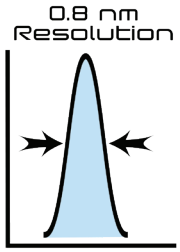
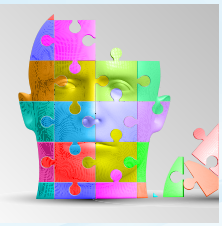
HORIBA
Scientific

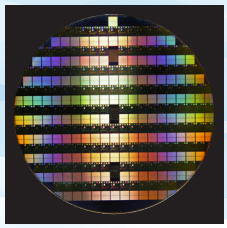


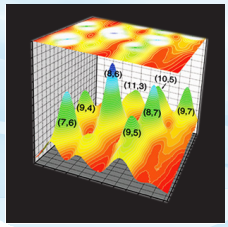
VS70-HSR & VS70-HDR

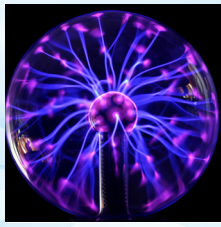
Miniature CCD Spectrometer

VS70 Family









For OEM
Industrial Applications

JOBIN YVON
Technology

horiba.com/oem

Miniature CCD Spectrometer VS70 Family
VS70-HSR & VS70-HDR

Overview

VS70 is a high performance compact fiber coupled spectrometer system covering wide spectral range of 200 to 1050 nm.

This OEM optical module is built around Horiba's type-IV Aberration-Corrected Flat-Field Holographic Ion-Etched concave grating and is specially designed to easily adapt to a large variety of detectors and electronic drivers. This system is fitted with a custom variable order-sorting filter to eliminate higher orders.

The proprietary layout of the VS70 features a single-optics design for superior imaging, peak symmetry and resolution, sensitivity and low-stray light performance, for low-light applications (fluorescence, emission) and high-dynamic applications (absorbance, reflectance).

Applications

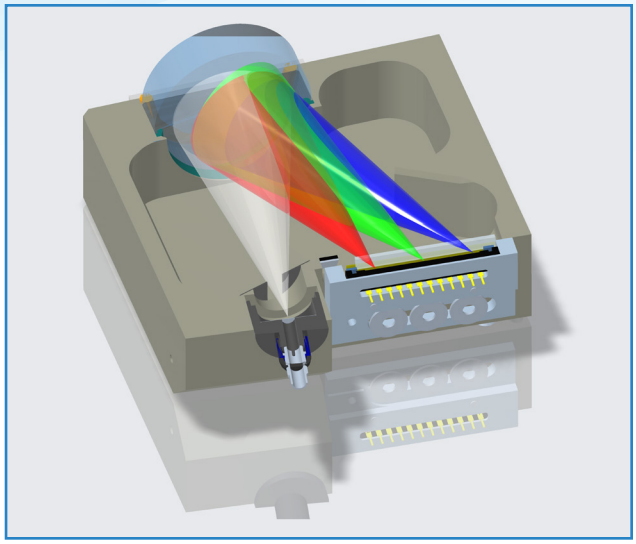
Ideal for industrial applications:

- Ideal for industrial low-light applications such as fluorescence, emission, absorbance, and reflectance

Examples:

- Semiconductor plasma monitoring
- Blood and urine analysis
- Food moisture content analysis
- Flow cytometry
- Liquid chromatography
- Colorimetry

Optical and Mechanical Layout



Features

High spectral resolution and system throughput

Compact size robustness and stability

High Spectral Rate (HSR)

High Dynamic Range (HDR)

