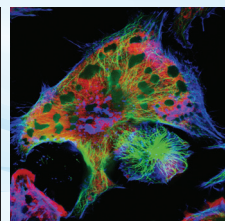
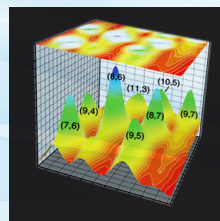
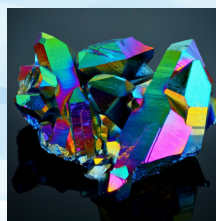
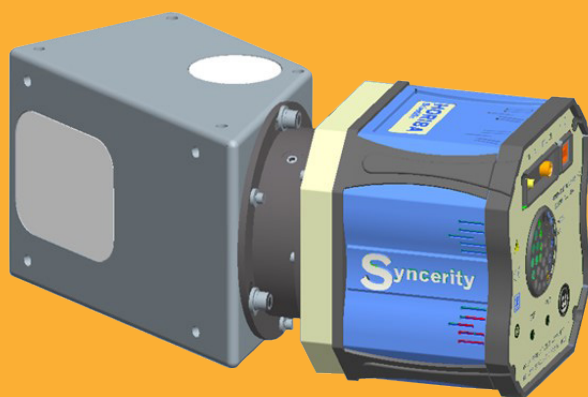


## CiCi-Raman-NIR Spectrometer



For OEM  
Industrial Applications

# CiCi-Raman-NIR Spectrometer

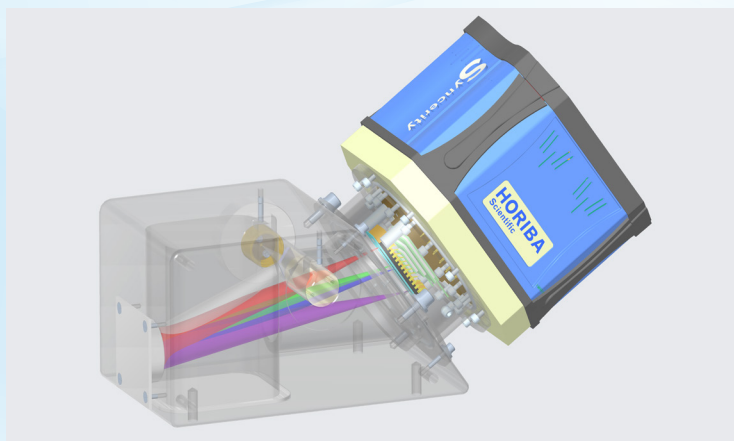
## Overview

HORIBA Scientific is the world leader in Raman spectroscopy, with a long history in the technique. HORIBA OEM has pioneered Raman systems for spectroscopy, designing and manufacturing them for over four decades. We provide miniature spectrometers and systems for industrial applications such as process control, security, pharmaceutical, medical and semiconductor. The CiCi-Raman-785 is our high performance spectrometer featuring an aberration-corrected concave holographic grating configured with Horiba Scientific's Sincerity™ TE-cooled CCD camera with a VIS-NIR 2048 x 70 detector, in a TE-cooled Head at -50° C.

## Applications

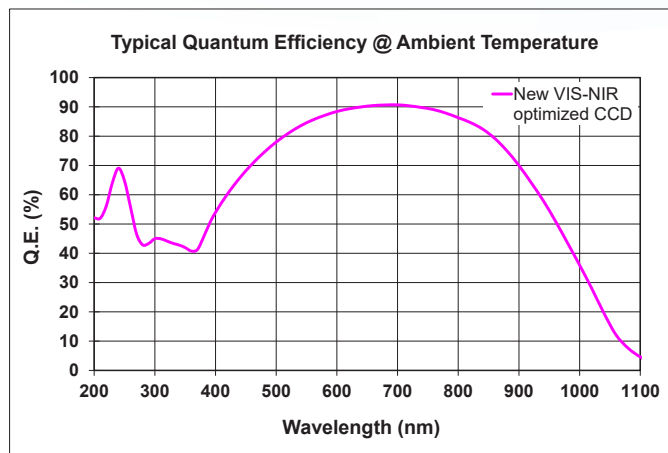
- Process Control
- Pharmaceuticals and Cosmetics
- Geology and Mineralogy
- Carbon Materials
- Life Sciences
- Forensic and Security
- Semiconductor
- Food and Beverage Safety

## Optical and Mechanical Layout



CiCi-Raman-NIR sturdy optical housing with TE-cooled Sincerity CCD detector.

