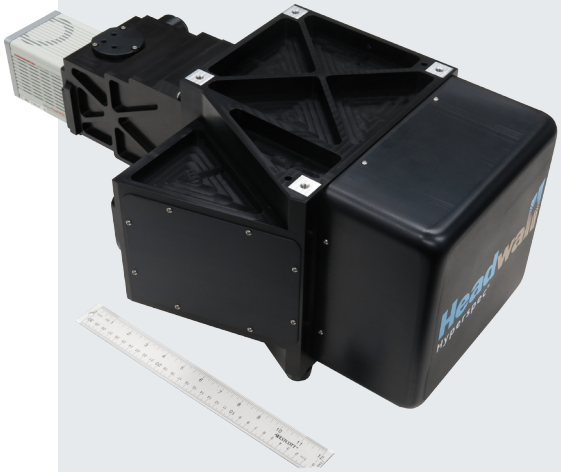
Data Sheet

High-Resolution
Chlorophyll Fluorescence Sensor

High-Resolution Chlorophyll Fluorescence Imaging Sensor for 755nm-775nm Spectral Range



Headwall's Chlorophyll Fluorescence imaging sensor is designed for airborne remote-sensing applications in which simultaneous high spatial and spectral resolution (0.1-0.2 nm across the range) are critical requirements. An important example is remote measurement of chlorophyll fluorescence emissions across large-area geographical regions. These hard-to-detect signatures occur in the Near-Infrared (NIR) range, between 755nm and 775nm. They are resolved with exceptional clarity thanks to Headwall's aberration-corrected, high-throughput optical sensor design. With this new sensor, scientists are able to gain a better understanding of plant physiology and spot environmental trends with precision.

Headwall's imaging spectrometers feature a totally reflective concentric optical design enabling simultaneous high spectral and spatial resolution across a wide scan swath. Residual smile and keystone distortions are also minimized to the maximum extent possible in a compact, high dispersion instrument. Incorporation of Headwall's holographic diffraction grating technology means every sensor contains a high-efficiency master grating, simultaneously maximizing signal throughput and minimizing stray light. State-of-the-art opto-mechanics create a rugged, passively athermalized platform optimized for imaging in real-world environments such as aircraft and satellites. The resulting data products thus exhibit best in-class SNR and camera-limited spatial resolution across a wide field of view.

This imaging sensor can be tuned by Headwall to image any 20-30 nm wide passband within the interval 460-800 nm without any loss of imaging performance. Headwall's sensor is far smaller and lighter than comparable resolution, previous generation spectrometers that typically occupied a space claim equivalent to a medium-sized lab table. The Headwall solution is thus a perfect fit with the next generation of payload restricted applications requiring simultaneous high SNR, and high spatial and spectral resolution.

Airborne hyperspectral image using Headwall's aberration-corrected sensor. (courtesy of NASA)

Application-Specific Solutions For Critical Environments

High-Resolution Chlorophyll Fluorescence Sensor	
Passband (nm)	755 - 775 [1]
f/#	3.5
Camera Technology	Backthinned Silicon CCD
FPA format (Pixel x Pixel x µm)	2048 x 2048 x 6.5
Slit Image FWHM (nm)	≤ 0.15nm within entire slit image
Slit Image (spatial x spectral)	13.3 mm x 7.45 mm [2]
Optical Throughput	> 0.5
Pixel Binning (Spatial & Spectral)	YES
Entrance Slit (mm x µm) (Length x Width)	13.3 x 30 [3]
Magnification	1:1 (unity)
Spectral bands	1146
Size	650mm x 300mm x 240mm
	25.6" x 11.8" x 9.5"
Weight (lb / kg)	28 / 12.7
Max Power (W)	70
Foreoptics Interface	C-Mount or M-42
Residual smile (µm)	≤ 2.5
Residual keystone (µm)	≤ 7.0

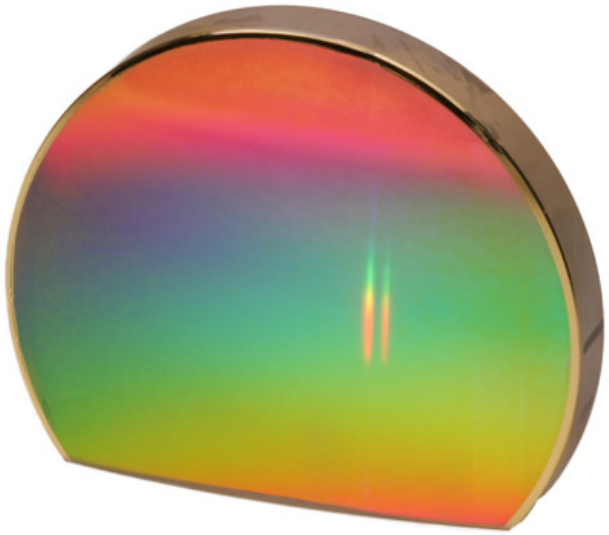
[1] Bandpass is factory-tunable to capture any 20-30 nm region within the interval 460-800 nm.

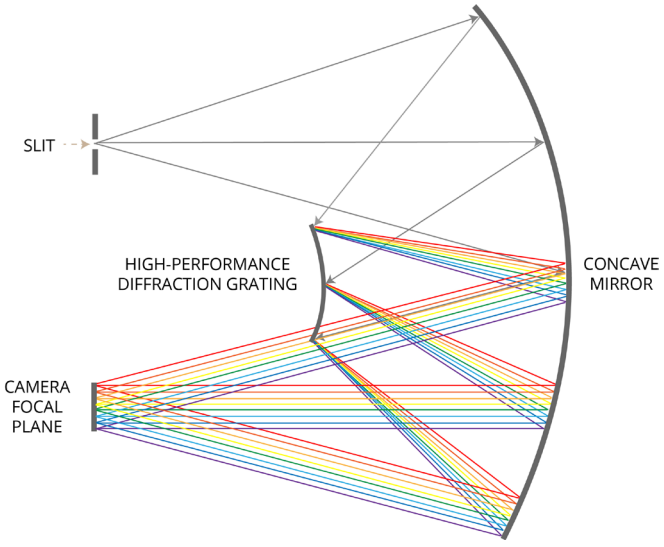
[2] Image format spanning 755-775 nm.

[3] Other entrance slit widths are available on request.

All-Reflective Concentric Imager

Headwall's hyperspectral sensors deliver aberration-corrected imaging characterized by high spatial and spectral resolution, a wide field of view, and very high signal throughput. Headwall's own application-specific diffraction gratings are fundamental to these key specifications, which are crucial for airborne hyperspectral sensors. Headwall's all-reflective, concentric sensor design is robust and thermally stable.





About Headwall Photonics: Headwall is the leading designer and manufacturer of imaging spectrometers and spectral instrumentation for industrial, commercial, and government markets. Headwall's high performance spectrometers, spectral engines, and holographic diffraction gratings have been selected by OEM and end-user customers around the world for use in critical application environments. As a pioneer in advanced, patented optics technology, Headwall enjoys a market-leading position through the design and manufacture of spectral instrumentation that is customized for application-specific performance.

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