Wide spectral coverage from UV to NIR combined with ultra low stray light

High linearity (raw) and linearity-correction

Highly customizable for various applications

General Spectrometer Specifications*

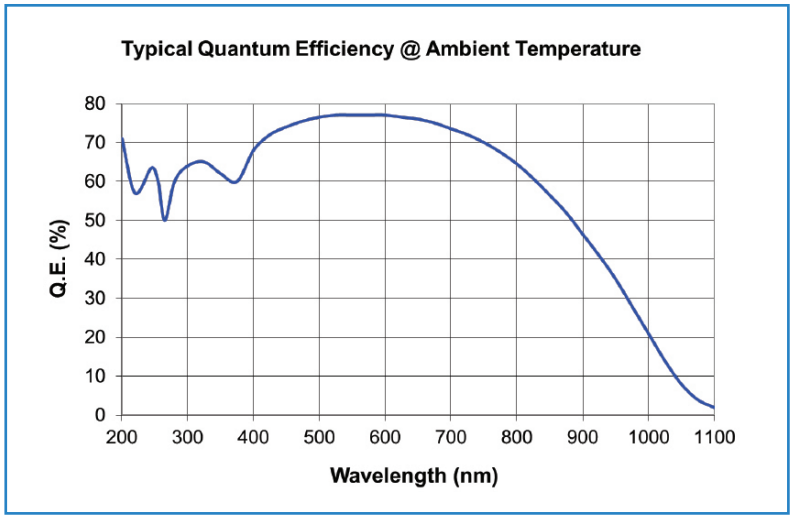
Spectral Coverage	Standard: UV-VIS (200–860 nm) with 477 l/mm grating, VIS (380–750 nm) with 582 l/mm grating, UV-NIR (200–1050 nm) with double-blazed 365 l/mm grating On request other spectral ranges available / different mechanical integration might needed
Spectrometer Input	Fiber coupled: FC or SMA; Free space: 12-25-37-50-62-75-100-125-150-200 µm slits, other options available upon request
Spectral Resolution	2 nm for 365 l/mm grating, 1 nm for 477 l/mm grating, 0.8 nm for 582 l/mm grating (25 µm slit for all)
Average Spectral Dispersion	30.9 nm/mm for 365 l/mm grating, 23.7 nm/mm for 477 l/mm grating, 16.3 nm/mm for 582 l/mm grating
Focal Length	70 mm
Options	Selection of high grade sensors: CMOS, B.I. CCD, PDA Input port: SMA, FC, free space, custom input
F/#	F/2.8
Stray-light rejection Typical (Maximum)	0.01% (0.02%) for UV-VIS configuration with 300 µm tall CCD, measured at 700 nm (measured with broad bandpass 510 nm filter, 75 µm slit-width) > 2.4 AU linear range (5% variation) with caffeine 273 nm absorption peak in 10 mm cuvette and D_2 lamp.
Wavelength accuracy	0.2 nm
Software**	LabVIEW™ acquisition software for initial evaluation (DLLs provided for software integration)

Detector Options and Specifications*

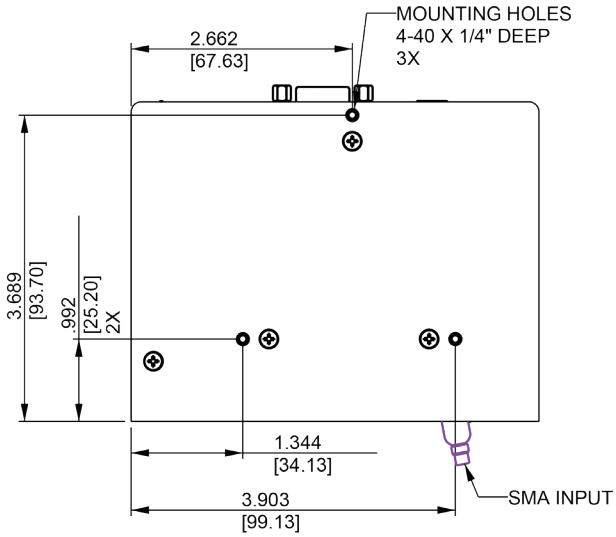
Linear back-illuminated CCD with large active area and high sensitivity		
Detector Model	Hamamatsu CCD sensor S11071 with high spectral acquisition speed	Hamamatsu CCD sensor S10420 with high dynamic range
Sensor Format	2048 x 70 pixels, shorter version available on request	2048 x 70 pixels, shorter version available on request
CCD Pixel Size	14 x 14 µm	14 x 14 µm
CCD Active Area	28.7 x 1 mm	28.7 x 1 mm
CCD QE	> 75% for 450-750 nm	> 75% for 450-750 nm
Sensor Temperature	Uncooled	Uncooled
Maximum Spectral Rate	760 spectra/s	223 spectra/s
Full Well Capacity	>200,000 e^- (typical); >175,000 e^- (minimum)	>225,000 e^- (sensitivity mode); >375,000 e^- (high full well mode)
Readout Noise	35 e^- (typical); 45 e^- (maximum)	35 e- (typical) & 45 e^- (maximum) in sensitivity mode; 50 e^- (typical) and 75 e^- (maximum) in high full well mode
Digitization	16-bit	16-bit
Dynamic Range (FW/RN)	6,000:1 (typical)w	7,000:1 (typical) in sensitivity mode; 5,500:1 (typical) in high FW mode
Non-linearity (measured on each system)	< 0.4% (corrected)	<0.4% (corrected)
Dark current	50 e^-/pix/s (typical); 500 e^-/pix/s (maximum)	50 e^-/pix/s (typical); 500 e^-/pix/s (maximum)
Communication	USB2	USB2
Environmental conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C	
Power requirements	Molex connector (24 VDC)	

