

# MIDWAVE SPECTROMETER

- 2.0 - 5.0  $\mu\text{m}$  Bandwidth
- 400 Hz Full-Spectrum Readout Rate
- SMA-905 Fiber Connector
- Plug-n-Play



# THE TECHNOLOGY

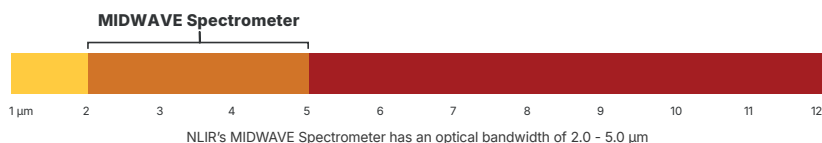
## SPECTROMETER | MIDWAVE

NLIR's MIDWAVE Spectrometer is a fast, portable and versatile tool for measuring mid-infrared light in the 2.0 – 5.0  $\mu\text{m}$  range. Designed for applications requiring high-speed and accurate spectral measurements, it captures full spectra in milliseconds, making it ideal for both in and out of the lab.

At the core of the spectrometer is NLIR's patented upconversion technology, which converts mid-infrared light to near-visible light for detection. This approach leverages the superior speed and sensitivity of silicon-based detectors, enabling exceptional performance in the mid-infrared

regime. More information about the technology can be found on our website.

The MIDWAVE Spectrometer is easy to set up and operate, featuring an intuitive GUI for plug-and-play measurements. For advanced users, API interfaces for MATLAB, Python, and C (via DLLs) are included, enabling seamless integration into custom workflows and automated processes ■



## DETAILS

### MIDWAVE Spectrometer

Optical Bandwidth	2.0 – 5.0 $\mu\text{m}$
Resolution	$< 6 \text{ cm}^{-1}$
Exposure Time	0.0108 – 500 ms
Max. Readout Rate	400 Hz
Bit Depth	16
Sensitivity	130k counts/(ms $\mu\text{W}$ )
Dark Noise Std. <sup>1</sup>	11 counts
Minimum Detectable Power in 100 ms	5 pW/nm
Stability <sup>2</sup>	$\pm 1 \%$ over 24 hours
Optical Input	SMA 905-Fiber Connector
Rec. IR Fiber Core Size	100, 200, 300 $\mu\text{m}$
Polarization Direction <sup>3</sup>	Vertical
Trigger	5 V TTL
Connection	USB-B
Power Consumption	60 – 90 W
Supply Voltage	19 V
Operating Temperature	18 – 30 $^{\circ}\text{C}$
Measurements (L × W × H)	306 × 200 × 100 mm
Weight	5 kg

<sup>1</sup> At minimum exposure time <sup>2</sup>  $\pm 1^{\circ}\text{C}$  ambient variation <sup>3</sup> Free-space input available



Performing reflection measurements using NLIR's MIDWAVE Spectrometer and REFLECTION Interface.



Measuring byproducts of combustion processes with NLIR's MIDWAVE Spectrometer in real time.

Do you have any questions? Do not hesitate to contact us: [info@nlir.com](mailto:info@nlir.com) +45 7174 7870

# SOFTWARE AND TECH DRAWINGS

## SOFTWARE

NLIR's MIDWAVE Spectrometer comes together with NLizeR, an intuitive graphical user interface (GUI), included free of charge. Requiring no installation, it's easy to get started immediately.

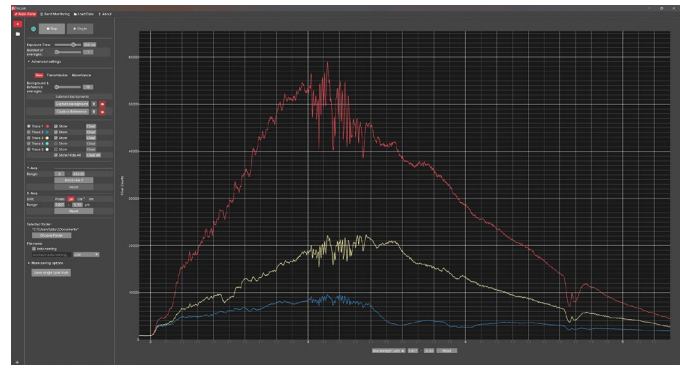
The software allows users to adjust key spectrometer settings such as exposure time, averaging, gain, and offset, providing flexibility for both alignment purposes and actual measurement tasks.

NLizeR offers several features to enhance usability, including the ability to display up to five different traces simultaneously and monitor the time evolution of specific

wavelength bands in real time. Spectra can be quickly measured and saved, streamlining workflows for both routine and advanced measurements.

For advanced users, API interfaces for MATLAB, Python, and C (via DLLs) are included, enabling seamless integration into custom workflows or automated processes.

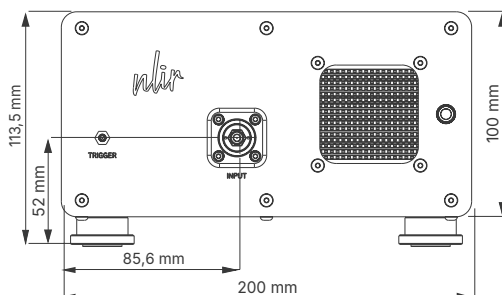
Designed for ease of use and powerful functionality, NLizeR makes mid-infrared spectroscopy accessible and efficient.



