

AvaSpec-NIR256/512-1.7-EVO

NIRLine Near-Infrared Fiber-optic Spectrometer

For measurements in the near infrared range out to 1.7 μm , Avantes offers a new series of uncooled spectrometer configurations. The AvaSpec-NIR256-1.7-EVO and the AvaSpec-NIR512-1.7-EVO offer the same high sensitivity optical bench with the next generation of electronics. Both instruments deliver the same exceptional performance specifications such as a sample speed of only 0.53 ms/scan and integration times as fast as 20 μs , as the Avantes instruments you have come to trust.

For applications where resolution is key, or more datapoints for modelling is required, the 512 pixel detector will be the best choice.

The AvaSpec-NIR256/512-1.7-EVO spectrometers pair the same trusted InGaAs array detectors with our ultra low-noise electronics board featuring USB3 and Giga-Ethernet connection port. Digital and analog I/O ports enable external triggering and control over the shutter and pulsed lightsources and choose from two distinct software-controlled gain-setting modes, high-sensitivity mode (HS, default) and the low-noise (LN) mode.

These affordable uncooled instruments are USB powered and are available with a choice of four gratings and replaceable slits to match the bandwidth and requirements fitting your application.

AvaSpec-NIR256-1.7-EVO



Technical Data

Spectrometer	AvaSpec-NIR256-1.7-EVO	AvaSpec-NIR512-1.7-EVO
Optical Bench	Symmetrical Czerny-Turner, 50 mm focal length,	
Wavelength range	900-1750 nm	
Resolution (slit & grating dependent)	2-50 nm	
Stray-light	<1%	
Sensitivity HS in counts /μW per ms	8,200,000 (integral 1000-1750 nm)	3,880,000 (integral 1000-1750 nm)
Dynamic Range HS	6000:1	
Integration time HS	10 μs -500 ms	
Signal/Noise HS	1900:1	
Sensitivity LN in counts /μW per ms	469,000 (integral 1000-1750 nm)	222,000 (integral 1000-1750 nm)
Dynamic Range LN	9000:1	
Integration time LN	10 μs -10 s	
Signal/Noise LN	5000:1	
Detector	InGaAs linear array, 256 pixels, 50 μm x 500 μm	InGaAs linear array, 512 pixels, 25 μm x 500 μm
AD converter	16-bit, 500 kHz	16-bit, 500 kHz
Interface	USB3.0 high speed, 5 Gbps, Gigabit Ethernet 1 Gbps	
Sample speed with store to RAM	0.53 ms/scan	
Data transfer speed	0.53 ms/scan (USB3)	
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 13 Digital IO bi-directional, trigger, synchronization, strobe, laser	
Power supply	Default USB power, 600 mA or external 12VDC, 320mA (4W)	
Dimensions, weight	185 x 100 x 184 mm, 2.7 kg	

Grating Selection Table for AvaSpec-NIR256/512-1.7-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
		256/512			
NIR	900-1750	850	200	1500	NIR200-1.5
NIR	1000-1700	340	400	1600	NIR400-1.6
NIR	900-1400	200	600	1200	NIR600-1.2
NIR	1300-1600	152	600	1600	NIR600-1.6

Resolution Table (FWHM in nm) for AvaSpec-NIR256/512-1.7-EVO

Grating (lines/mm)	Slit size (μm)				
	25*	50	100	200	500
200	6	8	12	22	50
400	2.5	3	6	12	25
600	n.a.	2	4	8	18

* only for AvaSpec-NIR512

Ordering Information

AvaSpec-NIR256-1.7-EVO	<ul style="list-style-type: none"> Fiber-optic Spectrometer, 50 mm AvaBench, 256 pixel InGaAs detector, high-speed USB3 and ETH interface, with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3. Specify grating, wavelength range and slit
AvaSpec-NIR512-1.7-EVO	<ul style="list-style-type: none"> Fiber-optic Spectrometer, 50 mm AvaBench, 512 pixel InGaAs detector, high-speed USB3 and ETH interface, with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3. Specify grating, wavelength range and slit
PS-12V/1.0A	<ul style="list-style-type: none"> External power supply, needed for operation in ETH mode

