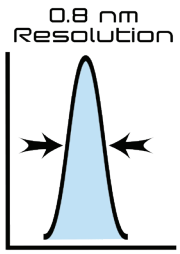
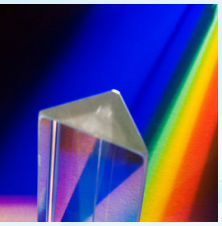
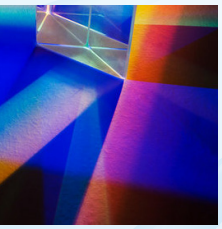
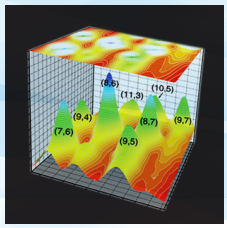
HORIBA
Scientific

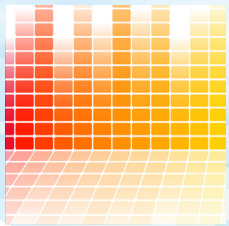


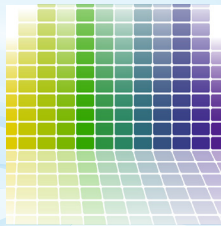
MiniVS70
Compact High Resolution CMOS or CCD Spectrometer











For OEM
Industrial Applications

JOBIN YVON
Technology

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MiniVS70 Compact High Resolution CMOS or CCD Spectrometer

Overview

MiniVS70 is the latest evolution of the cost-effective high performance family of mini-spectrometers from HORIBA Scientific. This MiniVS70 system for industrial applications uses a modified miniaturized VS70 optical engine which is optimized for the UV-VIS-NIR spectral range. The MiniVS70 is based on a high performance aberration corrected concave grating fitted with a custom order-sorting filter to eliminate higher orders.

This platform is specially designed to easily adapt to a large variety of detectors and electronic drivers. The optical design is optimized to minimize stray light and maximize optical performance. The MiniVS70 outperforms competitive mini-spectrometers based on front-illuminated CMOS linear sensors or low-cost back-illuminated CCDs.

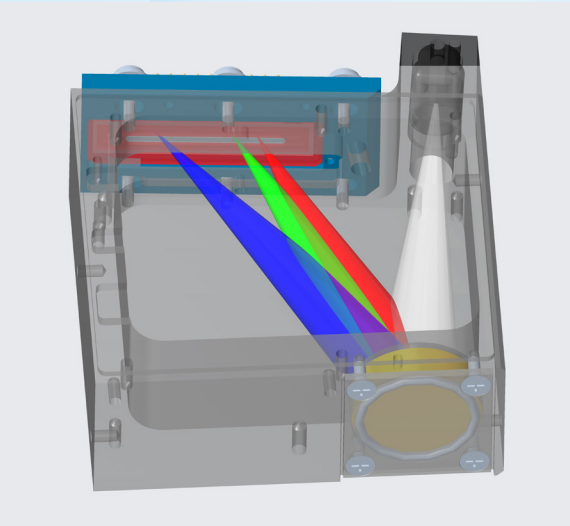
Applications

- Fluorescence, Emission, Absorbance, Reflectance and LIBS

Examples:

- Semiconductors
- Analytical Chemistry
- Process Monitoring
- Medical Analysis (blood, DNA, etc.)
- Metrology
- Chemical Fingerprint by Plasma Analysis

Optical and Mechanical Layout



Concave-grating mini spectrometer optical mechanical design.

