

# AvaLight-HAL-S-MINI

## Tungsten-Halogen Light Source

### AvaLight-HAL-S-MINI



From visible light to near infrared, that's where the AvaLight-HAL-S-Mini works best. It's a compact, stabilized halogen light source, with adjustable focusing of the fiber connection, maximizing output power at the desired wavelength. The light source also has adjustable output power to provide extra power or longer bulb life.

A filter-slot mounted on the front of the AvaLight-HAL-S-Mini accepts 1" round or 2" x 2" square filters, to block specific ranges of wavelengths or instantly lower the intensity.

The adjustable focus on the AvaLight-HAL-S-Mini helps you get the most out of your light source: it makes sure all possible power is transmitted through your optical fiber. Bulb replacement is easy and can be done in a matter of minutes.

Optionally a combined direct-attach cuvette holder and attenuator is available (CUV-ATT-DA-HAL). for attenuation you can use the Inline Filterholder, FH-INL, or the Inline attenuator, ATT-INL.

The optical output can be controlled through a dongle at the backside or from your spectrometer. At low setting the

lamp has a color temperature of 2700K but provides over 13000 hours of lifetime. The standard or medium setting changes the color temperature to 2850K and provides 50% more power with a bulb lifetime of 4000 hours. The high power setting gives a color temperature of 3000K, double power compared to the long-life setting and gives you up to 1000 hours of lifetime.

The AvaLight-HAL-S-Mini features an internal TTL-shutter, controllable from your AvaSpec spectrometer. This gives you the ability to use the auto-save dark option in AvaSoft spectroscopy software.

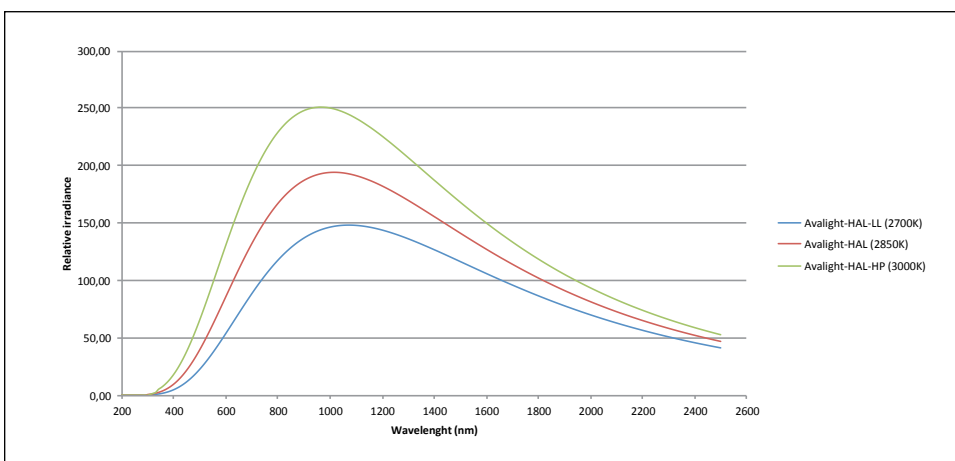


Figure 9 Spectral output of AvaLight-HAL-Mini

## Technical Data

	AvaLight-HAL-S-Mini (standard)	AvaLight-HAL-S-Mini (long life)	AvaLight-HAL-S-Mini (high power)
<b>Wavelength Range</b>	360-2500 nm		
<b>Stability</b>	± 0.1%/ °C		
<b>Time to stabilize</b>	Ca. 10 min.		
<b>Output to bulb</b>	12.0 VDC/ 0.83A	11.3 VDC/ 0.8A	14.1 VDC/ 1.0A
<b>Bulb Life</b>	4000 hrs	> 13000 hrs	< 1000 hrs
<b>Min. Optical power* 200 µm fiber</b>	0.5 mWatt	0.35 mWatt	0.7 mWatt
<b>Min. Optical power* 600 µm fiber</b>	4.5 mWatt	3.2 mWatt	6 mWatt
<b>Min. Optical power* 1000 µm fiber</b>	10 mWatt	7 mWatt	14 mWatt
<b>Bulb Color Temperature</b>	2,850 K	2,730 K	3,000 K
<b>Power requirement</b>	12 VDC / 2.08A		
<b>Temperature range</b>	0-55 °C		
<b>Dimensions, weight</b>	150 x 78 x 37 mm, 510 grams		
<b>Lifetime shutter</b>	1,000,000 cycles (typical)		

