

# AvaSpec-ULS2048CL-EVO

## StarLine CMOS Spectrometer

### AvaSpec-ULS2048CL-EVO



Using CMOS instead of the conventional CCD detectors, this spectrometer offers you the latest technology.

In combination with our latest AS-7010 electronics, it offers you a versatile device including USB3.0 communication with 10x higher speed compared to USB2, and a second communication port which offers Gigabit Ethernet for integration in your company network and possibility for long distance communication.

Besides the high-speed communication options, the EVO series offers a fast microprocessor and increased memory to help you store more

spectra onboard and realize more functionality.

Options include a detector collection lens to enhance sensitivity in the 200 to 1100 nm range and an order-sorting filter to reduce second-order effects. The AvaSpec-ULS2048CL-EVO is available with a wide range of slit sizes, gratings and fiber-optic entrance connectors as well.

It comes complete with AvaSoft-Basic software, USB cable and an extensive manual.

The AvaSpec-ULS2048CL-EVO is also available as OEM unit, bench only or Rackmount version.

### 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>	0.19 - 1.0%, depending on the grating
<b>Sensitivity</b>	375,000 counts/ $\mu$ W per ms integration time
<b>Detector</b>	CMOS linear Image Sensor
<b>Signal/noise</b>	300:1
<b>AD converter</b>	16-bit, 6 MHz
<b>Integration time</b>	30 $\mu$ s - 59 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>	0.38 ms/scan
<b>Data transfer speed</b>	0.38 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	375,000	80%	300:1	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 2048 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	1.0	1.4	2.5	4.8	9.2	21.3
600	0.40 - 0.53*	0.7	1.2	2.4	4.6	10.8
830	0.32	0.48	0.93	1.7	3.4	8.5
1200	0.20 - 0.28*	0.27 - 0.38*	0.52 - 0.66*	1.1	2.3	5.4
1800	0.10 - 0.18*	0.20 - 0.29*	0.34 - 0.42*	0.8	1.6	3.6
2400	0.09 - 0.13*	0.13 - 0.17*	0.26 - 0.34*	0.44 - 0.64*	1.1	2.7
3600	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.

## 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, 200 or 500 μm. Only available for AvaSpec-ULS2048CL-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

# EVO Series, with 4k CMOS detector: StarLine AvaSpec-ULS4096CL-EVO

Another new member in our EVO series: the AvaSpec-ULS4096CL-EVO. Using CMOS technology instead of the conventional CCD technology, this spectrometer offers you the latest technology; 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. The AvaSpec-ULS4096CL-EVO offers you this latest technology ensuring a spectrometer platform for the coming years. In combination with our latest AS-7010 electronics it offers you a versatile device including USB3.0 Communication with 10x higher speed compared to USB2, and a second communication port which offers Gigabit Ethernet for integration in your company network and possibility for long distance communication at an affordable price.

Besides the high speed communication options, the EVO also offers a fast microprocessor and 50x more memory which can help you to store more spectra onboard and realise more functionality.

Options include a detector collection lens to enhance sensitivity in the 200-1100 nm range and order-sorting filter to reduce 2nd order effects. Furthermore, the AvaSpec-4096CL is available with a wide range of slit sizes, gratings and fiber-optic entrance connectors.

It comes complete with AvaSoft-Basic software, USB cable and an extensive manual.

The AvaSpec-ULS4096CL-EVO is also available as OEM unit, Bench only or Rackmount version.

With the 4096 pixels these spectrometers are tailored for high resolution applications like Plasma and LIBS.