Features

High spectral resolution

Compact size, robustness, and stability

Configurable with linear CMOS for affordability, or CCD for highest sensitivity

Various wavelength ranges UV-VIS / VIS / UV-NIR

Ultra low stray light

Highly customizable for many applications

High volume production capacity

General Spectrometer Specifications*

Spectral Coverage	200 - 1050 nm with double-blazed 365 l/mm grating, 190 – 850 nm with 477 l/mm grating, ≤ 400 – ≥ 800 nm with 582 l/mm grating
Spectrometer 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/3.8
Wavelength Accuracy	<0.25 nm (using multi-area wavelength calibration)
Stray Light	< 0.1%
Software	LabVIEW™ acquisition software for initial evaluation (DLLs provided for software integration)

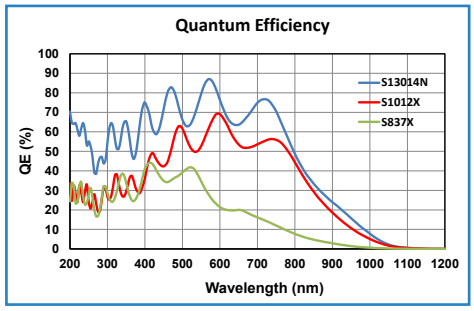
Detector Options and Specifications

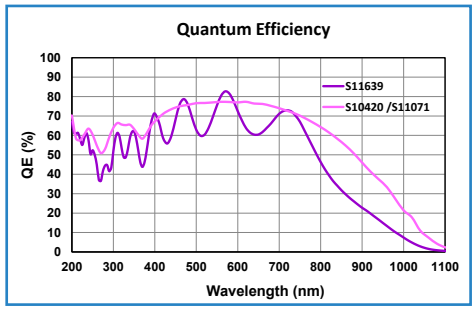
Linear front illuminated CMOS sensor with high speed and UV extension		Linear back-illuminated CCD with large active area with high sensitivity	
Sensor Type	Hamamatsu CMOS linear image sensor S11639 with active pixel structure and global e-shutter	Hamamatsu CCD sensor S11071 with high spectral acquisition speed	Hamamatsu CCD sensor S10420 with high dynamic range
Sensor Format	2048 x 1 pixels	2048 x 70 pixels, shorter version available on request	2048 x 70 pixels, shorter version available on request
Active Area	28.7 x 0.2 mm	28.7 x 1 mm	28.7 x 1 mm
Pixel Size	14 x 200 µm	14 x 14 µm	14 x 14 µm
QE	> 75% for 450 - 750 nm		
Full Well Capacity	100,000 e^- (typical) 80,000 e^- (minimum)	>240,000 e^- (typical) >175,000 e^- (minimum)	>375,000 e^- (high FW mode)
Readout Noise	16 e^- (typical) 20 e^- (maximum)	35 e^- (typical) 45 e^- (maximum)	50 e^- (typical) & 75 e^- maximum) in high full well mode
Maximum Spectral Rate	1400 spectra/s and higher	770 spectra/s	223 spectra/s
ADC	16-bit	16-bit	16-bit
Dynamic Range (FW/RN)	6250:1 (typical)	6800:1 (typical)	7500:1 (high FW mode) (typical)
Non-linearity	<0.1% (corrected)	<0.4% (corrected)	<0.4% (corrected)
Dark Current (@25° C)	375 e^-/pixel/s (typical) 500 e^-/pixel/s (maximum)	50 e^-/pixel/s (typical) 500 e^-/pixel/s (maximum)	50 e^-/pixel/s (typical) 500 e^-/pixel/s (maximum)
Communication	USB 2		
Environmental Conditions	Operating temperature +15° C to 45° C ambient Relative humidity <70% (non-condensing); Storage temperature -20° C to 60° C		
Power Requirements	Through USB 2	Y Cable (5 VDC)	

Other detector options, such as CMOS-PDAs with passive pixel structure and full well up to 1Ge^- available.

