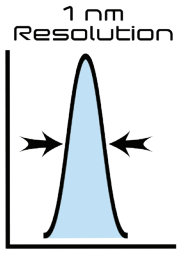
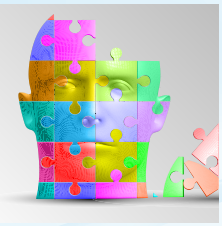
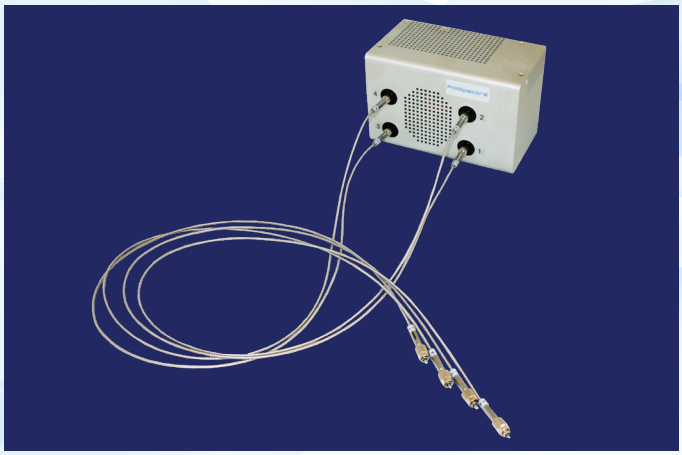
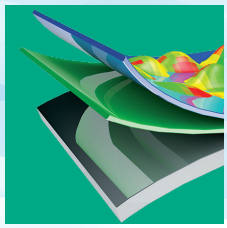
HORIBA
Scientific

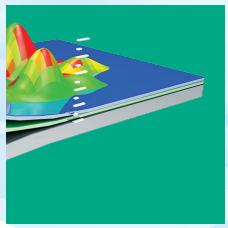


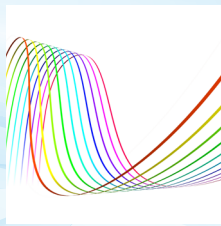
PoliSpectra® Quad Spectrometer











For OEM Industrial Applications

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JOBIN YVON Technology

PoliSpectra® Quad

Overview

HORIBA's OEM PoliSpectra Quad spectrometer is an integration of four VS70 spectrometers built around HORIBA JY Type-IV flat-field aberration-corrected holographic concave gratings. This high throughput VIS spectrometer with 4 fiber inputs provides simultaneous acquisition of 4 channels at high speed with minimal crosstalk. The main electronics board is designed to read the two CCDs on the system simultaneously, and provides 1-8X binning capability. This OEM system is a unique and innovative approach to drastically reduce the cost per channel.

Applications

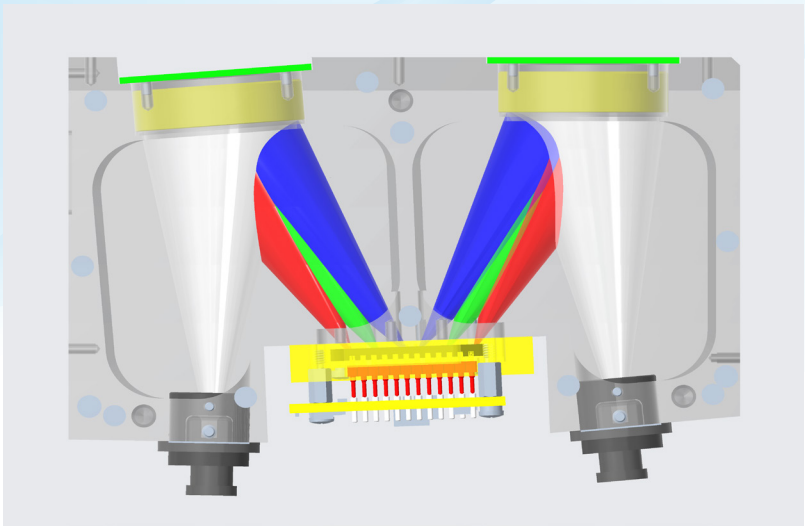
Ideal for Industrial Low-light Applications:

- Fluorescence
- Emission (OES)
- Absorbance
- Reflectance

Examples:

- Body Fluids Analysis
- Flow Cytometry
- LED Testing, Colorimetry
- Food Analysis Moisture Content

Optical and Mechanical Layout



Tens of years ago, colorimetry, and other reflectance applications, required the monitoring of a lamp in parallel of a sample. HORIBA (then I.S.A. Jobin-Yvon) had met the challenge with its line of spectrographs, built around aberration-correction holographic gratings. Continuing its tradition of designing and manufacturing dual concave grating spectrometers, in which the 2 spectra are adjacent and share a PDA linear array or a 2D sensor, HORIBA has also been producing QUAD Spectra versions. The above top view shows a Dual VS70 spectrometer layout, sharing the same CCD detector. The QUAD version contains two stacks of this housing assembly, which provide simultaneous acquisition from 4 fiber input channels. One input can be allocated to the monitoring of a lamp. Thanks to a single set of CCD or CMOS electronics controlling 2 or more sensors, the acquisitions are perfectly synchronized.

Features

Simultaneous acquisition of 4 channels

Excellent light purity with a typical 0.05% channel-to-channel crosstalk

Spectral acquisition time as low as 1.3 ms for all 4 channels

High throughput (f/2.3)

Ultra-low stray light with aberration correction holographic grating

High SNR and dynamic range

TTL in/out to trigger each, and all channels

Compact size, robustness, stability and affordability

General Spectrometer Specifications*

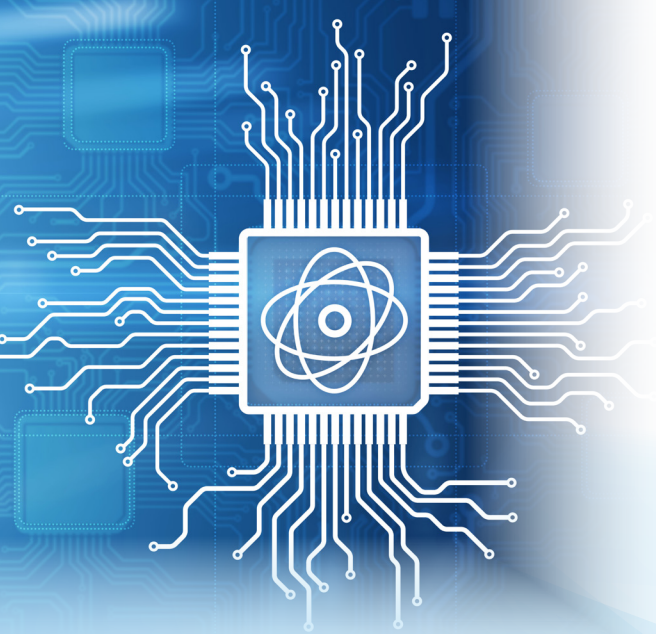
Spectral Coverage	470 to 730 nm; start/end wavelengths can be tuned
Spectrometer Input	FC (standard); other input types available upon request
Spectral Resolution	1.0 nm with 25 µm slit; 5 nm for Ø 200 µm fiber (no slit)
Average Spectral Dispersion	23.56 nm/mm; 0.33 nm/pixel (14 µm pixel CCD detector)
Crosstalk (channel-to-channel)	< 0.05% (typical)+ < 0.1% (maximum)
Focal Length	70 mm
F/#	~ F/2.3
Stray Light Rejection (< 590 nm or > 680 nm)	< 0.05 % (typical)
Wavelength Accuracy	< 0.25 nm (average between 500 nm and 710 nm)
Software	LabVIEW™ acquisition software for initial evaluation (DLLs provided for software integration)

