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SM301/SM301-EX

PbS/PbSe Array Spectrometer

- **Low Noise**
- **Cooled, Stable Operation**
- **256 Detection Elements**
- **Accommodates spectral measurements in the 1.0 to 3.0 micron (PbS) or 1.5 to 5.0 micron (PbSe) range**
- **Optical input direct to slit or via fiber.**



The Choice for IR Spectral Applications

The SM301/SM301-EX is a versatile, high performance PbS/PbSe array spectrometer. Its active components include a TE cooler and a 256-element PbS/PbSe detector element array. Operation of the unit for research applications is easy with the included Windows based SM32Pro-based analysis software. The system is ideal for spectroscopic applications in the 1.0 to 3.0 micron (PbS) or 1.5 to 5.0 micron (PbSe) region.

The SM301/SM301-EX includes thermoelectric cooling to guarantee long-term operational stability.

General Description



The SM301/SM301-EX is a complete compact PbS/PbSe 256 pixel array Spectrometer for use with a PC to perform spectral measurements in the region of 1.0 to 3.0 microns (PbS) or 1.5 to 5.0 microns (PbSe).

It consists of four parts: 1. an entrance mechanism with a built-in slit, a fiber coupling adapter, and an order sorting filter; 2. a spectrograph of a crossed Czerny-Turner arrangement using high quality optics; 3. a linear PbS/PbSe sensor array and driving circuitry; 4. a computer interface for data acquisition.

All the optical components and driving electronics are enclosed in aluminum housing for stable operation. A thermal electric (TE) cooler is also included.

Application

The SM301/SM301-EX employs a multiplexed PbS/PbSe array as its NIR detection element. The array is cooled and temperature stabilized at around -10°C which ensures long-term operation stability. Dark signal can thus be automatically measured by the built-in electronics periodically and subtracted automatically.

Compared with conventional scanning NIR spectrometers the SM301/SM301-EX provides the multi-

channel detection advantage, both in reducing the measurement time and enhancing measurement signal-to-noise ratio. The SM301/SM301-EX can operate at a readout rate of 2MHz or faster allowing fast measurement and averaging operation to be performed in a short period of time.

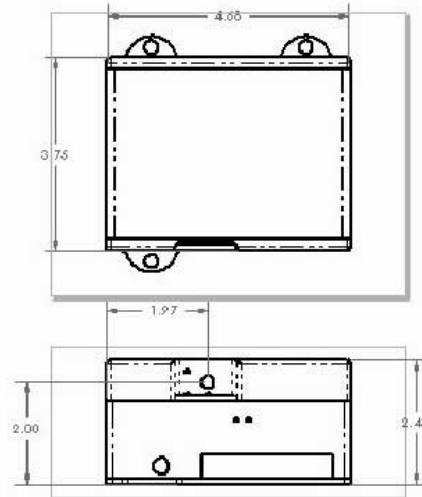
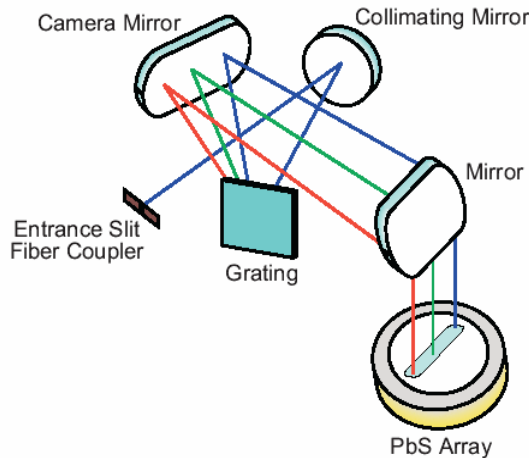
A variety of accessories makes the SM301/SM301-EX versatile for process control, spectroscopy, environmental monitoring, and other applications. It can easily be configured for transmission, reflectance, absorbance, and other measurements.

The wavelength range from 1.0 to 3.0 μm (PbS) or 1.5 to 5.0 μm (PbSe) can be covered by one grating optimized for the wavelength range.

The spectral range can also be factory configured to meet application needs. The SM301/SM301-EX can accept light directly coupled through a built-in slit, from a fiber through an SMA coupler or both. The fiber coupling ability makes the unit flexible for remote and process control applications. Where high mobility is required, the SM301/SM301-EX can be used with just a slit to eliminate the light transfer variations caused by the changes in fiber bending curvatures. As a result, attenuation resulting from the use of optical fibers can also be avoided.



Layout of SM301(-EX)



Specifications:

SM301

Detector: 256 PbS array
Pixel size: 45 by 450 μ m
Peak Detectivity (D*): 1×10^{11} cmHz^{0.5}W⁻¹
Linearity: >90% over 10% to 90% of dynamic range
Response Uniformity: +/-10% of array signal mean
Pixel Clock: 2MHz max. for 4MHz data output
Integration Range: 100 μ s-200ms
Spectral response range: 1000 to 3000nm
Spectral Resolution: ~15-150nm according to grating and slit option.
Light entrance:
 Slit: 25 μ m to 400 μ m
 Fiber: SMA 905 fiber coupler
 NA: 0.22
Grating: 75 to 1200 grooves per mm
Stray light rejection: better than 10^{-3}
Analog to digital: 16-bit resolution, USB standard
Dynamic range: >4000:1 for single scan
Dimensions: 5" x 4" x 2.5" (LxWxH)
Shutter: Built-in
Detector cooling: -4°C
Weight: 2 lbs.
Software: SM32Pro

SM301-EX

Detector: 256 PbSe array
Pixel size: 45 by 450 μ m
Peak Detectivity (D*): 1×10^{11} cmHz^{0.5}W⁻¹
Linearity: >90% over 10% to 90% of dynamic range
Response Uniformity: +/-20% of array signal mean
Pixel Clock: 2MHz max. for 4MHz data output
Integration Range: 100 μ s-200ms
Spectral response range: 1500 to 5000nm
Spectral Resolution: ~20-150nm according to grating and slit option.
Light entrance:
 Slit: 25 μ m to 400 μ m
 Fiber: SMA 905 fiber coupler
 NA: 0.22
Grating: 40 to 600 grooves per mm
Stray light rejection: better than 10^{-3}
Analog to digital: 16-bit resolution, USB standard
Dynamic range: >4000:1 for single scan
Dimensions: 5" x 4" x 2.5" (LxWxH)
Shutter: Built-in
Detector cooling: -4°C
Weight: 2 lbs.
Software: SM32Pro