Options

SLIT-XX-RS	<ul style="list-style-type: none"> Replaceable slit with SMA connector, specify slit size XX=25*, 50, 100 or 200 μm
SLIT-XX-RS-FCPC	<ul style="list-style-type: none"> as SLIT-XX-RS, but with FC/PC connector

* only for AvaSpec-NIR512

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Did you know the AvaSpec-NIR256-1.7-EVO has a little brother? Our new AvaSpec-Mini-NIR uses the same detector as the AvaSpec-NIR256-1.7-EVO, but in a much smaller package! This makes the AvaSpec-Mini-NIR perfect for OEM use and integration into handheld devices. Check it out on page 31!

AvaSpec-NIR256/512-1.7-HSC-EVO NIRLine Cooled Near-Infrared Fiber-optic Spectrometer

For measurements in the near infrared range out to 1.7 μm , Avantes offers a new series of cooled spectrometer configurations. The AvaSpec-NIR256-1.7-HSC-EVO and the AvaSpec-NIR512-1.7-HSC-EVO offer the high sensitivity 100mm optical bench (HSC) with the next generation of electronics (EVO). Both instruments deliver exceptional performance specifications such as a high sample speed and integration times as fast as 20 μs , as the Avantes instruments you have come to trust.

For applications where resolution is key, or more datapoints for modelling is required, the 512 pixel detector will be the best choice.

The AvaSpec-NIR256/512-1.7-HSC-EVO spectrometers pair the same trusted InGaAs

array detectors with our ultra low-noise electronics board featuring USB3 and Giga-Ethernet connection port. The instruments are standard equipped with a Replaceable Slit. Digital and analog I/O ports enable external triggering and control over the shutter and pulsed lightsources and choose from two distinct software-controlled gain-setting modes, high-sensitivity mode (HS, default) and the low-noise (LN) mode.

Cooling ensures optimal noise condition even at longer integration times. All NIR-1.7 instruments are available with a choice of four different gratings, making it possible to choose the bandwidth fitting your application.

AvaSpec-NIR256-1.7-HSC-EVO



Technical Data

Spectrometer	AvaSpec-NIR256-1.7-HSC-EVO	AvaSpec-NIR512-1.7-HSC-EVO
Optical Bench	Symmetrical Czerny-Turner, 100 mm focal length, 1 stage TE-cooled	
Wavelength range	900-1750 nm	
Resolution (slit & grating dependent)	1.9-32 nm	1.7-32 nm
Stray-light	<1%	
Sensitivity HS in counts /μW per ms	4.800.000 (integral 1000-1750 nm)	2.500.000 (integral 1000-1750 nm)
Dynamic Range HS	4900:1	
Signal/Noise HS	1900:1	
Integration time HS	20 μs -500ms	
Sensitivity LN in counts /μW per ms	160.000 (integral 1000-1750 nm)	83.000 (integral 1000-1750 nm)
Dynamic Range LN	7600:1	
Signal/Noise LN	5000:1	
Integration time LN	20 μs -20 s	
Detector	TE-cooled InGaAs linear array, 256 pixels, 50 μm x 500 μm	TE-cooled InGaAs linear array, 512 pixels, 25 μm x 500 μm
AD converter	16-bit, 1,2 MHz	
Interface	USB3.0 high speed, 5 Gbps, Gigabit Ethernet 1 Gbps	
Sample speed with store to RAM	0.13 ms/scan	0.24 ms/scan
Data transfer speed	0.4 ms/scan (USB3)	0.53 ms/scan (USB3)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 13 Digital IO bi-directional, trigger, synchronization, strobe, laser	
Power supply	12VDC, 12W	
Operating temperature	0-40°C	
Cooling	25°C versus ambient	
Dimensions, weight	185 x 160 x 184 mm, 3.6 kg	