## Quantum Efficiency of the CCD Detector



## Features

**Rugged design for ultra-high stability and in-situ monitoring**

**Deep cooled CCD with high quantum efficiency**

**Super long exposure time**

**Selectable high resolution or high throughput configuration**

**Competitively priced**

**Available for 785 nm and 532 nm excitation wavelengths**

**Stable and robust**

## General Compact Raman Spectrometer Specifications

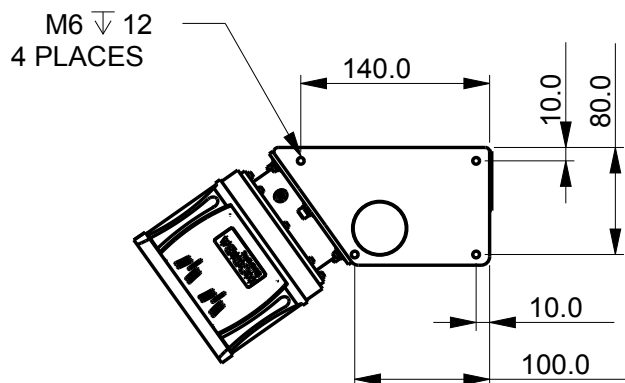
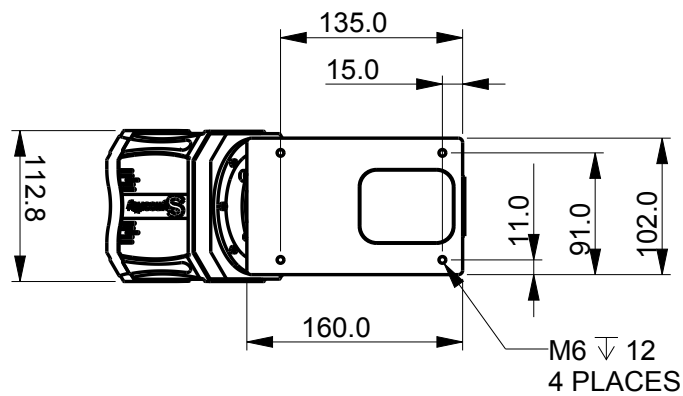
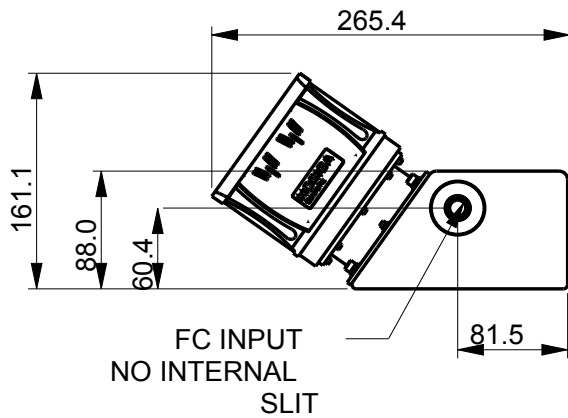
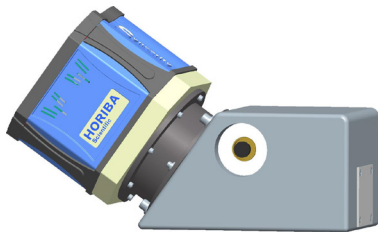
Spectral Coverage	785 - 1060 nm (Also available: 532 nm optimized spectrometer) 150 to > 3300 $\text{cm}^{-1}$ (Note: low limit depends on Raman probe)
Spectrometer Input	0.1 NA fiber for F/5 version 0.22 NA fiber for F/2.3 version
Spectral Resolution (at F/5)	< 0.6 nm from 780 nm to 965 nm < 1.5 nm from 965 nm to 1,060 nm 6 $\text{cm}^{-1}$ at 1777 $\text{cm}^{-1}$ 7 $\text{cm}^{-1}$ at 2518 $\text{cm}^{-1}$
Focal Length	140 mm
Optical Dispersion	9.77 nm/mm; 0.137 nm/pixel
Stray Light	< 0.1% (typical)
Wavelength Accuracy	0.025 nm
F#	F/2.3 (for highest sensitivity) F/5 (for the most compact and highest resolution configuration)
Software	Basic LabVIEW acquisition software for evaluation. See our optional <a href="#">LabSpec</a> software. (DLLs provided for software integration)