\* Optical power measured from 350-1100nm

## Separate 50x50 mm filters to install in AvaLight-HAL-(S)-Mini

<b>GL-WG305-3</b>	Separate 50 x 50 x 3 mm long-pass filter > 305 nm
<b>GL-KG3-3</b>	Separate 50 x 50 x 3 mm band-pass filter, transparent > 325 nm and < 700 nm
<b>GL-BG28-3</b>	Separate 50 x 50 x 3 mm band-pass filter, transparent > 360 nm and < 500 nm
<b>GL-GG385-3</b>	Separate 50 x 50 x 3 mm long-pass filter > 385 nm
<b>GL-GG475-3</b>	Separate 50 x 50 x 3 mm long-pass filter > 475 nm
<b>GL-OG515-3</b>	Separate 50 x 50 x 3 mm long-pass filter > 515 nm
<b>GL-OG550-3</b>	Separate 50 x 50 x 3 mm long-pass filter > 550 nm
<b>GL-NG9-1</b>	Separate 50 x 50 x 1 mm Neutral Density filter (transmission 10%, 400-1100 nm)
<b>GL-NG9-2</b>	Separate 50 x 50 x 2 mm Neutral Density filter (transmission 1%, 400-1100 nm)
<b>GL-NG9-3</b>	Separate 50 x 50 x 3 mm Neutral Density filter (transmission 0.1%, 400-1100 nm)

More filter types available, please contact us for ordering information

## Ordering Information

<b>AvaLight-HAL-S-Mini</b>	• 10W Tungsten Halogen lamp, fan cooled, incl. TTL shutter, needs extra PS-12V/2.08A power supply
<b>AvaLight-HAL-S-RM</b>	• Rack-mounted version of AvaLight-HAL-S-Mini
<b>IC-DB26-2</b>	• Interface cable AvaSpec-USB2 platform to AvaLight-HAL-(S)-Mini
<b>AvaLight-HAL-B-Mini</b>	• 10W Tungsten Halogen Replacement bulb for AvaLight-HAL-(S)-Mini
<b>PS-12V/2.08A</b>	• Power supply 100-240VAC/12VDC, 2.08A, necessary for AvaLight-HAL-Mini
<b>DONGLE-Mini-H</b>	• Dongle for high power setting
<b>DONGLE-Mini-L</b>	• Dongle for long life setting

# AvaSpec-NIR256/512-2.5-HSC-EVO NIRLine Near-infrared Fiber Optic Spectrometer



New High Sensitivity Compact NIR Spectrometers! 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 modeling is required, the 512 pixel detector will be the best choice.

A range of gratings are available offering the possibility to tailor the instrument for optimal performance in your application. The instrument is equipped with a replaceable slit which

offers you great flexibility in your experiment.

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 / $\mu$ W per ms (1000-2500 nm)	990,000	990,000
Signal/Noise HS	1800:1	1900:1
Integration time HS	10 $\mu$ s - 5ms	
Sensitivity LN in counts / $\mu$ W per ms (1000-2500nm)	55,000	55,000
Signal/Noise LN	4000:1	3700:1
Integration time LN	10 $\mu$ 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)	50x250 $\mu$ m	25x250 $\mu$ 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	1.11ms/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 $^{\circ}$ C	
Cooling	45 $^{\circ}$ 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	1000-2500	1173 - 1150*	100	2500	NIR100-2.5
NIR	1000-2500	800 - 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

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

# AvaSpec-ULS2048L StarLine Versatile Fiber-optic Spectrometer

## AvaSpec-ULS2048L



A close cousin to the AvaSpec-ULS2048 but with larger pixels, is the AvaSpec-ULS2048L. It provides enhanced sensitivity at an affordable price. The AvaSpec-ULS2048L has pixels that are almost four times higher than those in the AvaSpec-ULS2048. It gives you a better signal to noise ratio and 40% less dark noise.

Options include a deep-UV detector coating, for better performance in the deep-UV-range, a detector collection lens to enhance sensitivity in the 200-1100 nm range and order-sorting filter to reduce 2<sup>nd</sup> order effects. Furthermore, the AvaSpec-ULS2048L is available with a wide range of slit sizes, gratings and fiber-optic entrance connectors.

The AvaSpec-2048L is also available in dual or multi-channel versions (up to 10 spectrometers), where all spectra are taken simultaneously.

Connection to your PC is handled via USB2-connection, delivering a scan every 1.8 milliseconds. Integration time can be as short as 1.05 milliseconds up to a maximum of 10 minutes. It comes complete with AvaSoft-Basic software, USB cable and an extensive manual, including a quick start guide in four languages.

