NeoSpectra-Module – SWS62221 – Spectral Sensor

General Description

The NeoSpectra-Module is a plug-and-play spectral sensing module that can be used in a wide variety of material sensing applications for qualification and quantification. The sensor offers performance comparable to laboratory based spectrometers, but at a dramatically smaller size and lower cost.

The sensors are based on Fourier Transform InfraRed (FT-IR) technology, which is a standard technique used in laboratory based spectrometers that offers a wide spectral range for the best qualification and quantification of materials. The sensors used patented Micro Electro Mechanical Systems (MEMS) technology, which allows for a Michelson interferometer to be created monolithically on a MEMS chip.

The NeoSpectra-Module determines the spectral content of the input light in the Near InfraRed (NIR) (selectable options between 1,250 – 2,500 nm).

Features

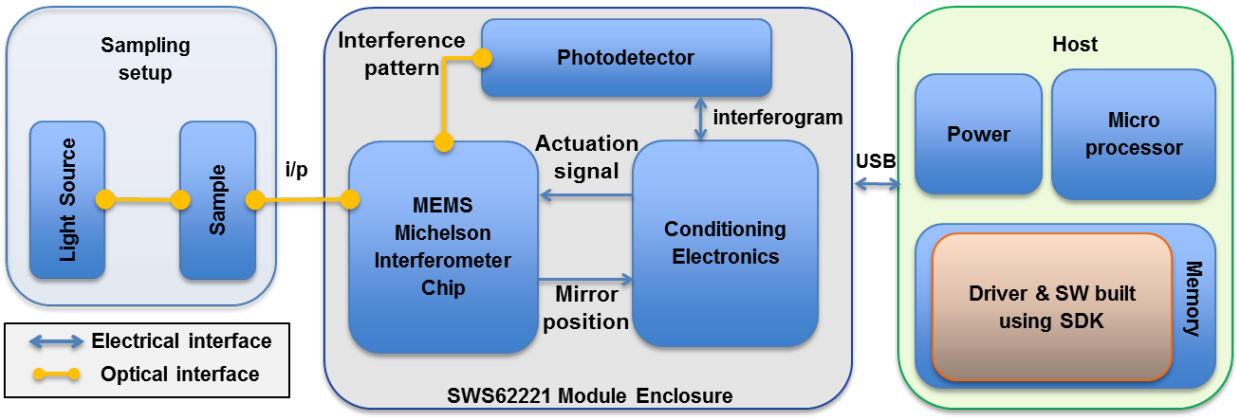
- Low cost, embedded NIR spectral sensor solution
- Wide spectral ranges (λ: 1,250 – 2,500 nm)
- User selectable resolutions
- Fast, on-chip, data processing
- Alignment free optics
- Low power consumption
- Designed for high volume production

Applications

Enabling a broad range of applications and use cases across multiple industries:

- Smart Farming
- Smart Food
- Smart Healthcare
- Smart Industry

Block Diagram



Specifications

Parameter	Conditions	SWS62221-1.7	SWS62221-2.1	SWS62221-2.5	Units
Wavelength Range	PSD[a]> max PSD/10	1,250 - 1,700	1,300 - 2,100	1,350 - 2,500	nm
Resolution	At λ=1,550 nm, FWHM criterion	8 or 16			nm
		33.3 or 66.6			cm^{-1}
Typical SNR (rms)	2 s Scan time, Tx[b], resolution = 16 nm[c]	>3000:1 (@λ = 1,600 nm)	> 3000:1 (@λ = 1,950 nm)	3000:1 (@λ = 2,050 nm)	-
	2s Scan time, Rx[d], resolution = 16 nm[e]	>1,000:1 (@λ = 1,600 nm)	>1,000:1 (@λ = 1,950 nm)	1,000:1 (@λ = 2,050 nm)	-
Temperature	Operation	-5: 40[f]			°C
Wavelength Accuracy	@λ = 1,400 nm; temperature < 40°C	± 1.5			nm
Wavelength Repeatability	@λ = 1,400 nm; absorbance level = 0.5 A.U., Resolution: 16 nm	± 0.1			nm
Power Consumption	USB powered with 5 V supply	750			mW
Dimensions		70 × 50 × 25			mm^3

Interfaces

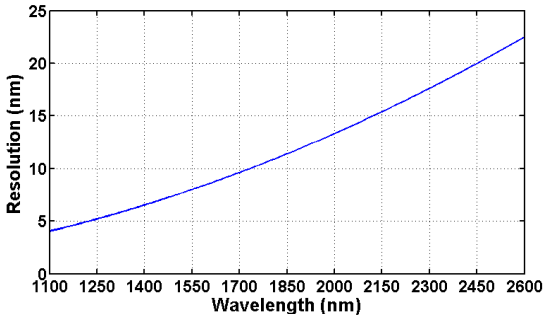
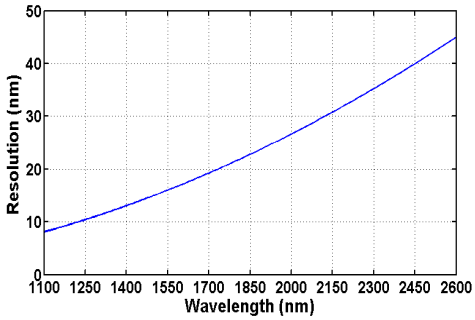
Electrical Interface	USB 2.0
Optical Interface	FCPC Multimode optical fiber, Core diameter >= 400 µm, NA = 0.22
Software Interface	Software: SpectroMOST Basic Edition & SDK Edition OS: Windows XP, Vista, 7, 8 , Linux Ubuntu 12.04, Linux Debian Machines: 32 & 64 bits