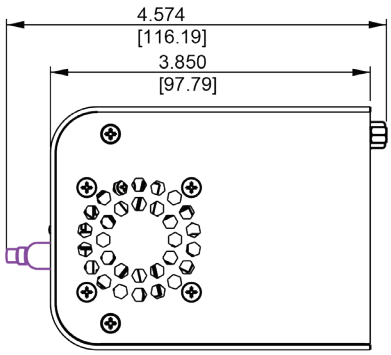
* HORIBA Instruments has a policy of continuous product development, and reserves the right to amend part numbers, descriptions and specifications without prior notice.
**No LabVIEW™ license is needed to run our acquisition software.

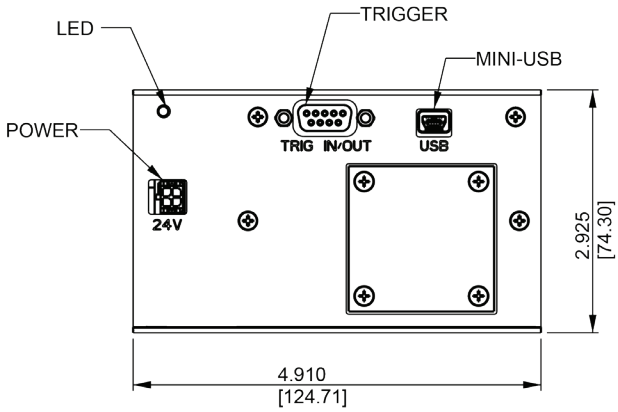
Quantum Efficiency



System Mechanical Drawings





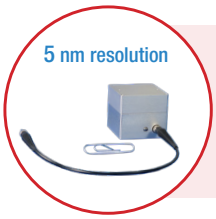


ALL UNITS IN INCHES [MM] UNLESS NOTED OTHERWISE

Best Selling Miniature Spectrometers for OEM Industrial Applications

Fiber-coupled USB Spectrometers:

MiniVS20 Spectrometer with Linear UV-VIS CMOS or NIR InGaAs Sensor



OEM hand-held spectrometer covering 190 to 1,700 nm for various low stray light applications

- Aberration-corrected concave holographic grating options
- VIS configuration featuring a 1.7" x 1.9" x 2" size combined with full F/2.3 optics for high signal-to-noise
- High throughput, compactness and long term reliability

MiniVS70 VIS Spectrometer with FI CMOS or BI CCD

NEW miniaturized VS70 configuration

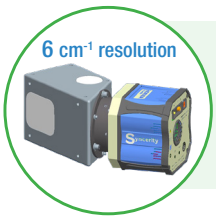
- Based on high performance aberration-corrected concave gratings fitted with a custom order-sorting filter to eliminate higher orders
- Low cost combined with high performance and low stray light
- Long term opto-mechanical stability and choice of front-illuminated linear CMOS or back-illuminated CCD sensors

VS70 UV-VIS-NIR Spectrometer with Uncooled / TE-cooled CCD

Compact, versatile most popular VS70 OEM spectrometer and OES configurations

- Based on high performance aberration-corrected concave gratings with full F/2.3 aperture
- Affordable, high throughput, robust and stable
- Electronics drivers ranging from **USB-2 to Ethernet and EtherCAT**

