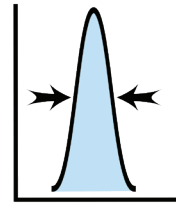
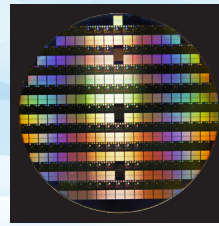
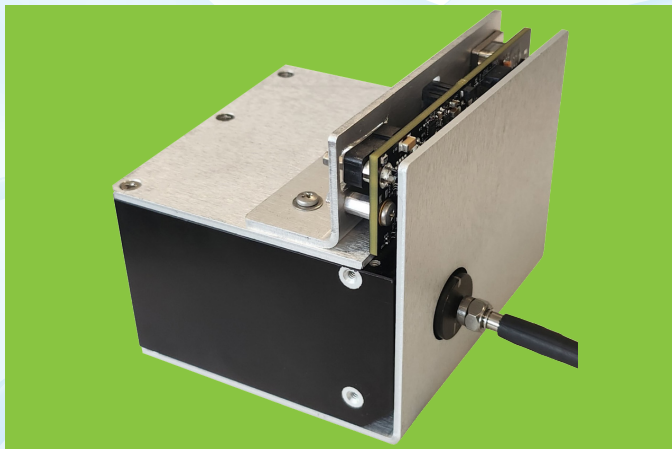
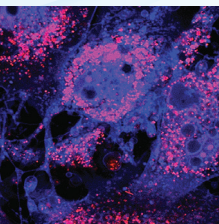
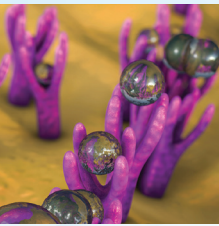


0.8 nm
Resolution



V570-PDA-HDR Miniature 18-Bit Spectrometer V570 Family



For OEM
Industrial Applications

horiba.com/oem



Miniature PDA-HDR Spectrometer VS70 Family

Overview

Introducing HORIBA's VS70-PDA-HDR OEM Photodiode Array Spectrometer...a high-performance USB 2.0 powered compact fiber-coupled spectrometer covering a wide spectral range of 200 to 1000 nm with 18-bit digital resolution.

Based on an enhanced VS70 optical engine and a newly designed, monolithic single board, ultra-quiet 18-bit data acquisition system, this "smart" spectrometer system boasts a dynamic range of more than 42,000:1 for industrial, bright-light applications such as emission, absorbance and reflectance.

At the optical heart of this VS70-PDA-HDR lies a proprietary HORIBA type-IV aberration-corrected flat-field holographic ion-etched concave grating and custom order-sorting filter to eliminate higher diffraction orders.

In addition to the instrument's single-optics design that provides sterling performance attributes with respect to imaging, sensitivity, resolution and low stray light, this detection system offers flexible I/O triggering for experiment synchronization, as well as a highly efficient USB-powered architecture.

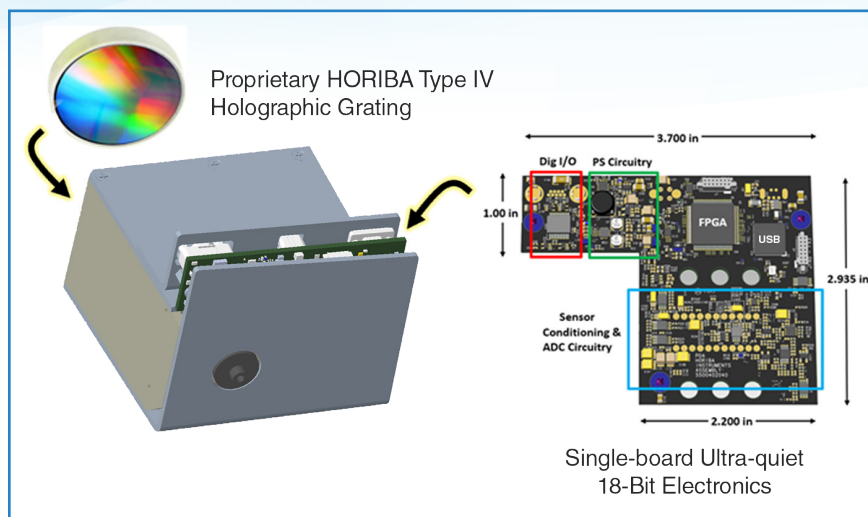
Applications

Ideal for industrial bright-light applications such as emission, absorbance, differential optical absorbance, and reflectance.