## OEM SYNCERITY™ Scientific Camera with 2048 x 70 – VIS-NIR Optimized CCD\*

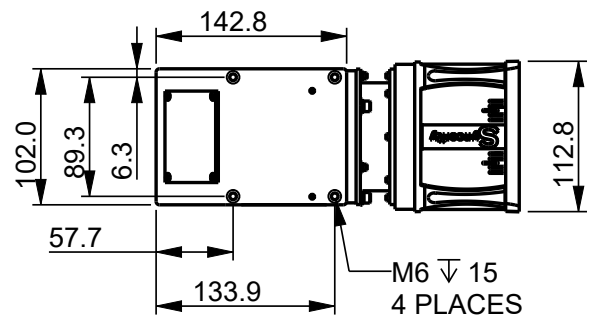
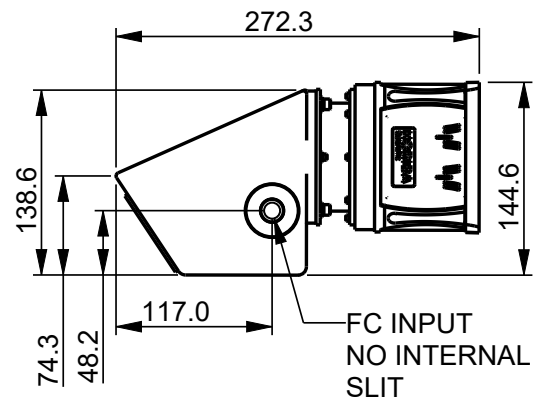
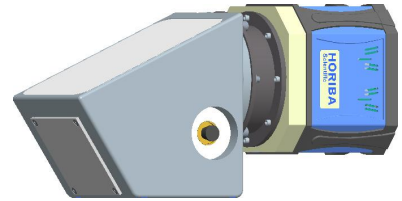
Quantum Efficiency at 20° C	New VIS-NIR Optimized CCD (Also available: 532 nm optimized spectrometer)
CCD Sensor Format	2048 x 70
CCD Pixel Size	14 x 14 $\mu\text{m}$
CCD Height	1 mm
CCD QE at 20° C	88% at 600 nm; 90% at 700 nm; 86% at 800 nm 70% at 900 nm; 36% at 1000 nm; 15% at 1,050 nm See curve on the previous page.
Deep Thermoelectric Cooling	-50° C @ +25° C ambient or -40° C @ +40° C ambient. Yields low dark current suitable for most OEM and many research applications
Single Pixel Well Capacity	50,000 $\text{e}^-/\text{pixel}$ (minimum); 60 000 $\text{e}^-/\text{pixel}$ (typical)
Serial Register Full Well Capacity	250,000 $\text{e}^-/\text{pixel}$ (minimum); 500 000 $\text{e}^-/\text{pixel}$ (typical output register saturation)
Scan Rates	45 kHz and 500 kHz
Readout Noise (at 45 kHz and at -50° C	10 $\text{e}^-$ (typical) to 12 $\text{e}^-$ (maximum)
Readout Noise (at 500 kHz and at -50° C)	20 $\text{e}^-$ (typical) to 25 $\text{e}^-$ (maximum)
Dynamic Range (typical)	55,500:1
Maximum Spectral Rate	20 Hz at 45 kHz scan rate; 189 Hz at 500 kHz scan rate
Digitization	16-bit ADC
Non-linearity (measured on each camera)	<0.15% (typical) at 45 kHz (0.4% maximum) <0.20% (typical) at 500 kHz (1% maximum)
Dark Current at -50° C Note: Pixel Size = 14 $\mu\text{m}$	0.025 $\text{e}^-/\text{pixel/s}$ (typical)
Software-adjustable Gains	2, 4, and 10 $\text{e}^-/\text{count}$ at -50° C
Communication	USB 2
Environmental Conditions	Operating temperature 0° C to 40° C ambient Relative humidity <70% (non-condensing) Storage temperature -25° C to 45° C
Power Requirements AC/DC Power Supply (provided)	90-264 VAC, 47-63 Hz

# System Mechanical Drawings

F/5 version drawing



F/2.3 version drawing



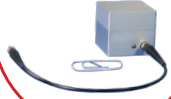
All dimensions in mm

# 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

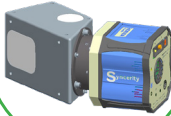


Compact, versatile most popular VS70 OEM spectrometer and OES configurations

- 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<sup>-1</sup> resolution



Most compact OEM Raman spectrometer with aberration-corrected holographic grating