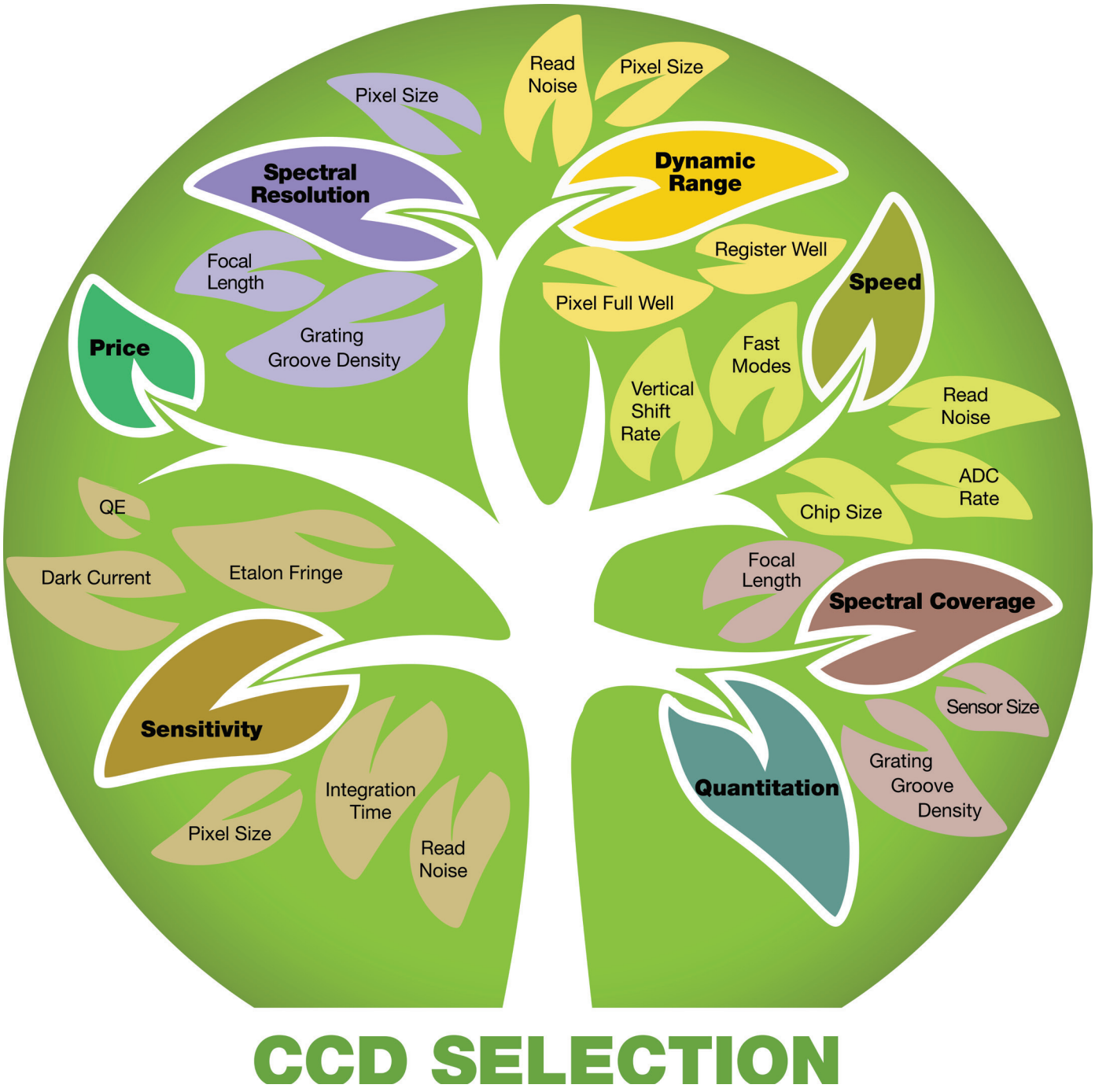
Linear CMOS-PDA Options (other sensors available upon request)		
Sensor type	S1012X Series (High Performance)	S837X Series (Low Cost)
Pixel Format	25 or 50 µm pixel pitch; 0.5 or 2.5 mm pixel height; 512 pixels or 1024 pixels	
Detector QE	Refer to graphs on the following page	
Full Well (e-)	From 94 Me^- to 1 Ge^- (typical)	From 43 Me^- to 430 Me^- (typical)
Readout Noise (e-)	5200 e^- (typical)	3370 e^- (typical)
Spectrometer housing will be slightly different depending on CMOS-PDA options		