Examples:

- Pharmaceuticals & life science
- Hematology
- HPLC/UPLC
- Semiconductor
- Environment, agriculture and energy

VS70-PDA-HDR Open-frame Layout



Features

High spectral acquisition speed (readout time ~5 ms/1024 pixels)

Wide spectral coverage from UV to NIR

Colossal PDA full well up to 1 Ge⁻, more than 100 times deeper than any CCD

High signal-to-noise ratio combined with ultra low stray light, 18-bit digital resolution

High UV sensitivity with smoothly varying spectral response

High throughput

Compact size, robustness and high thermal stability

General Spectrometer Specifications*

Spectral Coverage	UV-VIS (200–800 nm) with 477 l/mm grating, VIS (280–700 nm) with 582 l/mm grating, UV-NIR (200–985 nm) with double blazed 365 l/mm grating. On request, other spectral ranges available; different mechanical integration might be 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
Average Digital Resolution with 25 (50) μm pixel width	0.8 (1.5) nm/px for 365 l/mm grating, 0.59 (1.2) nm/px for 477 l/mm grating, 0.4 (0.8) nm/px for 582 l/mm grating
Focal Length	70 mm
Options	Selection of high grade sensors: Hamamatsu S1590x and S1012x families (other PDA sensors available upon request); Input port: SMA, FC, free space, custom input (e.g., round-to-line fiber bundle)
F/#	F/2.8
Stray Light Rejection Typical	0.01% for UV-VIS configuration measured at 400 nm and 700 nm with a 550 nm (40 nm band) bandpass filter, 31 μm slit-width
Wavelength Accuracy	0.2 nm
Software**	LabVIEW™ acquisition software for initial evaluation (DLLs provided for software integration)

Detector Options and Specifications*

OPTION A (High SNR, High Spectral Resolution)	
Detector Model	Hamamatsu S10124-1024 or S15909-1024 with high UV sensitivity.
Sensor Format	1024 x 1 pixels
PDA Pixel Size	25 μm x 2500 μm
PDA Active Area	25.6 mm x 2.5 mm
PDA Spectral Response	S15909-1024 has improved spectral response (NO FRINGES) compared to S10124-1024. (See figure below)
Sensor Temperature	Uncooled
Full Well Capacity	624 Me ⁻ for S15909-1024 and 468 Me ⁻ for S10124-1024
Readout Noise	14,700 e ⁻ (typical) for S15909-1024. S10124-1024 not yet evaluated
Digitization	18-bit
Dynamic Range (FW/RN)	42,500:1 (typical) for S15909-1024. S10124-1024 not yet evaluated
Max SNR ($\sqrt{\text{FW}}$)	24,980:1 (typical) for S15909-1024 and 21,600:1 (typical) for S10124-1024
Non-linearity (measured on each system)	<0.4% (corrected)
Dark Current (at 25C ambient)	190,000 e ⁻ /pix/s (typical) for S15909-1024 and 625,000 e ⁻ /pixel/s (typical) for S10124-1024
Communication	USB 2.0 high-speed, (USB 3.0 customizable)
Environmental Conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C
Power Requirements	5 VDC @ 0.13 A, USB-powered or Molex connector

* 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.