- Covers 150-3,300 cm<sup>-1</sup>
- 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  $\mu$ m resolution

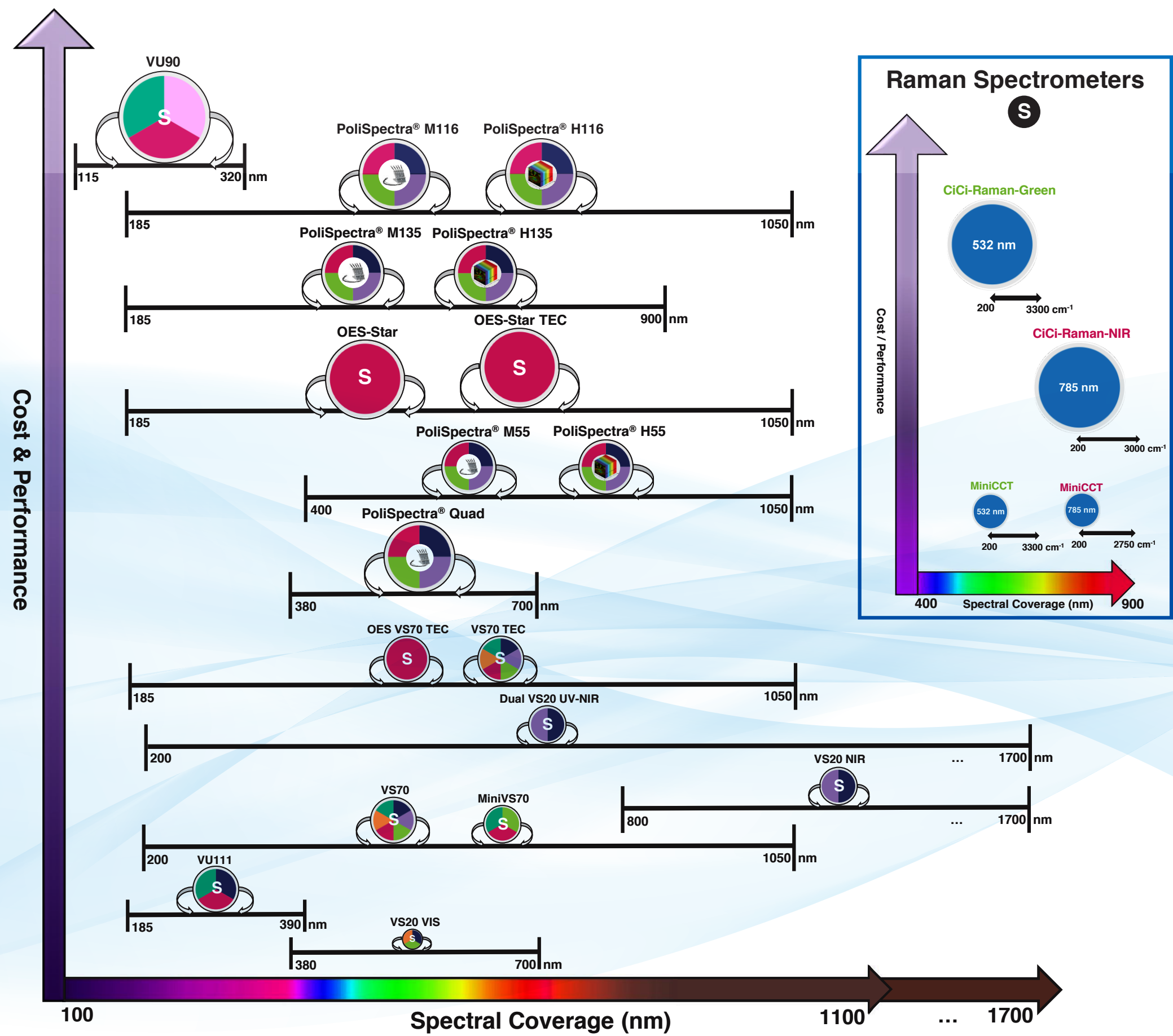


Ultra-high performance rugged spectrometer for hyperspectral imaging with a 2D sCMOS Camera

- 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



Contact us in one of our centers of excellence	USA & Canada	Japan	Europe & Asia
	<a href="mailto:OEM.US@horiba.com">OEM.US@horiba.com</a>	<a href="mailto:OEM.JAPAN@horiba.com">OEM.JAPAN@horiba.com</a>	<a href="mailto:OEMSALES.JYFR@horiba.com">OEMSALES.JYFR@horiba.com</a>
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