

# AvaSpec-ULS4096CL-EVO

## StarLine CMOS Spectrometer

### AvaSpec-ULS4096CL-EVO



The AvaSpec-ULS4096CL-EVO uses the latest CMOS technology instead of the conventional CCD detectors, which means this spectrometer is completely up to date and ready for the next decade.

The dominant position of CCD detectors in the spectrometer field is fading and new technologies like CMOS have evolved and become a suitable alternative.

In combination with our latest AS-7010 electronics it offers you a versatile device including USB3 communication with 10 times higher speed compared to USB2 and a second communication port that offers Gigabit Ethernet.

Besides the high speed communication options, the EVO series also offers a fast microprocessor and improved memory which can help you to store more spectra onboard and realize more functionality.

The AvaSpec-ULS4096CL-EVO is available with a wide range of slit sizes, gratings and fiber-optic entrance connectors as well. The AvaSpec-ULS4096CL-EVO is also available as OEM unit, bench only or Rackmount version.

With its 4096 pixels, this spectrometer is tailored for high-resolution applications like plasma monitoring and LIBS.

### Technical Data

<b>Optical bench</b>	ULS symmetrical Czerny-Turner, 75 mm focal length
<b>Wavelength range</b>	200 - 1100 nm
<b>Resolution</b>	0.05 - 20 nm, depending on configuration (see table)
<b>Stray light</b>	0.19 - 1.0%, depending on the grating
<b>Sensitivity</b>	218,000 counts/ $\mu$ W per ms integration time
<b>Detector</b>	CMOS linear Image Sensor
<b>Signal/noise</b>	335:1
<b>AD converter</b>	16-bit, 6 MHz
<b>Integration time</b>	9 $\mu$ s - 40 s
<b>Interface</b>	USB 3.0 high speed, 5 Gbps Gigabit Ethernet 1 Gbps
<b>Digital IO</b>	HD-26 connector, 2 Analog in, 2 Analog out, 13 Digital bidirectional, trigger, sync., strobe, laser
<b>Power supply</b>	Default USB3 power, 500 mA Or 12VDC, 300 mA
<b>Dimensions, weight</b>	177 x 127 x 44,5 mm (1 channel), 1135 grams

### Timing and Triggering

<b>Sample speed with on-board averaging</b>	0.7 ms/scan
<b>Data transfer speed</b>	0.7 ms/scan (USB3), 1.0 ms (ETH)
<b>Min. delay / jitter</b>	0.9 / 0.02 $\mu$ s

### Detector Specifications

Sensitivity photons/count @ 600 nm	Sensitivity in cts/ $\mu$ W per ms int. time	QE (%) @ peak	Signal/noise	Dark noise (counts RMS)	Dynamic range
2	218,000	80%	325:1	16	4000

## Grating Selection Table

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200 - 1100**	891**	300	300	UA
UV/VIS/NIR	200 - 1100**	891**	300	300/1000	UNA-DB
UV/VIS	200 - 850	515	600	300	UB
UV	200 - 750	247 - 218*	1200	250	UC
UV	200 - 650	163 - 143*	1800	UV	UD
UV	200 - 580	113 - 69*	2400	UV	UE
UV	200 - 400	69 - 45*	3600	UV	UF
UV/VIS	250 - 850	515	600	400	BB
VIS/NIR	300 - 1100**	792**	300	500	VA
VIS	360 - 1000	495	600	500	VB
VIS	300 - 800	247 - 218*	1200	500	VC
VIS	350 - 750	142 - 89*	1800	500	VD
VIS	350 - 640	74 - 49*	2400	VIS	VE
NIR	500 - 1050	495	600	750	NB
NIR	500 - 1050	218 - 148*	1200	750	NC
NIR	600 - 1160	346 - 297	830	800	SI
NIR	600 - 1100**	495**	300	1000	IA
NIR	600 - 1100	495	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 4096 pixels will be used for the useable range.

## Resolution Table (FWHM in nm)

Grating (lines/mm)	Slit size (μm)					
	10	25	50	100	200	500
300	0.50 - 0.70	1.20 - 1.30*	2.17	4.6	9.00	20.0
600	0.30 - 0.36*	0.58 - 0.60	1.17	2.20	4.5	10.0
830	0.25	0.48	0.93	1.7	3.4	8.0
1200	0.14 - 0.18*	0.30	0.62	1.08	2.2	5.0
1800	0.09 - 0.11*	0.18	0.36 - 0.40*	0.78	1.5	3.7
2400	0.07 - 0.09*	0.13 - 0.15*	0.26 - 0.32*	0.40 - 0.64*	1.1	2.7
3600	0.05 - 0.06*	0.10	0.19	0.4	0.8	2.0

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

## Options

<b>-RS</b>	• Replaceable slit
<b>DCL-UV/VIS-200</b>	• Quartz detector collection lens (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 or 200 μm. Only available with AvaSpec-ULS4096CL-EVO-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 second-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 (>305 nm) and VB gratings, recommended with OSF-305
<b>OSC-UA</b>	• Order-sorting coating with 350 and 600 nm linear variable filter for UA, VA gratings
<b>OSC-UB</b>	• Order-sorting coating with 350 and 600 nm long-pass filter for UB or BB (<350 nm) gratings
<b>-FCPC</b>	• FC/PC fiber-optic connector