Detector Options and Specifications*

OPTION B (High SNR, Medium Spectral Resolution)	
Detector Model	Hamamatsu S15908-512 or S10121-512 with high UV sensitivity.
Sensor Format	512 x 1 pixels
PDA Pixel Size	50 μm x 2500 μm
PDA Active Area	25.6 mm x 2.5 mm
PDA QE	S15908-512 has improved spectral response (NO FRINGES) compared to S10121-512. (See figure below)
Sensor Temperature	Uncooled
Full Well Capacity	1.25 Ge ⁻ for S15908-512 and 1.03 Ge ⁻ for S10121-512
Readout Noise	14,700 e ⁻ (typical)
Digitization	18-bit
Dynamic Range (FW/RN)	42,500:1 (typical)
SNR	24,000:1 (typical)
Non-linearity (measured on each system)	<0.4% (corrected)
Dark Current	190,000 e ⁻ /pix/s (typical)
Communication	USB 2.0 High-speed, (USB 3.0 customizable)
Environmental Conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C
Power Requirements	5 VDC @ 0.13 A, USB-powered or Molex connector

OPTION C (Medium SNR, High Spectral Resolution)	
Detector Model	Hamamatsu S10123-1024 with high UV sensitivity
Sensor Format	1024 x 1 pixels
PDA Pixel Size	25 μm x 500 μm
PDA Active Area	25.6 mm x 0.5 mm
PDA QE	(See figure below)
Sensor Temperature	Uncooled
Full Well Capacity	87 Me ⁻
Readout Noise	14,700 e ⁻ (typical)
Digitization	18-bit
Dynamic Range (FW/RN)	Not yet evaluated.
SNR	9,330:1 (typical)
Non-linearity (measured on each system)	<0.4% (corrected)
Dark Current	125,000 e ⁻ /pix/s (typical)
Communication	USB 2.0 High-speed, (USB 3.0 customizable)
Environmental Conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C
Power Requirements	5 VDC @ 0.13 A, USB-powered or Molex connector

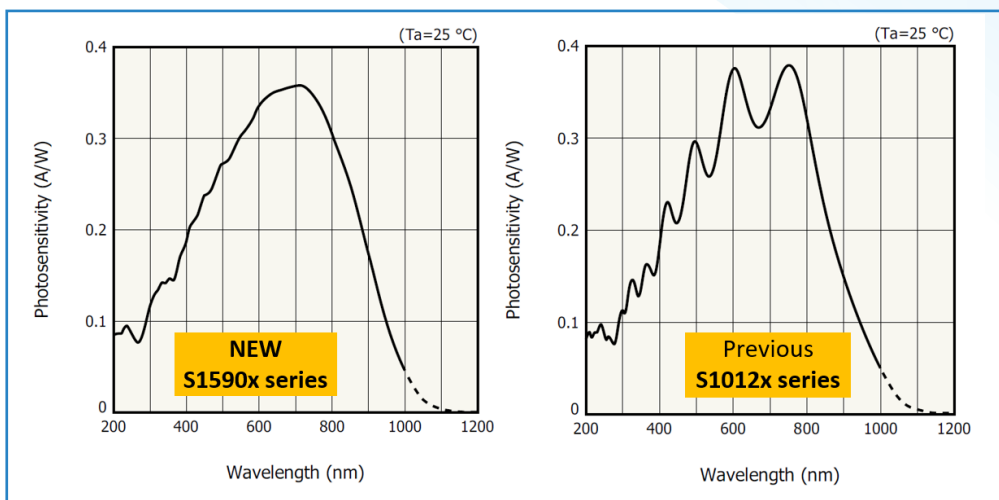
* HORIBA Instruments has a policy of continuous product development, and reserves the right to amend part numbers, descriptions and specifications without prior notice.