CiCi-Raman-NIR with Scientific Camera Optimized for 785 nm



Most compact OEM Raman spectrometer with aberration-corrected holographic grating

- Covers 150-3,300 cm^{-1}
- High efficiency and low stray light
- Available in F/2.3 and in compact F/5 configurations
- -50° C deep-cooled scientific CCD camera with minimized etaloning and high NIR QE

PoliSpectra® Quad Spectrometer for Simultaneous Acquisition of 4 VIS Spectra

CCD spectrometer for simultaneous acquisition from 4 fiber inputs (470-730 nm)

- High-speed electronics (as fast as <1.5 msec readout time for 4 spectra)
- QUAD-channel high throughput system (f/2.3) and ultra-low stray light
- Industrial low-light applications from low light fluorescence to reflectance

PoliSpectra® M116 8-32 Channel MultiTrack UV-VIS-NIR CMOS Spectrometer

Fiber-coupled multi-spectra system with 8- to 32-channel simultaneous measurements

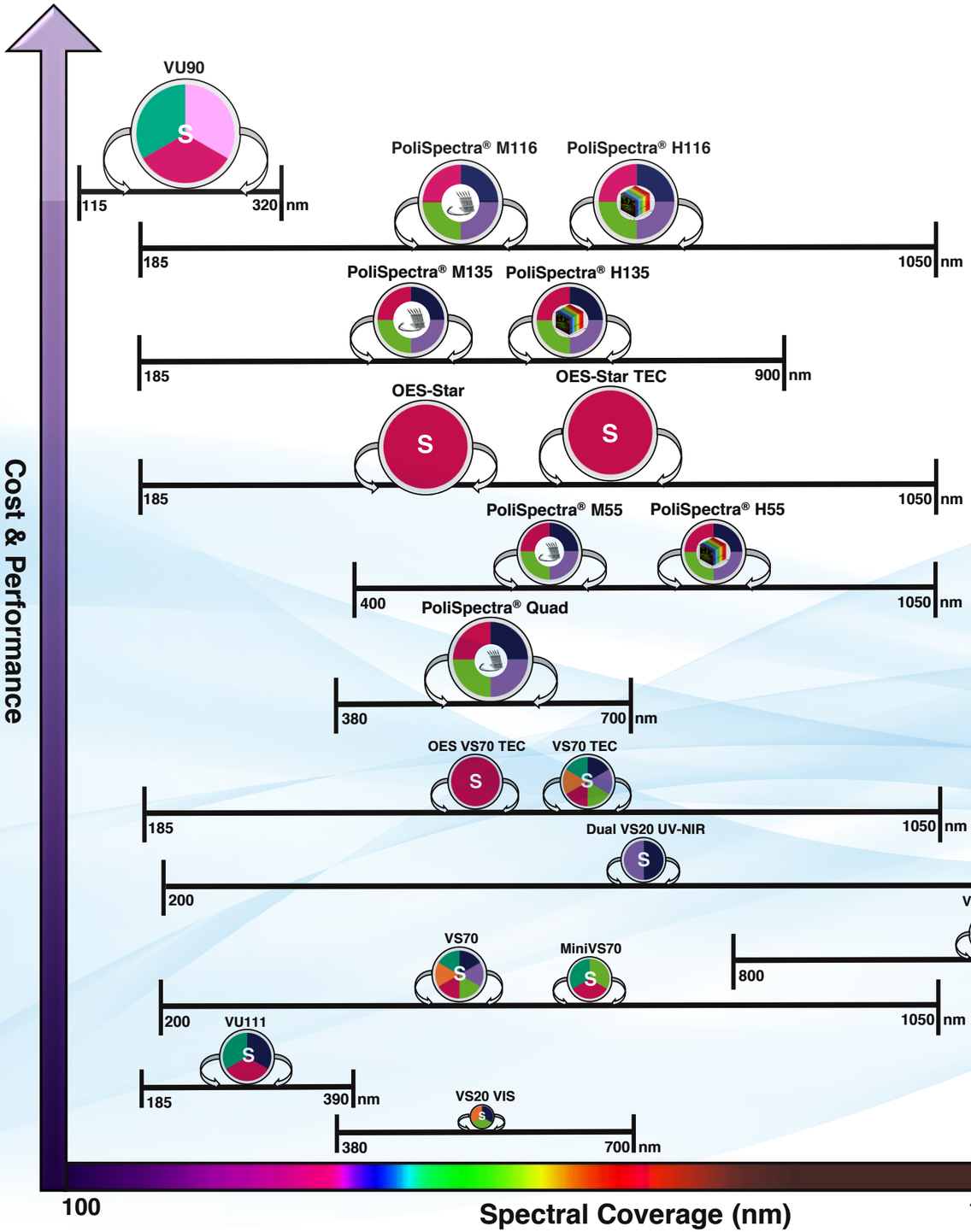
- Concentric optical design with UV extended spectral range provides minimized crosstalk
- High throughput USB-3 system featuring a fast 2D scientific BI CMOS running at 94 to 188 frames per second, acquiring 8, 16 or 32 simultaneous spectra (2048 pixels per spectrum)