Quantum Efficiencies



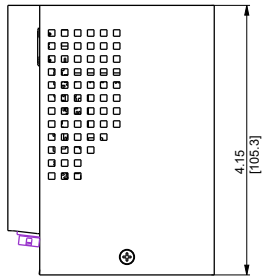


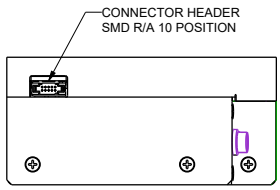
CCD Selection Guide

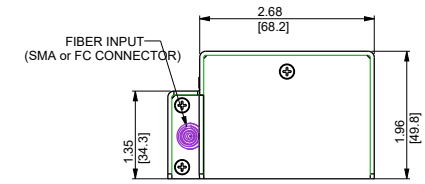


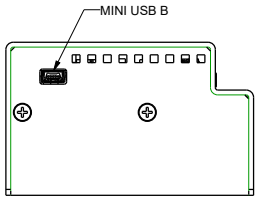
System Mechanical Drawings

MiniVS70 with CCD

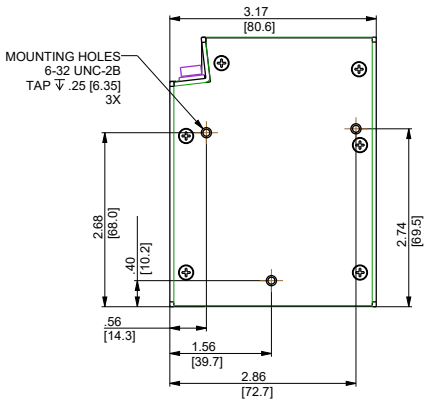






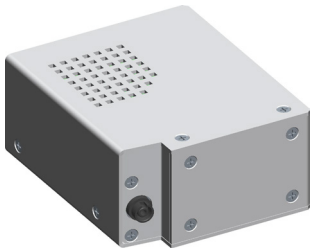


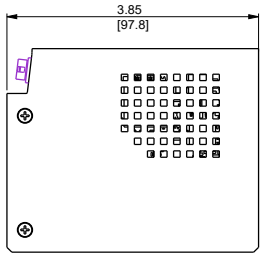
REAR VIEW

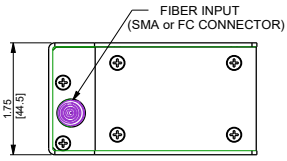


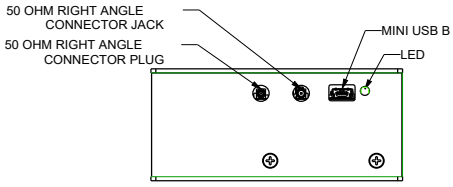
ALL UNITS IN INCHES [MM] UNLESS NOTED

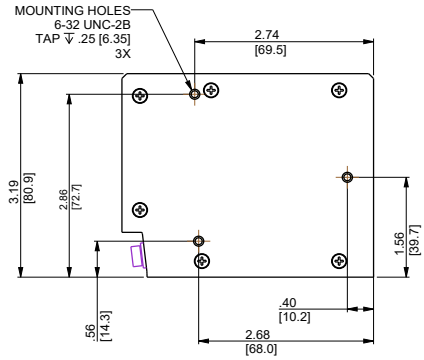
MiniVS70 with CMOS











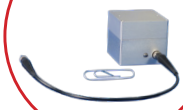
ALL UNITS IN INCHES [MM] UNLESS NOTED

Best Selling Miniature Spectrometers for OEM Industrial Applications

Fiber-coupled USB Spectrometers:

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

5 nm resolution



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

1 nm resolution

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

1-2 nm resolution

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

6 cm^{-1} resolution

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

1 nm resolution

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

1 nm resolution

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)