### Technical Data

<b>Optical Bench</b>	ULS Symmetrical Czerny-Turner, 75 mm focal length
<b>Wavelength range</b>	200-1100 nm
<b>Resolution</b>	0.06 -20 nm, depending on configuration (see table)
<b>Stray-light</b>	0.16-0.28%, depending on the grating
<b>Sensitivity</b>	470,000 counts/ $\mu$ W per ms integration time
<b>Detector</b>	CCD linear array, 2048 pixels
<b>Signal/Noise</b>	300:1
<b>AD converter</b>	16-bit, 2 MHz
<b>Integration time</b>	1.05 ms - 10 minutes
<b>Interface</b>	USB 2.0 high-speed, 480 Mbps RS-232, 115.200 bps
<b>Sample speed with store to RAM</b>	1.05 ms /scan
<b>Data transfer speed</b>	1.8 ms/scan (USB2) 430 ms/scan (RS-232)
<b>Digital IO</b>	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, sync.
<b>Power supply</b>	Default USB power, 350 mA Or with SPU2 external 12VDC, 150 mA
<b>Dimensions, weight</b>	175 x 110 x 44 mm (1 channel), 716 grams

Add flexibility  
to your spectrometer with  
the Replaceable Slit (-RS) option

## Grating selection table for AvaSpec-ULS2048L

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1100**	900**	300	300	UA
UV/VIS/NIR	200-1100**	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	300-1100**	800**	300	500	VA
VIS	360-1000	500	600	500	VB
VIS	300-800	250-200*	1200	500	VC
VIS	350-750	145-90*	1800	500	VD
VIS	350-610	75-50*	2400	VIS	VE
NIR	500-1050	500	600	750	NB
NIR	500-1050	220-150*	1200	750	NC
NIR	600-1100	350-300	830	800	SI
NIR	600-1100**	500**	300	1000	IA
NIR	600-1100	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-ULS2048L

Grating (lines/mm)	Slit size (μm)					
	10	25	50	100	200	500
<b>300</b>	1.0	1.4	2.5	4.8	9.2	21.3
<b>600</b>	0.40-0.53*	0.7	1.2	2.4	4.6	10.8
<b>830</b>	0.32	0.48	0.93	1.7	3.4	8.5
<b>1200</b>	0.20-0.28*	0.27-0.38*	0.52-0.66*	1.1	2.3	5.4
<b>1800</b>	0.10-0.18*	0.20-0.29*	0.34-0.42*	0.8	1.6	3.6
<b>2400</b>	0.09-0.13*	0.13-0.17*	0.26-0.34*	0.44-0.64*	1.1	2.7
<b>3600</b>	0.06-0.08*	0.10	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-ULS2048L-USB2

- Fiber-optic Spectrometer, 75 mm AvaBench, 2048 pixel CCD detector 14 x 200 μm, USB powered, high-speed USB2 interface, incl. AvaSoft-Basic, USB interface cable. Specify grating, wavelength range and options

We can also calibrate  
your AvaSpec series  
spectrometer

## Options

<b>-SPU2</b>	• incl. switch for USB powered USB2 or external power for RS-232
<b>-RS</b>	• Replaceable slit
<b>DUV</b>	• Deep-UV detector coating >150 nm
<b>DCL-UV/VIS-200</b>	• Detector Collection Lens to enhance sensitivity, Quartz, 200-1100 nm
<b>SLIT-XX</b>	• Slit size, please specify XX = 5, 10, 25, 50, 100, 200 or 500 µm
<b>SLIT-XX-RS</b>	• Replaceable slit with SMA connector , specify slit size XX=25, 50, 100, 200 or 500 µm. Only in combination with AvaSpec-ULS2048L-USB2-RS
<b>SLIT-XX-RS-FCPC</b>	• as SLIT-XX-RS, but with FC/PC connector
<b>OSF-YYY</b>	• Order-sorting filter for reduction of 2nd order effects, please specify YYY= 305, 395, 475, 515, 550 or 600 nm
<b>OSC</b>	• Order-sorting coating with 600 nm long-pass filter for BB (>350 nm) and VB gratings in AvaSpec-ULS2048L, recommended with OSF-305
<b>OSC-UA</b>	• Order-sorting coating with 350 and 600 nm long-pass filter for UA, VA gratings in AvaSpec-ULS2048L
<b>OSC-UB</b>	• Order-sorting coating with 350 and 600 nm long-pass filter for UB or BB (<350 nm) gratings in AvaSpec-ULS2048L
<b>-FCPC</b>	• FC/PC fiber-optic connector

For extra sensitivity:  
take a look at the  
AvaSpec-ULS2048XL