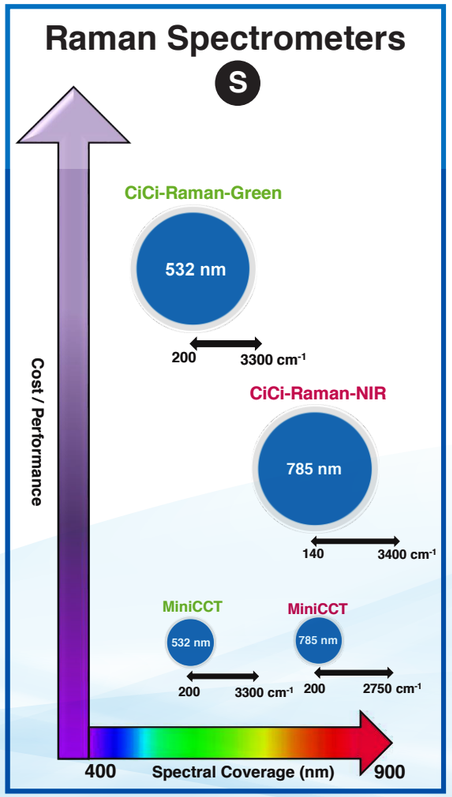
PoliSpectra® 135 Multichannel or Hyperspectral Line Imager from UV to NIR

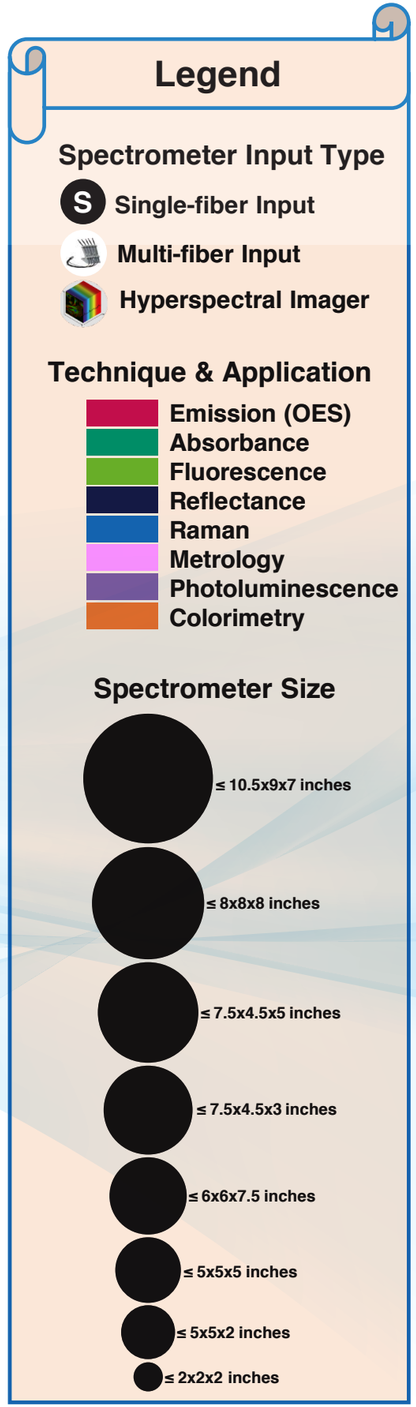
Ultra-high performance rugged spectrometer for hyperspectral imaging with a 2D sCMOS Camera