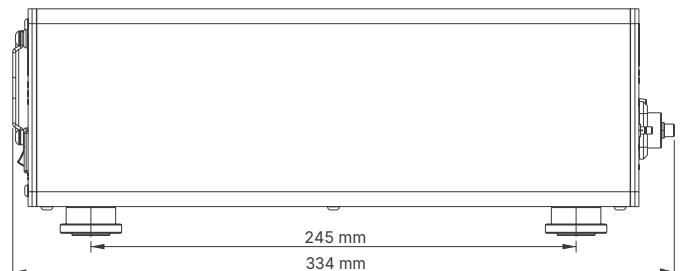
The NLIR software NLizeR makes it easy to adjust basic spectrometer settings and to capture and save spectra.

## TECH DRAWINGS

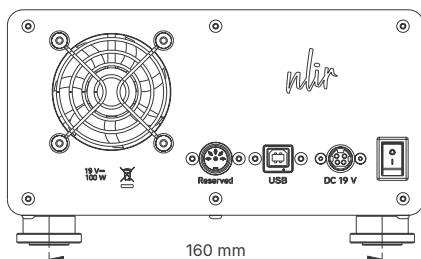
### FRONT



### SIDE



### BACK



### DESCRIPTION

The drawings provide detailed dimensions and an overview of NLIR's MIDWAVE Spectrometer's design.

The front view highlights the input port, trigger interface and ventilation grille, while the back view shows the connections for power, USB and additional interfaces.

Note that all measurements are in mm ■

# APPLICATION EXAMPLES

## NON-DESTRUCTIVE REFLECTION MEASUREMENTS

The MIDWAVE Spectrometer is highly sensitive, providing reliable results even from dark or low-reflecting samples.

In the example shown, the NLIR TOUCH Interface is used together with the MIDWAVE Spectrometer to measure the reflectance of a

black foam (Sample 1) and a red-painted metal plate (Sample 2).

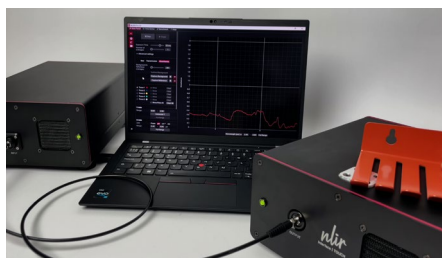
With an exposure time of 50 ms, the curves display single-capture data relative to the reflection of a diffuse gold surface, without any additional data processing. Despite the very low reflection of

the black foam, the spectrometer delivers excellent data.

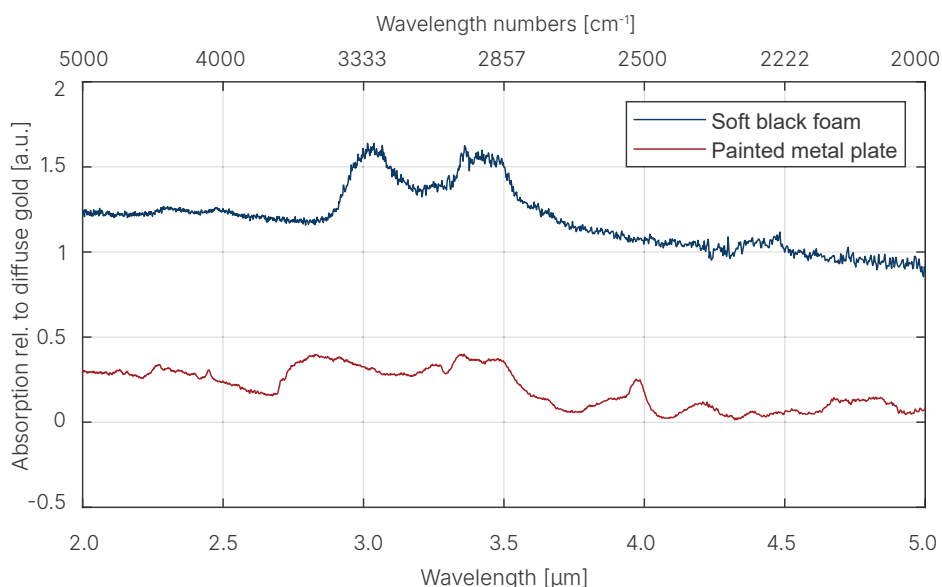
This demonstrates that the MIDWAVE Spectrometer is well-suited for high-speed reflection measurements across a wide range of sample types.



**Sample 1.** Reflection measurements of a black foam.



**Sample 2.** Reflection measurements of a painted metal plate.



## LASER CHARACTERIZATION

The MIDWAVE Spectrometer is capable of measuring the emission of laser sources.

The plot illustrates data from single captures of a mid-infrared supercontinuum laser and a HeNe 3.39 μm laser. In both cases, the exposure time was set to 12 μs, and no averaging or additional data processing was applied, aside from background subtraction.

The noise observed in the supercontinuum laser curve is primarily attributed to the light source itself. The HeNe laser curve demonstrates the spectrometer's 6 cm<sup>-1</sup> resolution.

Light from both laser sources was coupled into a fiber connected

to the spectrometer using NLIR's COLLIMATOR Accessory ■