Grating Selection Table for AvaSpec-NIR256/512-1.7-HSC-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
		256/512			
NIR	900-1700	800	150	1250	NIR150-1.2
NIR	900-1700	380-310*	300	1200	NIR300-1.2
NIR	900-1700	262-230*	400	1200	NIR400-1.2
NIR	960-1700	262-230*	400	1600	NIR400-1.6

*depends on the starting wavelength of the grating; the higher the wavelength, the bigger the dispersion and the smaller the range to select.

Resolution Table (FWHM in nm) for AvaSpec-NIR256/512-1.7 HSC- EVO

Grating (lines/mm)	Slit size (μm)				
	25*	50	100	200	500
150	4.0	5.7	7.0	12.8	32
300	1.8	2.3	3.0	4.0	10
400	1.7	1.9	2.5	3.3	8.3

* only for AvaSpec-NIR512

Ordering Information

AvaSpec-NIR256-1.7-HSC-EVO

- Fiber-optic Spectrometer, 100 mm AvaBench, 256 pixel InGaAs detector with 1-stage TE cooling, high-speed USB3 and ETH interface with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3. Specify grating, wavelength range and slit.

AvaSpec-NIR512-1.7-HSC-EVO

- Fiber-optic Spectrometer, 100 mm AvaBench, 512 pixel InGaAs detector with 1-stage TE cooling, high-speed USB3 and ETH interface with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3. Specify grating, wavelength range and slit.

Options

SLIT-XX-RS

- Replaceable slit with SMA connector, specify slit size XX=25*, 50, 100, 200 or 500 μm

SLIT-XX-RS-FCPC

- as SLIT-XX-RS, but with FC/PC connector

* only for AvaSpec-NIR512

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For external triggering Avantes offers the AvaTrigger featuring optical triggering, external TTL or manually through the pushbutton.

AvaSpec-NIR256/512-1.7-HSC-EVO NIRLine Cooled Near-Infrared Fiber-optic Spectrometer

For measurements in the near infrared range out to 1.7 μm , Avantes offers a new series of cooled spectrometer configurations. The AvaSpec-NIR256-1.7-HSC-EVO and the AvaSpec-NIR512-1.7-HSC-EVO offer the high sensitivity 100mm optical bench (HSC) with the next generation of electronics (EVO). Both instruments deliver exceptional performance specifications such as a high sample speed and integration times as fast as 20 μs , as the Avantes instruments you have come to trust.

For applications where resolution is key, or more datapoints for modelling is required, the 512 pixel detector will be the best choice.

The AvaSpec-NIR256/512-1.7-HSC-EVO spectrometers pair the same trusted InGaAs

array detectors with our ultra low-noise electronics board featuring USB3 and Giga-Ethernet connection port. The instruments are standard equipped with a Replaceable Slit. Digital and analog I/O ports enable external triggering and control over the shutter and pulsed lightsources and choose from two distinct software-controlled gain-setting modes, high-sensitivity mode (HS, default) and the low-noise (LN) mode.

Cooling ensures optimal noise condition even at longer integration times. All NIR-1.7 instruments are available with a choice of four different gratings, making it possible to choose the bandwidth fitting your application.