**No LabVIEW™ license is needed to run our acquisition software.

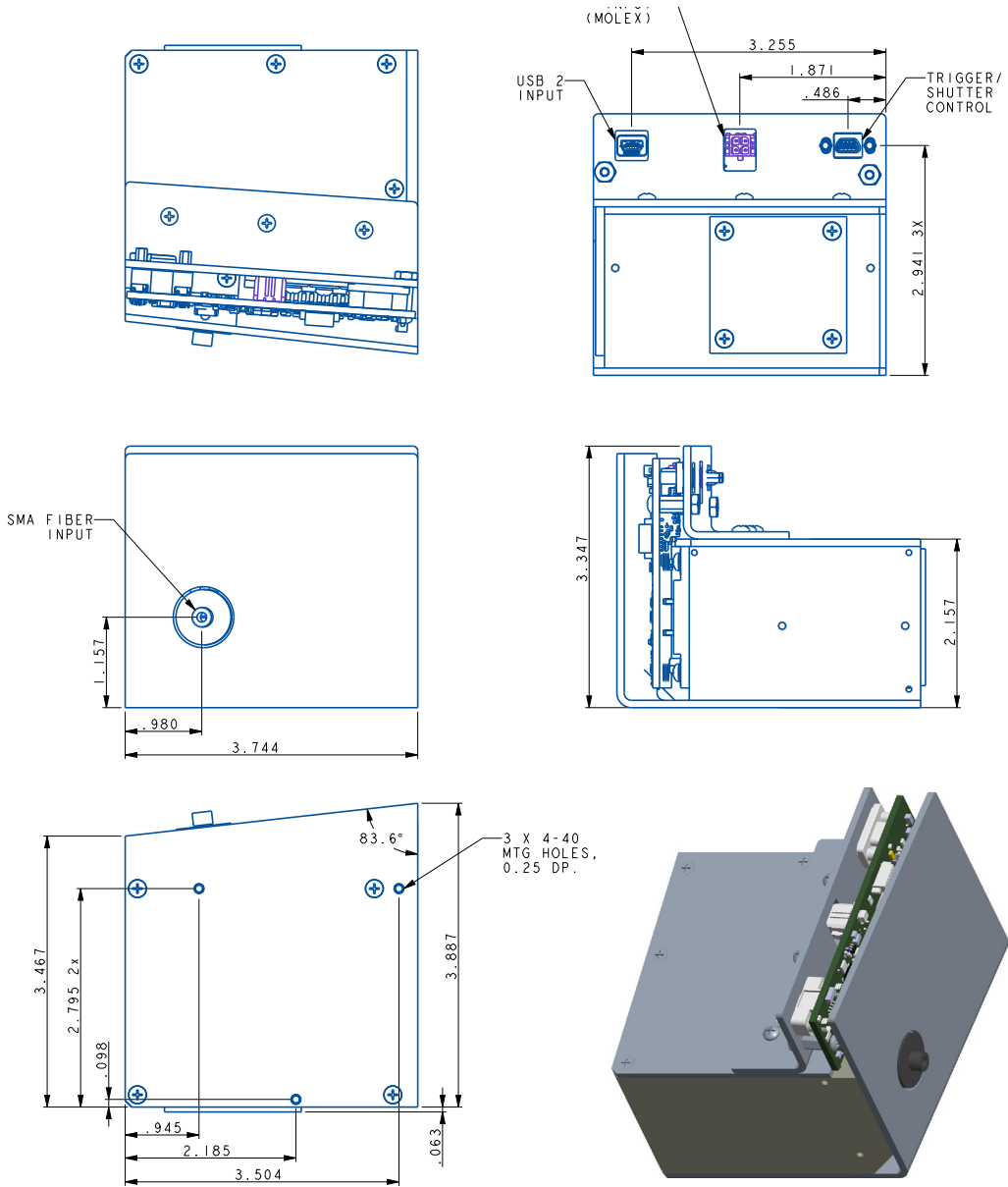
Detector Options and Specifications*

OPTION D (Medium SNR, Medium Spectral Resolution)	
Detector Model	Hamamatsu S10121-512 with high UV sensitivity.
Sensor Format	512 x 1 pixels
PDA Pixel Size	50 μm x 500 μm
PDA Active Area	25.6 mm x 0.5 mm
PDA QE	(See figure below)
Sensor Temperature	Uncooled
Full Well Capacity	200 Me ⁻
Readout Noise	14,700 e ⁻ (typical)
Digitization	18-bit
Dynamic Range (FW/RN)	Not yet evaluated
SNR	Not yet evaluated
Non-linearity (measured on each system)	<0.4% (corrected)
Dark Current	125,000 e ⁻ /pix/s (typical)
Communication	USB 2.0 High-speed, (USB 3.0 customizable)
Environmental Conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C
Power Requirements	5 VDC @ 0.13 A, USB-powered or Molex connector