Back-illuminated Linear CCD Detector

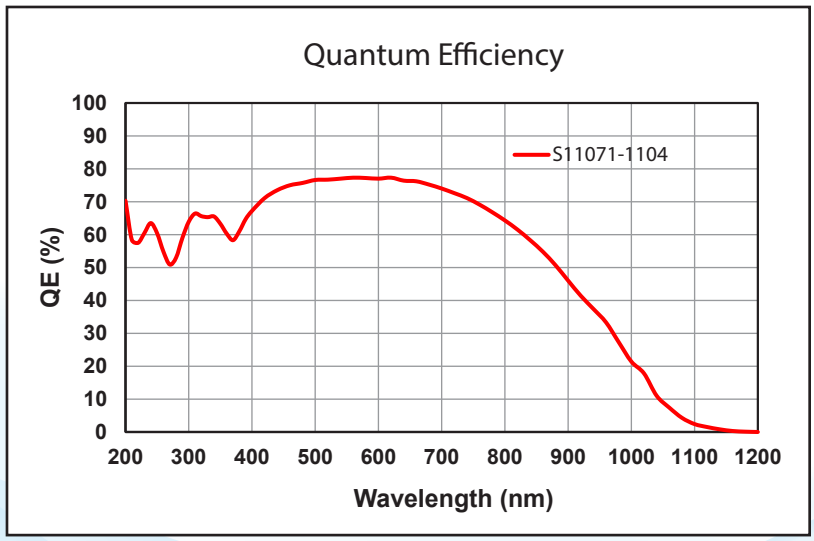
CCD Detector Model	Hamamatsu S11071-1104
CCD Sensor Format	2048 x 22 (2 spectra per CCD of about 1000 pixels each)
CCD Pixel Size	14 x 14 µm
CCD Height	0.3 mm
CCD QE at 20° C	QE = 63% at 250 nm; 76% at 650 nm; 55% at 850 nm
Pixel Scan Rate	2 MHz
Full Well Capacity	> 175,000 e^-/pixel (minimum); 240,000 e^-/pixel (typical)
Readout Noise	23 e^- (typical) to 35 e^- (maximum)
Maximum Spectral Rate	720 spectra/s with 0 ms exposure time (with fast CCD option)
Digitization	16-bit ADC
Dynamic Range (typical for single pixel)	6,800:1 (typical)
Non-linearity (measured on each system)	0.4% (corrected)
Dark Current at +25° C Note: Pixel Size = 14 µm	50 e^-/pixel/s (typical) 500 e^-/pixel/s (maximum)
Communication	USB 2
Environmental Conditions	Operating temperature 15° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -20° C to +60° C
Power Requirements AC/DC Power Supply (provided)	90-264 VAC, 47–63 Hz, 24 VDC

+ This value includes optical and electronic crosstalk

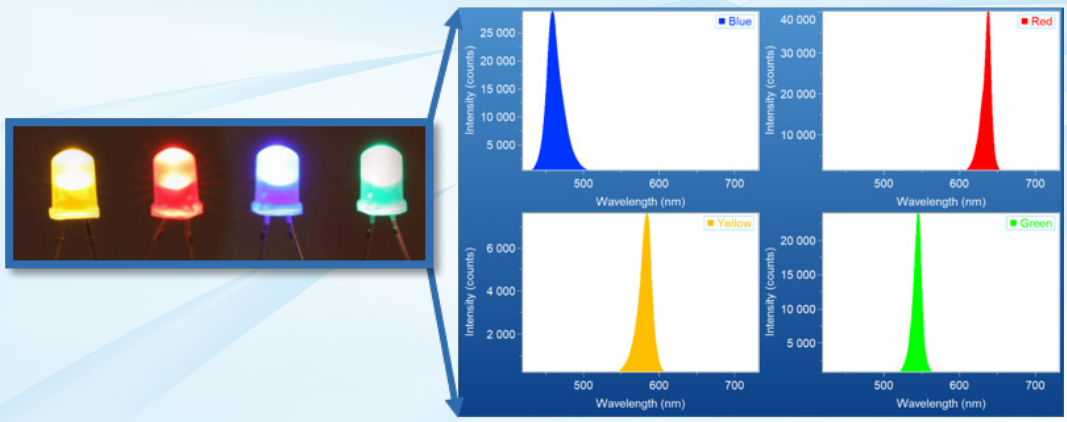
*Specifications, form factor, and spectrometer cover subject to change without notice.
No LabVIEW™ license is needed to run our acquisition software.