AvaSpec-NIR256-1.7-HSC-EVO



Technical Data

Spectrometer	AvaSpec-NIR256-1.7-HSC-EVO	AvaSpec-NIR512-1.7-HSC-EVO
Optical Bench	Symmetrical Czerny-Turner, 100 mm focal length, 1 stage TE-cooled	
Wavelength range	900-1750 nm	
Resolution (slit & grating dependent)	1.9-32 nm	1.7-32 nm
Stray-light	<1%	
Sensitivity HS in counts /μW per ms	4.800.000 (integral 1000-1750 nm)	2.500.000 (integral 1000-1750 nm)
Dynamic Range HS	4900:1	
Signal/Noise HS	1900:1	
Integration time HS	20 μs -500ms	
Sensitivity LN in counts /μW per ms	160.000 (integral 1000-1750 nm)	83.000 (integral 1000-1750 nm)
Dynamic Range LN	7600:1	
Signal/Noise LN	5000:1	
Integration time LN	20 μs -20 s	
Detector	TE-cooled InGaAs linear array, 256 pixels, 50 μm x 500 μm	TE-cooled InGaAs linear array, 512 pixels, 25 μm x 500 μm
AD converter	16-bit, 1,2 MHz	
Interface	USB3.0 high speed, 5 Gbps, Gigabit Ethernet 1 Gbps	
Sample speed with store to RAM	0.13 ms/scan	0.24 ms/scan
Data transfer speed	0.4 ms/scan (USB3)	0.53 ms/scan (USB3)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 13 Digital IO bi-directional, trigger, synchronization, strobe, laser	
Power supply	12VDC, 12W	
Operating temperature	0-40°C	
Cooling	25°C versus ambient	
Dimensions, weight	185 x 160 x 184 mm, 3.6 kg	

Grating Selection Table for AvaSpec-NIR256/512-1.7-HSC-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
		256/512			
NIR	900-1700	800	150	1250	NIR150-1.2
NIR	900-1700	380-310*	300	1200	NIR300-1.2
NIR	900-1700	262-230*	400	1200	NIR400-1.2
NIR	960-1700	262-230*	400	1600	NIR400-1.6

*depends on the starting wavelength of the grating; the higher the wavelength, the bigger the dispersion and the smaller the range to select.

Resolution Table (FWHM in nm) for AvaSpec-NIR256/512-1.7 HSC- EVO

Grating (lines/mm)	Slit size (μm)				
	25*	50	100	200	500
150	4.0	5.7	7.0	12.8	32
300	1.8	2.3	3.0	4.0	10
400	1.7	1.9	2.5	3.3	8.3

* only for AvaSpec-NIR512

Ordering Information

AvaSpec-NIR256-1.7-HSC-EVO

- Fiber-optic Spectrometer, 100 mm AvaBench, 256 pixel InGaAs detector with 1-stage TE cooling, high-speed USB3 and ETH interface with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3.
Specify grating, wavelength range and slit.

AvaSpec-NIR512-1.7-HSC-EVO

- Fiber-optic Spectrometer, 100 mm AvaBench, 512 pixel InGaAs detector with 1-stage TE cooling, high-speed USB3 and ETH interface with replaceable slit, incl. AvaSoft-Basic, USB interface cable, OSF-850/1000-3
Specify grating, wavelength range and slit.

Options

SLIT-XX-RS

- Replaceable slit with SMA connector, specify slit size XX=25*, 50, 100, 200 or 500 μm

SLIT-XX-RS-FCPC

- as SLIT-XX-RS, but with FC/PC connector

* only for AvaSpec-NIR512

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For external triggering Avantes offers the AvaTrigger featuring optical triggering, external TTL or manually through the pushbutton.

AvaSpec-NIR256/512-2.5-HSC-EVO

NIRLine Near-infrared Fiber Optic Spectrometer

AvaSpec-NIR256-2.5-HSC-EVO



The new and improved versions of our NIR spectrometers offer more sensitivity, less weight and less size. They are based on a 100mm optical bench with a NA of 0.13 offering optimal balance between resolution and sensitivity.

The 2.5-HSC series feature 256 or 512 pixel InGaAs detectors and are available in multiple configurations. These instruments are perfect for grain, corn, wheat, soya, polymers but also for medical uses, process monitoring and other analysis. The 256 pixel detectors offer best sensitivity for most applications.

For applications where resolution is key, or more datapoints for modelling is required, the 512 pixel detector will be the best choice.