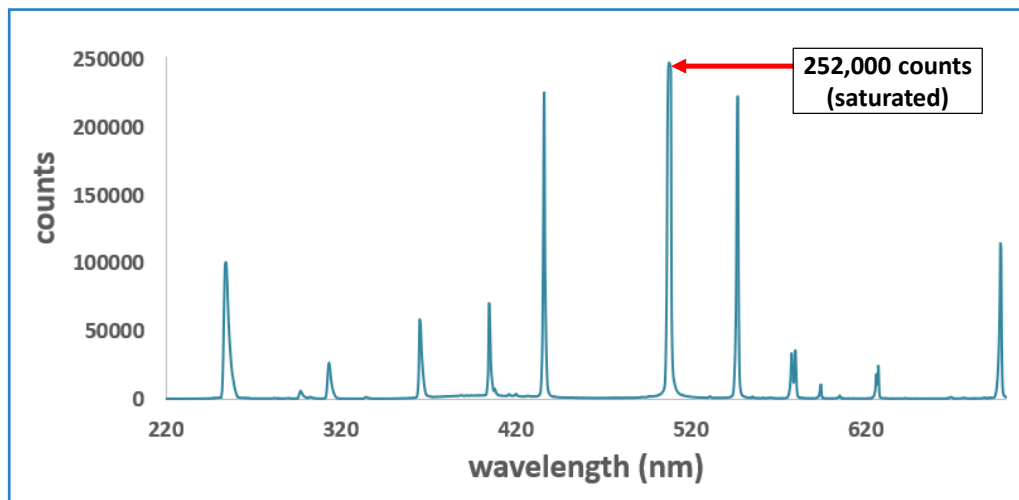
PDA's Spectral Response



System Mechanical Drawings

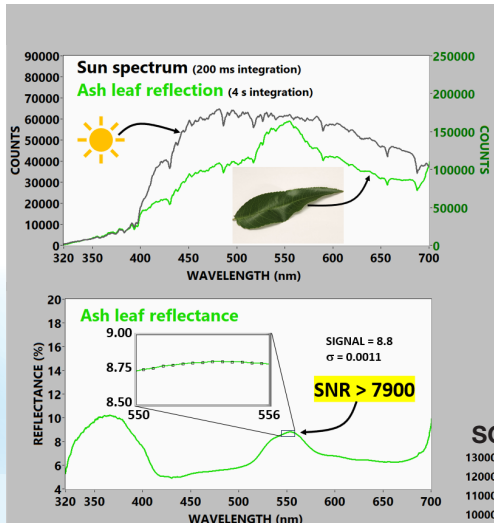
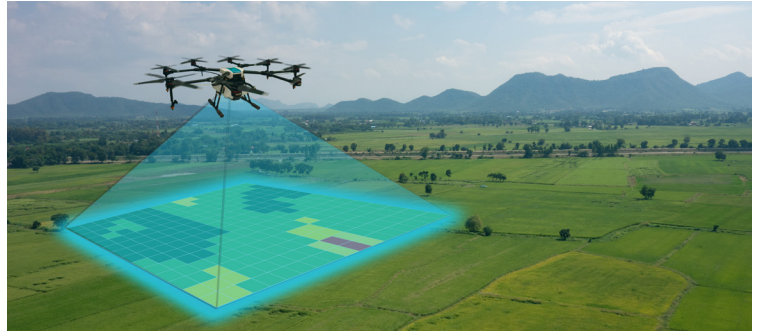


Hg-Ar Light Source Spectrum (14 μm slit width)

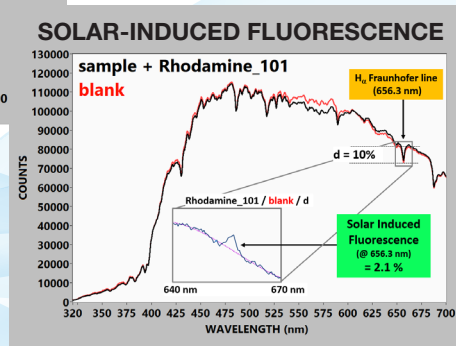


Application Examples

- Agriculture
- Environment
- Energy



Single Shot Measurements!
VS70-PDA-HDR
18-bit
Full Well up to 1Ge!