CCD Quantum Efficiency



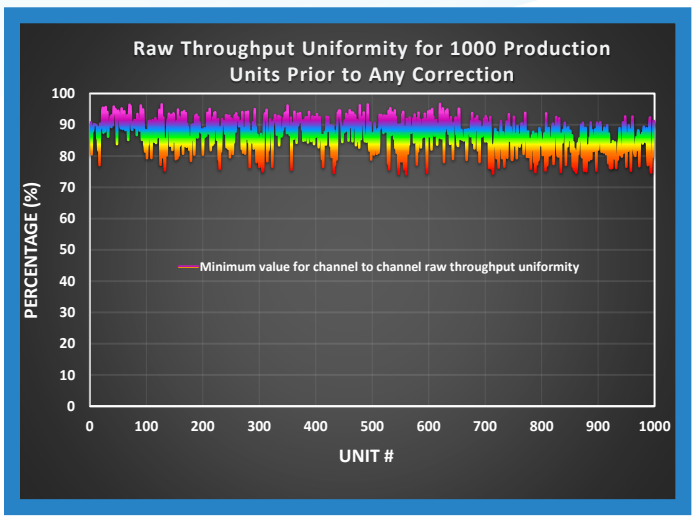
Simultaneous Measurement of 4-color LED Array Spectra with PoliSpectra Quad Spectrometer



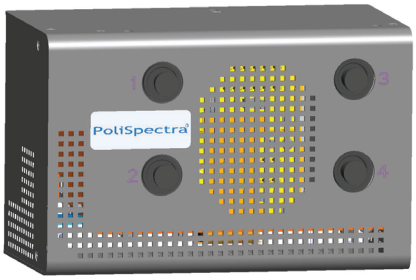
PoliSpectra Quad Spectrometer is capable of simultaneously measuring 4 channels of 1024 pixels spectra. The picture above shows the emission spectra of 4 different color LEDs measured using Ø 200 µm core fibers.

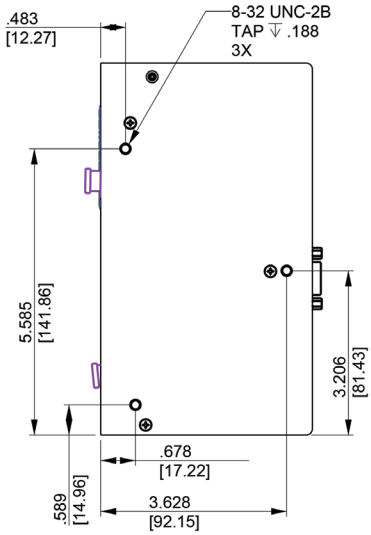
Raw Throughput Uniformity

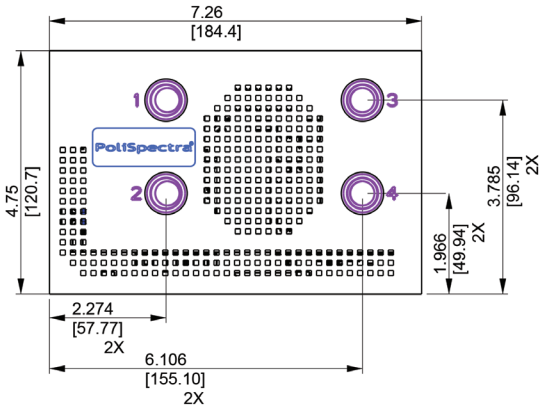
Raw throughput uniformity of better than 75% for 1000 production units measured channel-to-channel.