Also available on the -HSC is the userselectable gain setting mode: LN(low-noise, standard setting), which gives you a longer integration time and higher signal to noise ratio, or HS (high-sensitivity) for measuring in lowlight conditions. Analog and digital IO ports enable external triggering and control of shuttered and pulsed light sources from the AvaLight series.

The EVO instruments use the AS7010 electronics board offering USB3 (10 times faster than USB2), Gigabit Ethernet and better signal processing.

Technical Data

Spectrometer platform	AvaSpec-NIR256-2.5-HSC-EVO	AvaSpec-NIR512-2.5-HSC-EVO
Optical Bench	TE-cooled Symmetrical Czerny Turner, 100 mm focal length	
Wavelength Range	1000-2500 nm	
Resolution (slit & grating dependent)	4.4-85.0 nm	2.6-85.0 nm
Pixel Dispersion (with NIR 075-1.7 grating)	6.2 nm	3.1 nm
Stray-light	<1.0%	
Sensitivity HS in counts / μ W per ms (1000-2500 nm)	990,000	480,000
Signal/Noise HS	1800:1	1900:1
Integration time HS	10 μ s-5 ms	
Sensitivity LN in counts / μ W per ms (1000-2500nm)	55,000	26,600
Signal/Noise LN	4000:1	3700:1
Integration time LN	10 μ s-100 ms	
Detector	inGaAs linear array with 2-stage TE-cooling, 256 pixel	inGaAs linear array with 2-stage TE-cooling, 512 pixel
Pixel size (WxH)	50 x 250 μ m	25 x 250 μ m
AD converter	16 bit, 500kHz	
Interface	USB 3.0 high-speed, 5 Gbps Gigabit Ethernet 1 Gbps	
Sample speed with on-board averaging	0.54 ms/scan (USB3)	
Data transfer speed	1.11 ms/scan (USB3)	
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 13 Digital bi-directional, trigger, sync, strobe, laser	
Power supply	12 V, 40W	
Operating Temperature range	0-40°C	
Cooling	45°C versus ambient	
Dimensions, weight	185 x 145 x 185 mm, 3.5 kg	

Grating Selection Table for AvaSpec-NIR 256/512-2.5-HSC-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
NIR	1000-2500	1500	75	1700	NIR075-1.7
NIR	1350-2500	1173-1150*	100	2500	NIR100-2.5
NIR	1000-2500	750-660*	150	2000	NIR150-2.0
NIR	1000-2500	815-700*	150	2600	NIR150-2.6
NIR	1000-2500	574-530*	200	1500	NIR200-1.5

*Depends on the starting wavelength of the grating; the higher the wavelength, the bigger the dispersion and the smaller the range to select.

Resolution Table (FWMH in nm) for AvaSpec-NIR256/512-2.5-HSC-EVO

Grating (lines/mm)	Slit size (μm)				
	25*	50	100	200	500
75	8.9	12.9	16.0	33.9	84.5
100	7.2	9.5	12.0	20.0	50.0
150	4.0	5.7	7.0	12.8	32.0
200	2.6	4.4	5.2	9.3	23.3

* Only for AvaSpec-NIR 512

Ordering Information

AvaSpec-NIR256-2.5-HSC-EVO

- NIR Spectrometer, 100 mm Avabench, 256 pixel InGaAs detector 2stage TEC, high-speed USB 3.0 and ETH interface, incl. AvaSoft-Basic, USB cable, specify OSF-1000, NIR grating and wavelength range and Slit-xx-RS

AvaSpec-NIR512-2.5-HSC-EVO

- NIR Spectrometer, 100 mm Avabench, 512 pixel InGaAs detector 2stage TEC, high-speed USB 3.0 and ETH interface, incl. AvaSoft-Basic, USB cable, specify OSF-1000, NIR grating and wavelength range and Slit-xx-RS

Options

- SLIT-XX-RS** • Slit size, please specify XX = 25, 50, 100, 200 or 500 μm

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This instrument is perfect for grain, corn, wheat, soya and other analysis.