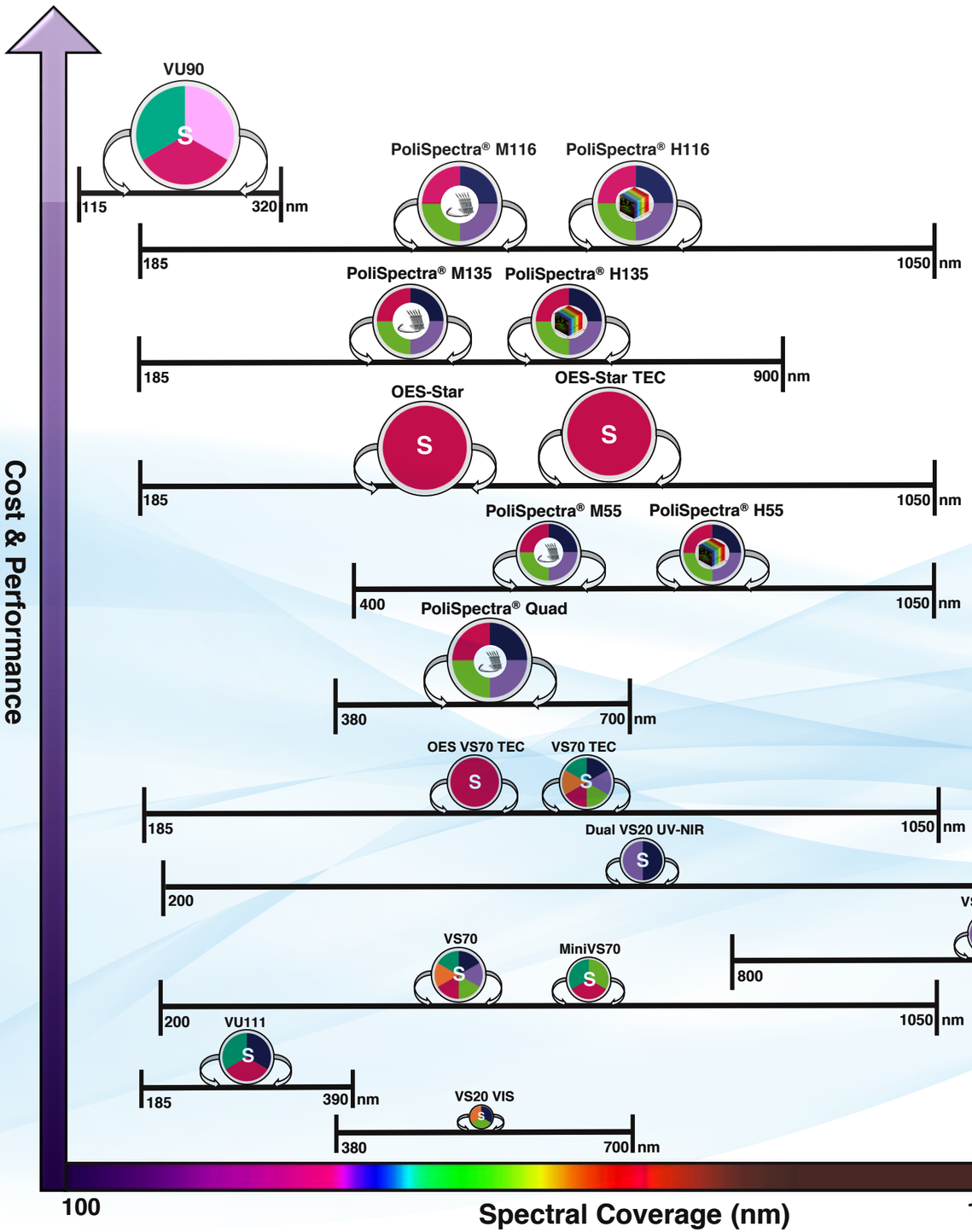
PoliSpectra® H116 Imaging Spectrometer for Hyperspectral Work from UV to NIR