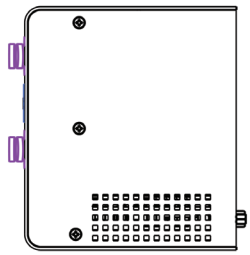


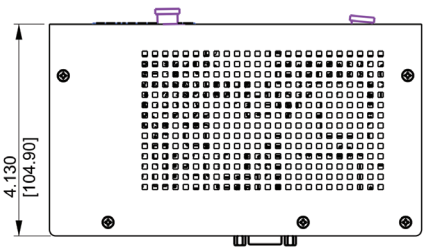
System Mechanical Drawings

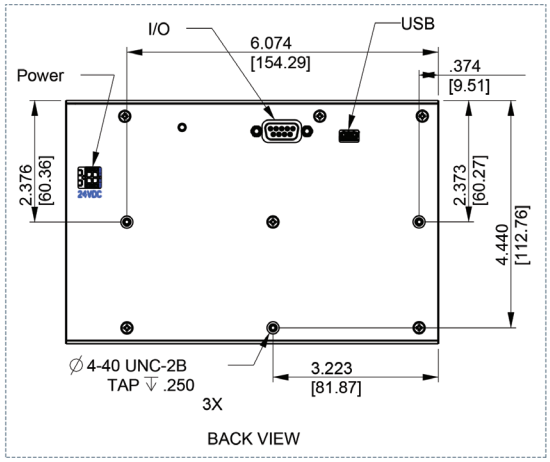










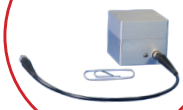


Best Selling Miniature Spectrometers for OEM Industrial Applications

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)

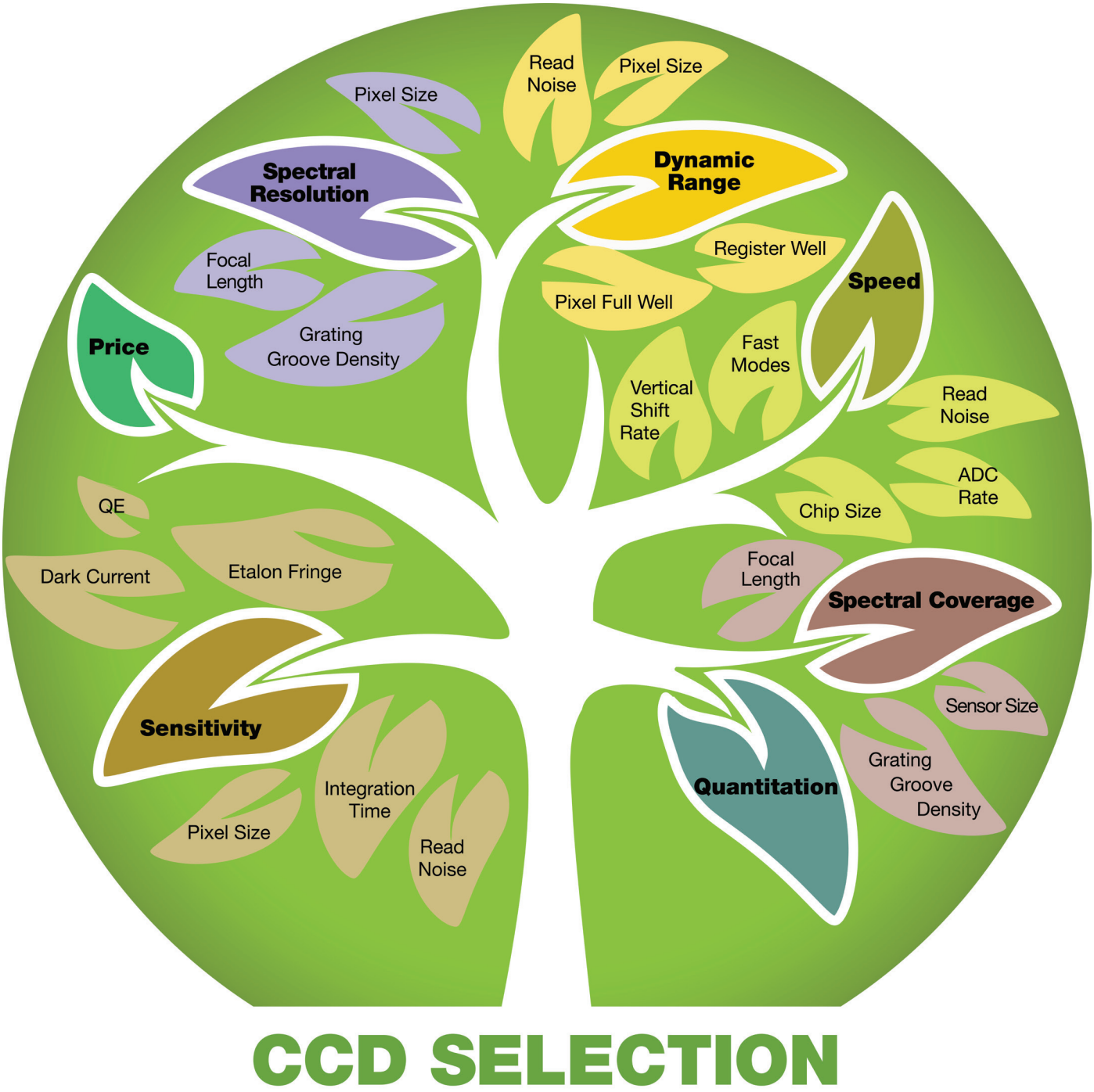
PoliSpectra® H116 Imaging Spectrometer for Hyperspectral Work from UV to NIR