AvaSpec-HS2048XL-EVO SensLine High UV and NIR Sensitivity Back-thinned CCD Spectrometer

For high sensitivity applications where high resolution is not of paramount concern, the AvaSpec-HS2048XL-EVO is an exceptional instrument. Featuring Avantes' HS optical bench which has a full 0.22 numerical aperture for superior throughput, the AvaSpec-HS2048XL has a back-thinned CCD detector with 2048 pixels measuring 14X500 microns.

Unlike many back-thinned CCD spectrometers, which have two dimensional arrays the HS2048XL has large monolithic pixels with exceptional efficiency in the UV, from 200-400 nm, and the NIR, from 950-1160 nm, while retaining sensitivity in the visible range. The unique optical design features torroid collimating and focusing mirrors to control image magnification and enhance efficiency. The instrument also features an electronic shutter, which enables integration times as low as 2 microseconds.

For configurations, which require second order filtering, order-sorting filters are avail-

able. The AvaSpec-HS2048XL is available with a wide range of slit sizes, gratings and may be configured with SMA or FC/ PC fiber-optic entrance connectors.

The AvaSpec-HS2048XL-EVO uses the AS7010 electronics board offering USB3 (10 times faster than USB2), Gigabit Ethernet and better signal processing.

AvaSpec-HS2048XL-EVO



Technical Data

Optical Bench	High-sensitivity asymmetrical design, 37.5 mm focal length; NA - 0.22, f/2.27
Wavelength range	200 - 1160 nm
Resolution	1 - 20 nm, depending on configuration (see table)
Stray-light	< 1 %
Sensitivity	1,250,000 counts/ μ W per ms int. time
UV Quantum efficiency	60% (200-300 nm)
Detector	Back-thinned CCD image sensor 2048 pixels
Signal/Noise	525:1
AD converter	16-bit, 1 MHz
Integration time	2 μ s - 600 seconds
Interface	USB 3.0 high-speed, 5 Gbps Gigabit Ethernet, 1 Gbps
Sample speed with on-board averaging	2.44 ms /scan
Dynamic Range	14.900
Data transfer speed	2.44 ms /scan (USB3)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, synchronization
Power supply	Default USB power, 700 mA. or external 12VDC, 360 mA
Dimensions, weight	175 x 165 x 85 mm, 1,950 kg

Grating Selection Table for AvaSpec-HS2048XL-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1160	900	500	330	HS500-0.33
UV/VIS	200-660	440	1000	250	HS1000-0.25
UV	200-850	520	600	300	HS600-0.30
UV/VIS	200-850	520	600	400	HS600-0.40
UV/VIS	300-1160	860	500	560	HS500-0.56
VIS	360-1000	500	600	500	HS600-0.50
NIR	500-1050	500	600	750	HS600-0.75
VIS	350-850	460	900	550	HS900-0.55
VIS	400-722	322	1200	500	HS1200-0.5
NIR	600-1160	500	600	1000	HS600-1.0
NIR	600-1160	350	830	900	HS830-0.9
NIR	750-990	240	1200	1000	HS1200-1.0

Resolution Table (FWHM in nm) for AvaSpec-HS2048XL-EVO

Grating (lines/mm)	Slit size (μm)					
	10	25	50	100	200	500
500	2.6	4.5	5.5	6.5	10.0	22.0
600	2.2	3.8	4.5	5.5	7.5	18.0
830*	2.1	3.6	4.0	5.0	7.0	15.0
900*	2.0	3.5	3.8	4.8	6.8	14.5
1000*	1.9	3.3	3.6	4.6	6.6	14.0
1200*	1.8	3.0	3.3	4.3	6.2	13.5

* theoretical values

Ordering Information

AvaSpec-HS2048XL-EVO

- High-sensitivity fiber-optic Spectrometer, 2048 large 500 μm pixel back-thinned CCD detector, USB powered, high-speed USB3.0 and ETH interface, incl. AvaSoft-Basic, USB interface cable. Specify grating, wavelength range and options