- For line-image scanning, in a push-broom hyperspectral configuration
- High throughput, USB-3 system featuring a fast 2D scientific BI CMOS with rolling shutter, running at 94 (HDR) to 188 (Standard Mode) frames per second (2048 pixels per spectrum)

OEM Spectrometer Selection Guide







OEM Philosophy and Mission

3 Centers of Excellence Dedicated to OEM Spectroscopy and Camera Solutions in US, EU, and Asia

Our mission is to provide a complete development and manufacturing experience, from optical simulations to opto-mechanical design and prototyping of spectroscopic and camera systems extending to, and including, electronics, firmware, software design and first articles.

Our products provide superior performance, reliability and stability, combined with robust cost reduction. Capable of flexible high volume production capacity in quantities of hundreds to thousands per year, we offer full confidentiality providing "Black Boxes" or private labelling, using your logo or graphics.

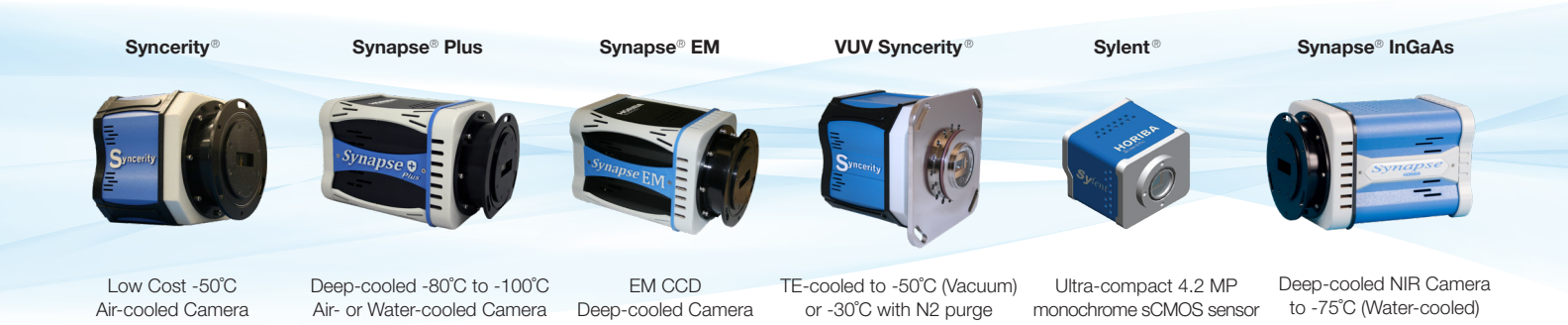
Unmatched customer service is provided by our exceptionally experienced workforce featuring on-time delivery and flexibility, allowing scheduling modifications.

Adhering to Copy Exactly! (CE!) processes, our fully trained staff, from engineering to manufacturing, form a dedicated OEM engineering force that supports you over the lifetime of the product.

Scientific Segment - OEM Products and Capabilities:

- Custom master optical diffraction gratings
- Diffraction grating replicas (concave, convex and flat)
- Spectrometers, optical assemblies with pre-aligned sensors (CCD, PDA, CMOS, InGaAs) using either customers' or HORIBA's OEM electronics
- OES spectrometers
- Spectroscopy systems or modular engines, such as mini fluorometers and mini Raman systems
- Single and double scanning monochromators
- Imaging spectrographs and spectrometers with CCD or CMOS cameras
- Multispectra spectrometers with multiple fiber inputs / MultiTrack spectroscopy
- Hyperspectral system with HORIBA or customer provided camera (Push-broom configurations)
- Cameras: Spectroscopic deep-cooled scientific cameras (1D and 2D CCD & InGaAs – FI and BI)
- OEM electronics for optosensors ranging from PD and PDA to CCD and CMOS sensors
- Imaging cameras: Uncooled and cooled with FI and BI high-end scientific CMOS
- VUV/FUV spectrometers and CCD vacuum and N2-purged cameras

Scientific Deep Cooled CCD, InGaAs and CMOS Cameras



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HORIBA Scientific

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