction of the cost. The **NIRONE Sensor** is easy to integrate and it provides new opportunities for increasing meaningful intelligence in your business.



HIGH-PERFORMANCE AND COMPACT SPECTRAL SENSOR

## High performance in a small package

Spectral Engines' NIRONE Sensor enables size and cost reductions in the next generation of high-performance spectral measurement instrumentation. It is the world's first truly miniaturized and robust near-infrared MEMS spectral sensor.

## Advanced Technology

The NIRONE Sensor uses the patented Micro Electro Mechanical System (MEMS) Fabry-Perot Interferometer, which is a fully programmable optical filter. The sensor can be driven across the whole wavelength range or it can operate only at selected wavelengths. The NIRONE Sensor's intelligent algorithms remove the need for additional temperature stabilization.

The NIRONE Sensor has a single point detector instead of a linear array, which makes it an affordable solution for all applications. The use of a single detector and Fabry-Perot Interferometer technology allow the use of a larger detector area than in linear arrays where the light is restricted by a slit. This makes the NIRONE Sensor's S/N ratio significantly better. The InGaAs area can be reached cost-efficiently by using a single detector. This provides better sensitivity and specificity in material sensing applications.

## Fits easily with any design

The NIRONE Sensor integrates all these high-tech features into a compact module. A single electrical connector and changeable front optics make it easily adaptable to any commercial design.

The NIRONE Evaluation Kit provides a good starting point for technology evaluation and application studies. The Evaluation Kit includes a USB communication board and the sensor can be controlled via a PC by using our user-friendly SensorControl software.

## Key Benefits

- High-tech spectrometer features integrated into a small package
- Modular design makes it easy to integrate in all designs
- True near-infrared means better sensitivity and specificity



## Technical Specifications

| SPECIFICATIONS                         | VALUE  |
|--|--|
| Wavelength range                       | 1.10 – 1.35 $\mu\text{m}$ (S1.4)<br>1.35 – 1.65 $\mu\text{m}$ (S1.7)<br>1.55 – 1.95 $\mu\text{m}$ (S2.0)<br>1.75 – 2.15 $\mu\text{m}$ (S2.2)<br>2.00 – 2.45 $\mu\text{m}$ (S2.5) |
| Wavelength resolution (typical, FWHM)  | 12 – 16 nm (S1.4) *<br>13 – 17 nm (S1.7) *<br>15 – 21 nm (S2.0) *<br>16 – 22 nm (S2.2) *<br>18 – 28 nm (S2.5) *  |
| Detector type                          | Single element InGaAs (S1.4)<br>Single element extended InGaAs (from S1.7 to S2.5)   |
| Illumination source                    | 2 tungsten vacuum lamps  |
| Bulb life                              | > 40,000 hrs   |
| Wavelength points                      | Minimum step 0.1 nm, up to 512 in total  |
| Wavelength switching time              | 1 ms   |
| SNR (typical, w/o averaging)           | > 15'000 (NIRONE 1.4) **<br>> 11'000 (NIRONE 1.7) **<br>> 7'500 (NIRONE 2.0 and 2.2) **<br>> 1'500 (NIRONE 2.5) **   |
| Wavelength temperature response (max.) | 0.1 nm/°C  |
| Operation temperature range            | +10..+50°C (non-condensing)  |
| Power consumption                      | < 1.1 W (peak),<br>< 300 mW (nominal)  |
| Optical interface                      | Micro reflection optics<br>SMA-connector   |
| Electrical interface                   | Supply voltage 5V<br>UART (3.3V)<br>I <sup>2</sup> C (3.3V)<br>Digital trig in/out (3.3V)  |
| Mechanical interface                   | Mountable on PCB. Two M2 screws and PCB connector. PCB area of 25 x 25 mm <sup>2</sup> needed  |
| Size (W x L x H)                       | 25 x 25 x 17.5 mm <sup>3</sup>   |
| Weight                                 | 15 g   |

\* With an SMA-adapter and a fiber with 400  $\mu\text{m}$  core and 0.22 NA

\*\* With external illumination and signal level of 75% of the maximum range

\*\*\* Specified by lamp manufacturer for ideal laboratory conditions. Lifetime may shorten as a result of shock, vibration, and extreme temperatures. Lifetime can be extended by using lower than 100% drive level.