PS-12V/1.0A

- External power supply, needed for use in ETH mode

Options

SLIT-XX	• Slit size, please specify XX = 10, 25, 50, 100, 200 or 500 μm
OSF-YYY	• Order-sorting filter for reduction of 2nd order effects, 1 mm thick, please specify YYY= 305, 385, 475, 515, 550 or 600 nm
OSC-HS500	• Order-sorting coating with 350 and 600 nm long-pass filter for HS500 gratings in AvaSpec-HS
OSC-HS600	• Order-sorting coating with 350 and 600 nm long-pass filter for HS600 gratings in AvaSpec-HS
OSC-HS900	• Order-sorting coating with 600 nm long-pass filter for HS900 gratings in AvaSpec-HS
OSC-HS1000	• Order-sorting coating with 350 nm long-pass filter for HS1000 gratings in AvaSpec-HS
FCPC	• FC/PC fiber optic connector

The AvaSpec-HS2048XL-EVO is ideally suited for diffuse reflection measurements (UV, VIS, NIR) and fluorescence.

AvaSpec-ULS2048XL-EVO SensLine High UV and NIR Sensitivity Back-thinned CCD Spectrometer

AvaSpec-ULS2048XL-EVO



Combining exceptional quantum efficiency with high-speed is the value proposition of the AvaSpec-ULS2048XL-EVO spectrometer. Unlike many back-thinned CCD spectrometers, which have two dimensional arrays, the ULS2048XL-EVO has large monolithic pixels of 14x500 microns with exceptional efficiency in the UV, from 200-400 nm, and the NIR, from 950-1160 nm. The instrument also has an electronic shutter, which enables integration times as low as 2 microseconds. To further enhance sensitivity, a detector collection lens is available which improves sensitivity up to 60% when combined with larger core fibers.

Options include order-sorting filter, to reduce 2nd order effects and purge ports for deep-UV measurements. The AvaSpec-ULS2048XL-EVO comes with a wide range of slit sizes, gratings and may be configured with SMA or FC/PC fiber-optic entrance connectors.

The AvaSpec-ULS2048XL-EVO uses the AS7010 electronics board offering USB3 (10 times faster than USB2), Gigabit Ethernet and better signal processing.

Connection to your PC is handled via a USB3-connection or Ethernet, delivering a scan every 2 milliseconds. The instrument comes complete with AvaSoft-basic software, USB cable and an extensive manual.

Technical Data

Optical Bench	ULS, Symmetrical Czerny-Turner, 75 mm focal length
Wavelength range	200 - 1160 nm
Resolution	0.09 -20 nm, depending on configuration (see table)
Stray-light	< 0.5%
Sensitivity	460,000 counts/ μ W per ms int. time
UV Quantum efficiency	60% (200-300 nm)
Detector	Back-thinned CCD image sensor 2048 pixels
Signal/Noise	525:1
AD converter	16-bit, 1 MHz
Integration time	2 μ s - 20 seconds
Interface	USB 3.0 high-speed, 5 Gbps Gigabit Ethernet 1 Gbps
Sample speed with store to RAM	2.44 ms /scan
Readout Noise	9.8 cnt RMS
Dark Noise	4.5 cnt RMS
Dynamic Range	13.700
Data transfer speed	2.44 ms /scan (USB3)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, synchronization
Power supply	Default USB power, 700 mA. Or external 12VDC, 360 mA
Dimensions, weight	175 x 127 x 44,5 mm (1 channel), 1180 grams