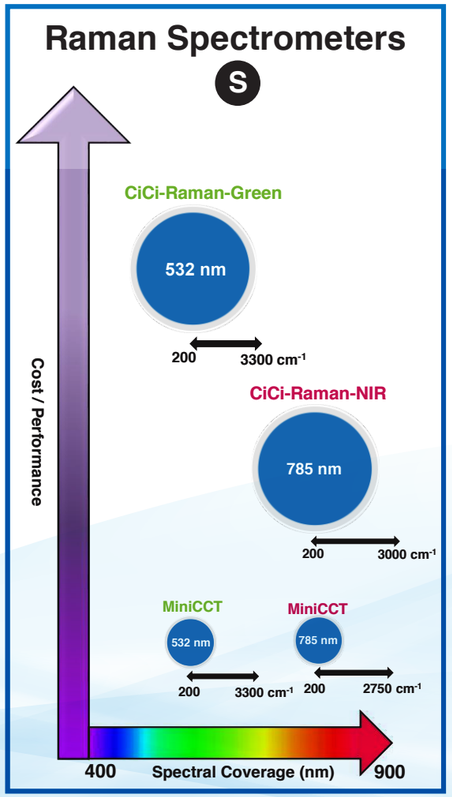
Free-space coupled
1 nm & 40 µm resolution

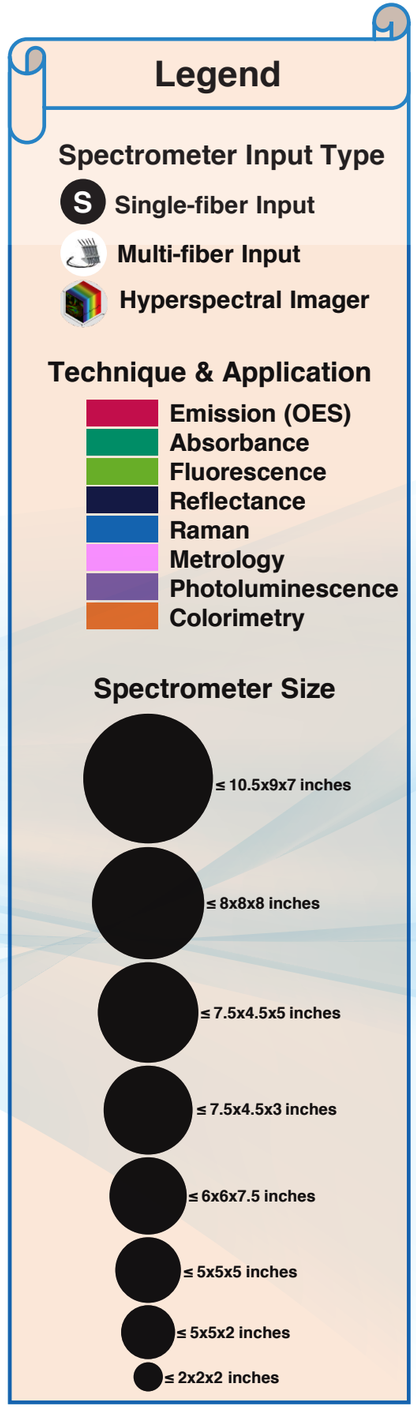
Ultra-high performance rugged spectrometer for hyperspectral imaging with a 2D sCMOS Camera

- 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

Syncerity®	Synapse® Plus	Synapse® EM	VUV Syncerity®	Synapse® InGaAs
Low Cost -50º C Air-cooled OEM Camera	Deep-cooled -80º C to -100º C Air- or Water-cooled Camera	EM CCD Deep-cooled Camera	TE-cooled to -50˚ C (Vacuum) or -30˚ C with N2 purge	Deep-cooled NIR Camera to -75˚ C (Water-cooled)

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HORIBA Scientific

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