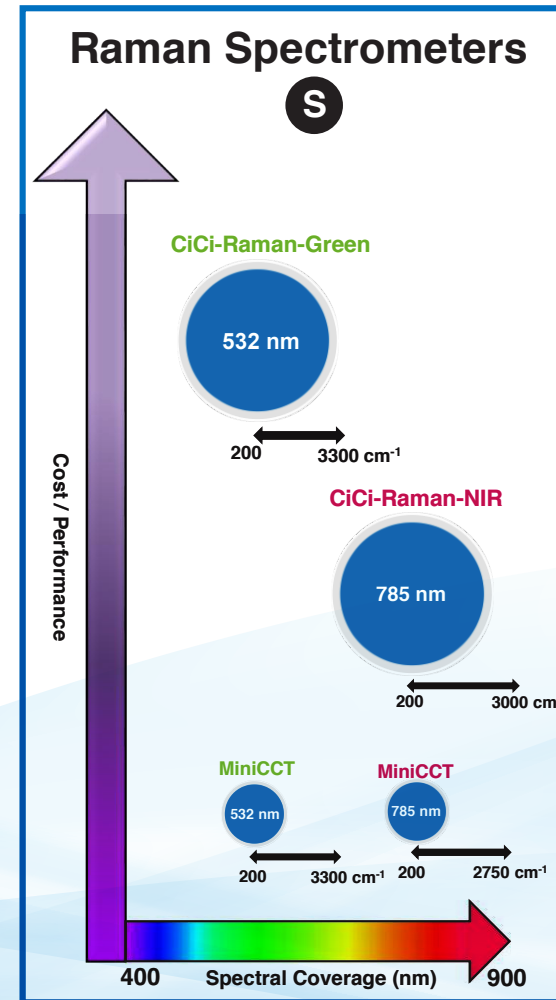
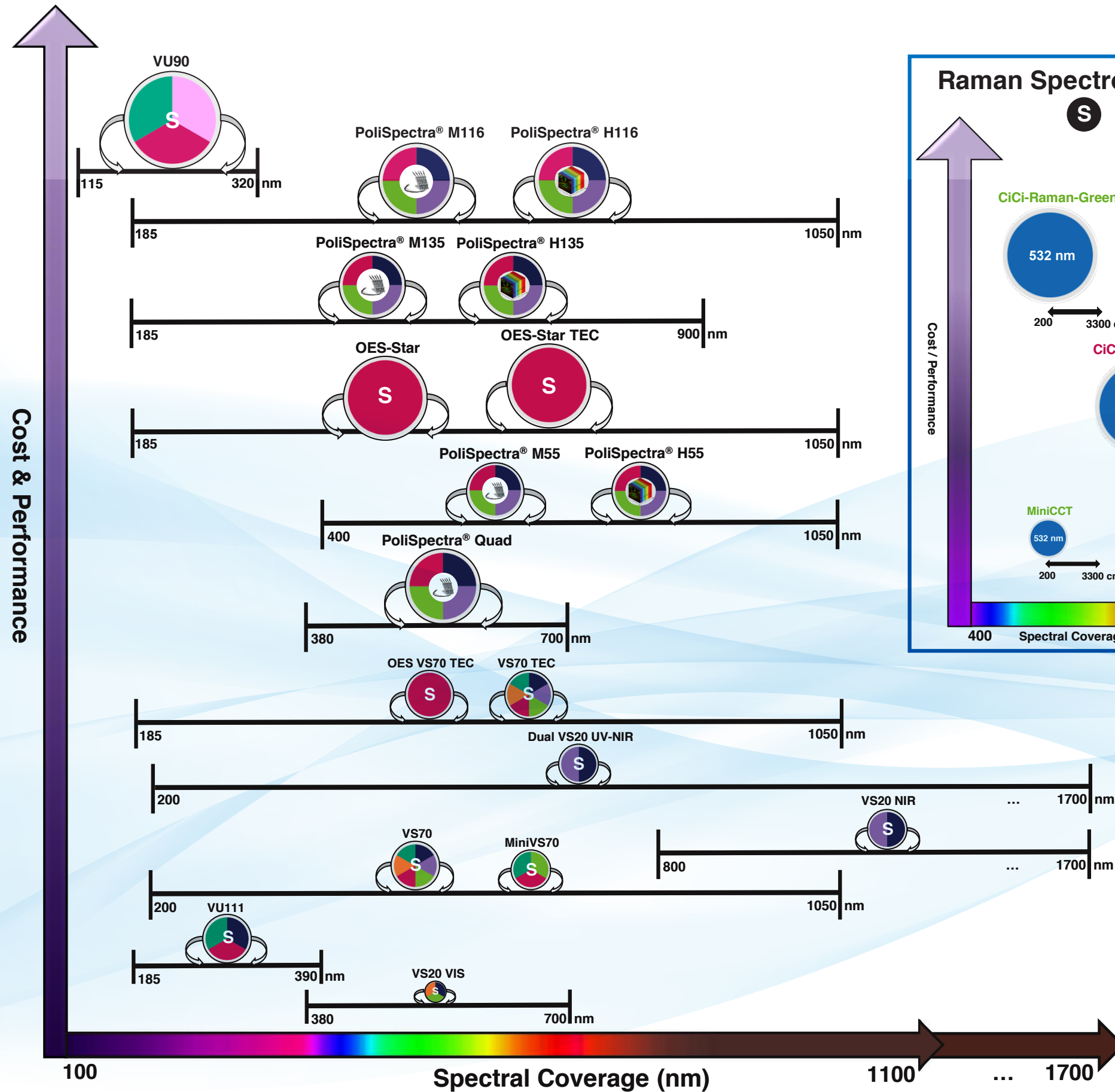