Free-space coupled
1 nm & 40 µm resolution

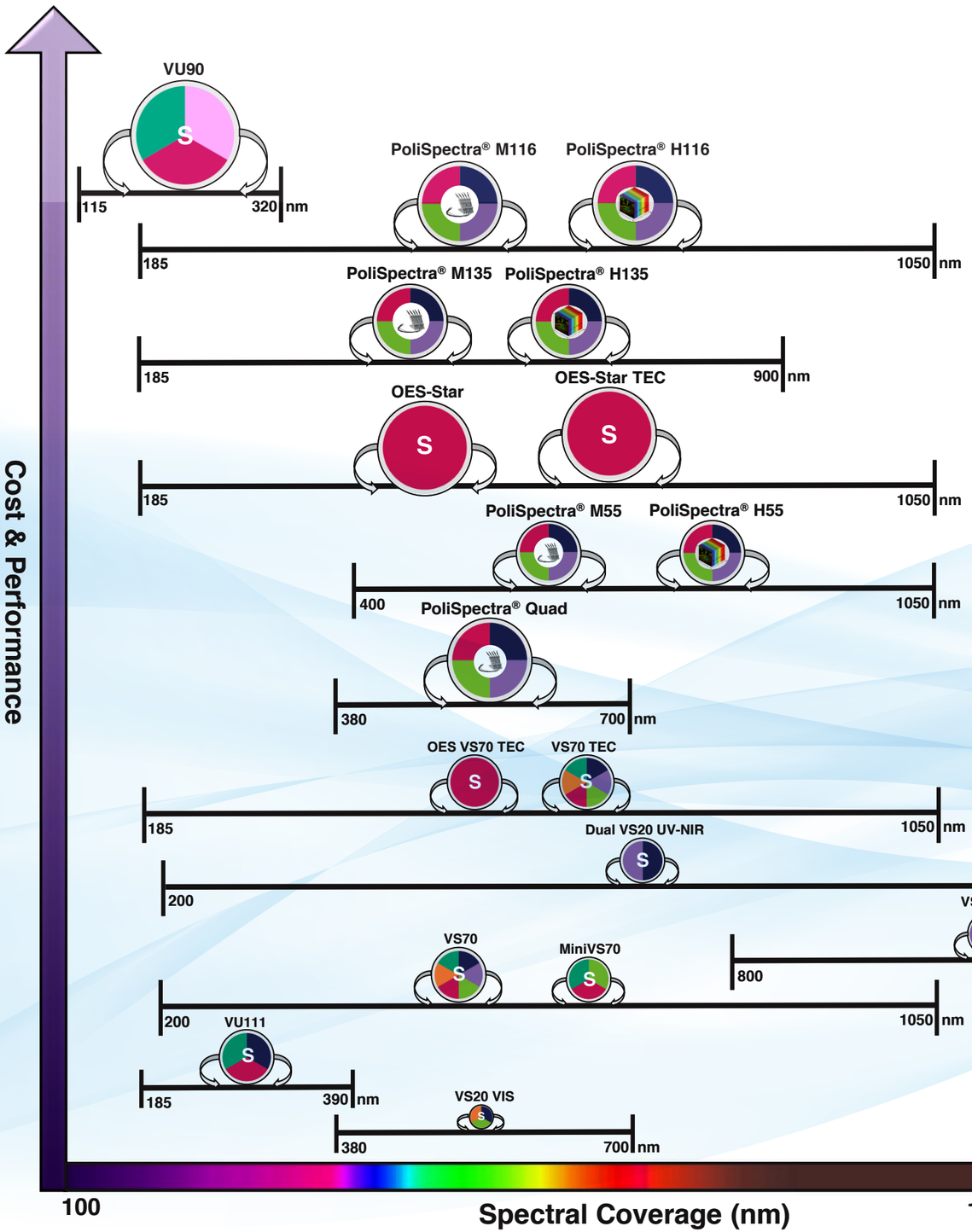
Ultra-high performance rugged spectrometer for hyperspectral imaging with a 2D sCMOS Camera