Grating Selection Table for AvaSpec-ULS2048XL-EVO

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1160**	960**	300	300	UA
UV/VIS/NIR	200-1160**	900**	300	300/1000	UNA-DB
UV/VIS	200-850	520	600	300	UB
UV	200-750	250-220*	1200	250	UC
UV	200-650	165-145*	1800	UV	UD
UV	200-580	115-70*	2400	UV	UE
UV	200-400	70-45*	3600	UV	UF
UV/VIS	250-850	520	600	400	BB
VIS/NIR	300-1160**	860**	300	500	VA
VIS	360-1000	500	600	500	VB
VIS	300-800	250-200*	1200	500	VC
VIS	350-750	145-100*	1800	500	VD
VIS	350-640	75-50*	2400	VIS	VE
NIR	500-1050	500	600	750	NB
NIR	500-1050	220-150*	1200	750	NC
NIR	600-1160	350-300	830	800	SI
NIR	600-1160**	560**	300	1000	IA
NIR	600-1160	500	600	1000	IB

* depends on the starting wavelength of the grating; the higher the wavelength, the bigger the dispersion and the smaller the range to select.

** please note that not all 2048 pixels will be used for the useable range

Resolution Table (FWHM in nm) for AvaSpec-ULS2048XL-EVO

Grating (lines/mm)	Slit size (µm)					
	10	25	50	100	200	500
300	1.40	1.50	2.5	4.8	9.2	21.3
600	0.70 - 0.80*	0.75-0.85*	1.2	2.4	4.6	10.8
830	0.42 - 0.48*	0.50-0.58*	0.93	1.7	3.4	8.5
1200	0.25 - 0.31*	0.37 - 0.43*	0.52-0.66*	1.1	2.3	5.4
1800	0.17 - 0.21*	0.26 - 0.32*	0.34-0.42*	0.8	1.6	3.6
2400	0.12 - 0.18*	0.18 - 0.24*	0.26-0.34*	0.44-0.64*	1.1	2.7
3600	0.09 - 0.12*	0.11 - 0.15*	0.19	0.4	0.8	1.8

* depends on the starting wavelength of the grating; the higher the wavelength, the bigger the dispersion and the better the resolution

Ordering Information

AvaSpec-ULS2048XL-EVO

- Ultra-low Stray-light Fiber-optic Spectrometer, 75 mm AvaBench, 2048 large 500 µm pixel back-thinned CCD detector, USB powered, high-speed USB3.0 and ETH interface, incl. AvaSoft-Basic, USB interface cable.
Specify grating, wavelength range and options

PS-12V / 1.0A

- External power supply, needed for use in ETH mode

Why is the XL so sensitive?
We're using back-illuminated detectors.
They have the electronics on the backside of the detector,
allowing more light to be caught by the front side.

Options

-RS	• Replaceable slit
DCL-UV/VIS-200	• Quartz Detector Collection Lens (200-1100 nm)
SLIT-XX	• Slit size, please specify XX = 10, 25, 50, 100, 200 or 500 μm
SLIT-XX-RS	• Replaceable slit with SMA connector, specify slit size XX=25, 50, 100, 200 or 500 μm . Only in combination with AvaSpec-ULS2048XL-EVO-RS
SLIT-XX-RS-FCPC	• as SLIT-XX-RS, but with FC/PC connector
OSF-YYY	• Order-sorting filter for reduction of 2nd order effects, 1 mm thick, please specify YYY= 305, 395, 475, 515, 550 or 600 nm
OSC	• Order-sorting coating with 600 nm long-pass filter for BB (>350 nm) and VB gratings, recommended with OSF-305
OSC-UA	• Order-sorting coating Linear Variable Filter for UA, VA gratings
OSC-UB	• Order-sorting coating with 350 and 600 nm long-pass filter for UB or BB (<350 nm) gratings
-FCPC	• FC/PC fiber-optic connector

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The grating can only be changed by Avantes.
Therefore, choose your grating wisely.
Our application specialists are available to support you with your choice.
In general, a higher resolution means a lower bandwidth.
By combining multiple spectrometers
in our AvaSpec-Dual or rack-mountable versions,
you can create one virtual spectrometer with high-resolution
and high bandwidth.