- Semiconductors

- Pharmaceuticals & life science
- Hematology
- HPLC/UPLC
- Water quality analysis



OEM Spectrometer Selection Guide



Legend

Spectrometer Input Type

- S** Single-fiber Input
- Multi-fiber Input
- Hyperspectral Imager

Technique & Application

- Emission (OES)
- Absorbance
- Fluorescence
- Reflectance
- Raman
- Metrology
- Photoluminescence
- Colorimetry

Spectrometer Size

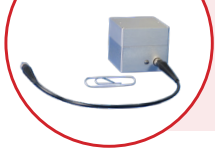
- ≤ 10.5x9x7 inches
- ≤ 8x8x8 inches
- ≤ 7.5x4.5x5 inches
- ≤ 7.5x4.5x3 inches
- ≤ 6x6x7.5 inches
- ≤ 5x5x5 inches
- ≤ 5x5x2 inches
- ≤ 2x2x2 inches

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

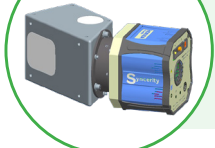


Compact, versatile most popular VS70 OEM spectrometer and OES configurations

- 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 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.

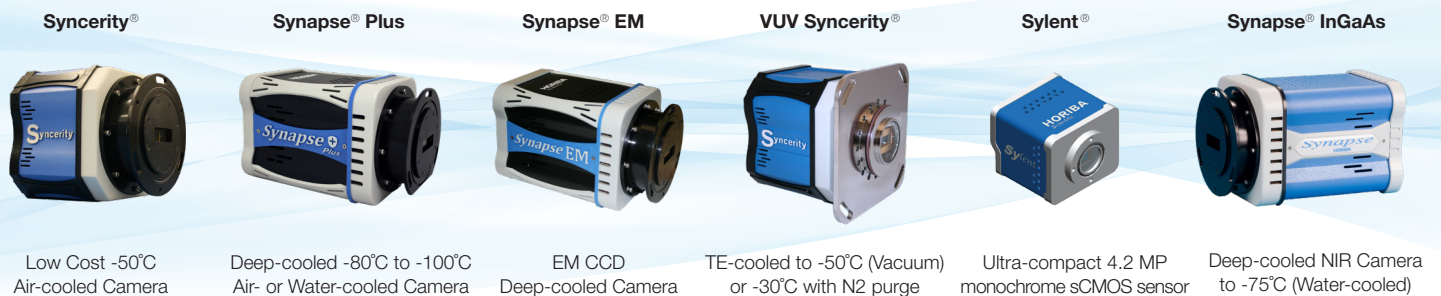
Unmatched customer service is provided by our exceptionally experienced workforce featuring on-time delivery and flexibility, allowing scheduling modifications.

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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