Typical Setups

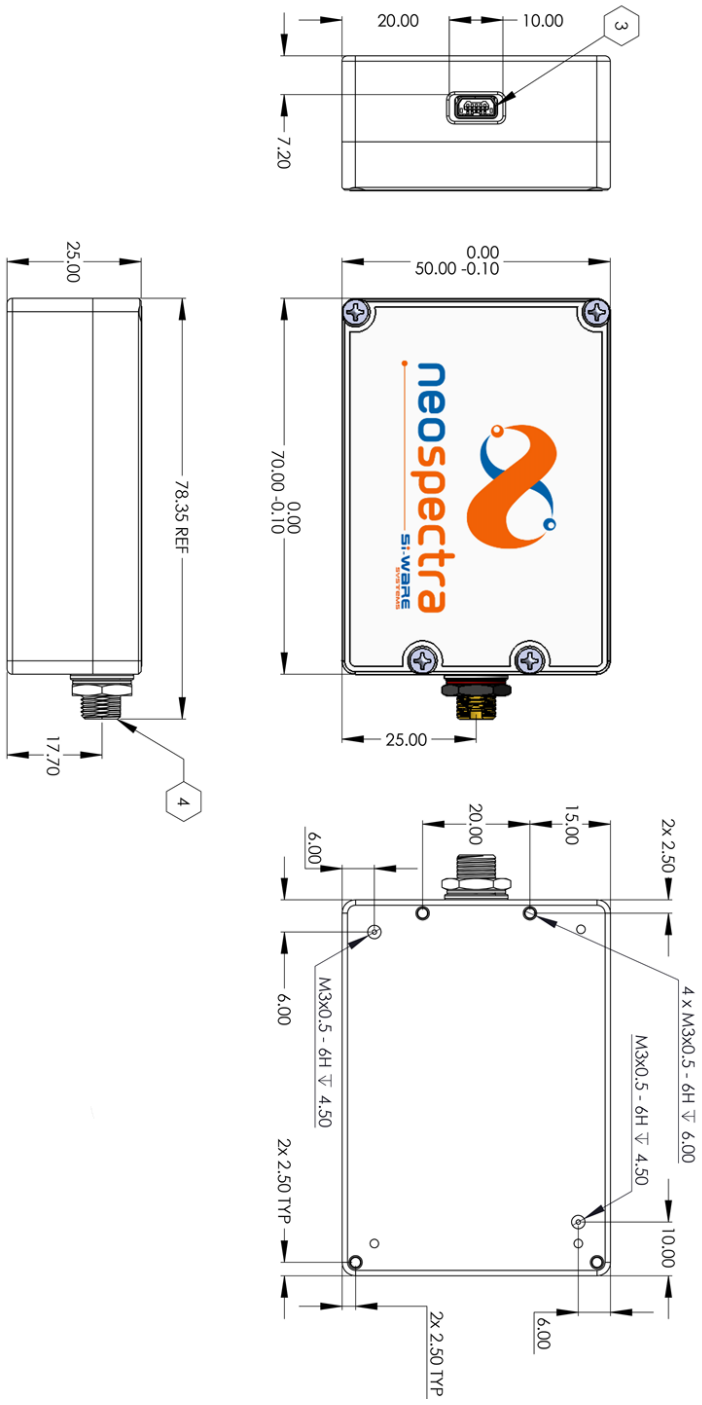
	Transmission Setup (TX)	Reflection Setup (RX)
Typical Coupled Power Value within wavelength range	> 3 mW	> 100 µW

[a] PSD: Power Spectral Density – Single beam spectrum
[b] Tx: Typical transmission setup
[c] Performance varies linearly with resolution
[d] Rx: Typical reflection setup
[e] Performance varies linearly with resolution
[f] Can be extended to 70°C upon request

Specifications and Parameters Definitions

Parameter	Definition
Wavelength range	The wavelength range is defined as the range where the spectral data are is useful. The upper and lower wavelength limits are determined by the wavelength points where the power spectral density reaches one tenth of maximum power spectral density over the range.
Typical SNR	SNR is calculated from the root mean square noise (N_{rms}) , which is the standard deviation of 100 consecutive 100% lines at each wavelength.$SNR = 1/N_{rms}$
Resolution	Resolution is defined as the minimum spacing between two consecutive wavelength (Δλ) / wavenumber (Δv) points that can be fully resolved by the module. Two consecutive lines are fully resolved if separation > Full Width Half Maximum (FWHM) power density of either line. The resolution in wavenumber is constant across the spectral range. The relationship between the resolution in wavelength Δλ, and the resolution in wavenumber Δv is governed by $\Delta\lambda = \Delta v\ \lambda^2$.  **(a)**  **(b)** **Typical variation of wavelength resolution across the spectral range** **(a) Δλ = 8 nm (b) Δλ = 16nm**
Wavelength accuracy	Wavelength accuracy is the difference between the measured wavelength of a wavelength standard (e.g. liquid methylene chloride), and the nominal wavelength reported for that wavelength standard.

Mechanical Drawings



Revision History

Revision	Date	Description
1.0	6/22/15	Initial version
1.1	5/19/16	Mechanical drawings added

Contact Information

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