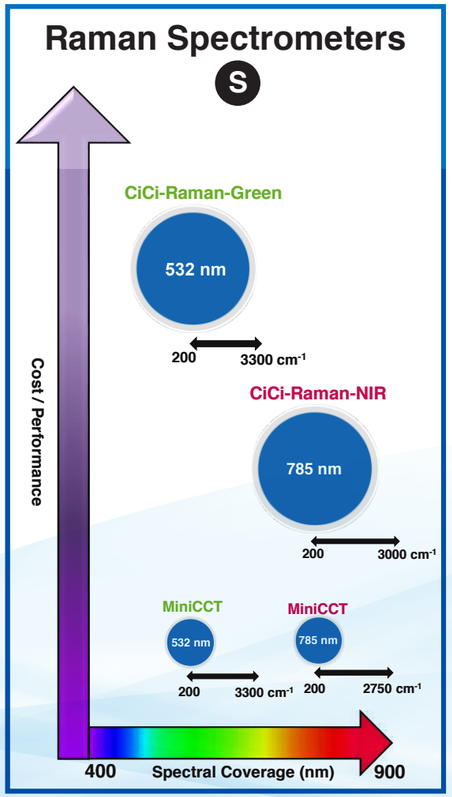
- For line-image scanning, in a push-broom hyperspectral configuration
- High throughput, USB-3 system featuring a fast 2D scientific BI CMOS with rolling shutter, running at 94 (HDR) to 188 (Standard Mode) frames per second (2048 pixels per spectrum)

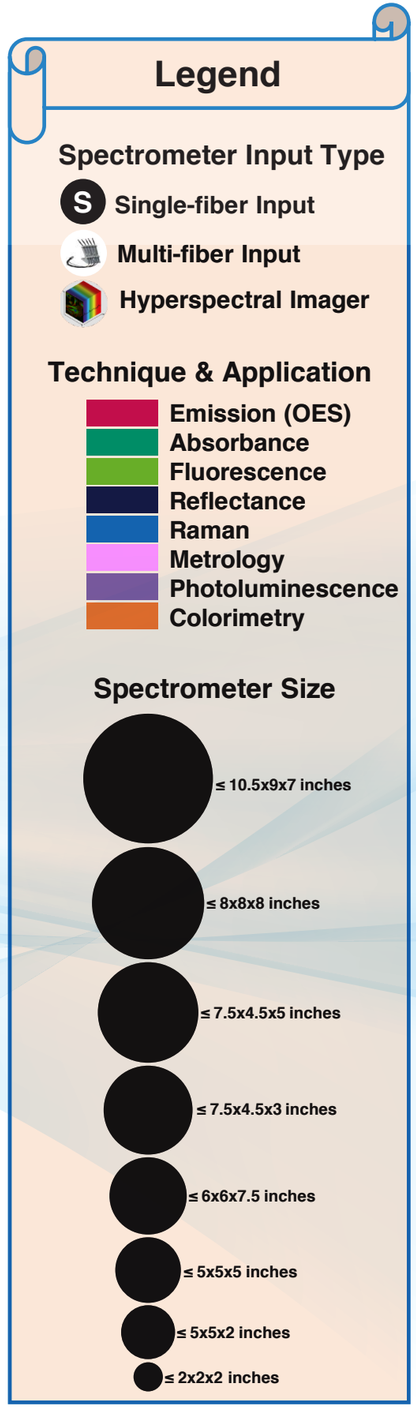
CCD Selection Guide



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 -50° C Air-cooled OEM Camera	Deep-cooled -80° C to -100° 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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