## AvaSpec-ULS4096CL



### 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 - 40s
<b>Interface</b>	USB 3.0 high-speed, 5 Gbps Gigabit Ethernet 1 Gbps
<b>Sample speed with on-board averaging</b>	0.70 ms /scan
<b>Data transfer speed</b>	0.70 ms/scan (USB3), 1.31 ms (ETH)
<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, 532 mA Or 12VDC, 300 mA
<b>Dimensions, weight</b>	177 x 127 x 44,5 mm (1 channel), 1155 grams

#### EVolutionary spectroscopy:

- Speed
- Network integration
- Multi-channel benefits

## Grating Selection Table for AvaSpec-ULS4096CL-EVO

Use	Usable 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	600-1100	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) for AvaSpec-ULS4096CL-EVO

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

\*\*expected resolution gain with a 5 micrometer slit will be a factor 0.8

## Ordering Information

**AvaSpec-ULS4096CL-EVO**

- Fiber-optic Spectrometer, 75 mm AvaBench, 4096 pixel CMOS detector 7 x 200 μm, USB powered, high-speed USB 3.0 and ETH interface, incl. AvaSoft-Basic, USB interface cable.  
Specify grating, wavelength range and options.

**PS-12V/1.0A**

- External power supply, needed for operation in ETH mode or with USB2 ports.

## 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 $\mu\text{m}$
<b>SLIT-XX-RS</b>	• Replaceable slit with SMA connector , specify slit size XX=25, 50, 100 or 200 $\mu\text{m}$ . Only in combination 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 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, recommended with OSF-305
<b>OSC-UA</b>	• Order-sorting coating with 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



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フォトテクニカ株式会社

〒336-0017 埼玉県さいたま市南区南浦和 1-2-17

TEL:048-871-0067 FAX:048-871-0068

e-mail: [voc@phototechnica.co.jp](mailto:voc@phototechnica.co.jp)

Using **CMOS technology** instead of conventional CCD technology, this spectrometer offers you the latest technology, ready for the next decade!

# AvaSpec-ULS2048L-EVO

## StarLine CCD Spectrometer

### AvaSpec-ULS2048L-EVO



The AvaSpec-ULS2048L-EVO uses our latest AS-7010 electronic board. This means it has all the advantages of the previous AvaSpec-ULS2048L-USB2, but offers USB3 communication instead of USB2, which makes for a significant increase in speed.

Unique is the second communication port which offers Gigabit Ethernet for integration in your company network and possibility for long distance communication.

This unique, first-to-the-market combination enables you to create

high-speed multichannels systems, perfectly suited for various industrial applications.

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 second-order effects.

The AvaSpec-2048L is available with a wide range of slit sizes, gratings and fiber-optic entrance connectors as well.

### 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>	0.04 - 0.1%, 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>	1.11 ms - 10 minutes
<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>	1.1 ms/scan
<b>Data transfer speed</b>	1.1 ms/scan (USB3), 3.8 ms (ETH)
<b>Min. delay / jitter</b>	3.28 / 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
4	470,000	40%	300:1	20	3300

## Grating Selection Table

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 - 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 - 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)

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

## 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



# AvaSpec-ULS3648 StarLine High-resolution Fiber-optic Spectrometer

When you're looking for high-resolution, then take a look at the AvaSpec-ULS3648. Featuring an electronic shutter, it can support integration times as short as 10 microseconds, making it also ideal for CW laser measurements.

Options include order-sorting filters to prevent 2<sup>nd</sup> order effects, deep-UV detector coating for better sensitivity in the deep-UV-range, and a detector collection lens to enhance overall sensitivity. Also, a wide range of slit sizes, gratings and fiber-optic entrance connectors are available.

Configurations with two to ten channel spectrometers are available. These give you the possibility for multiple simultaneous

readouts or higher optical resolution in which several spectrometers are arrayed with each covering a short range with high-resolution. For more information, see pages 62 and 63.

The connection to your computer is done through USB2 at 480 Mbps. This translates into 3.7 ms per scan data transfer speed. Of course it's supplied with AvaSoft-Basic, USB cable and an extensive manual, including a quick start guide in four languages.

## AvaSpec-ULS3648



### 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>	0.38-0.53%, depending on the grating
<b>Sensitivity</b>	160,000 counts/ $\mu$ W per ms integration time
<b>Detector</b>	CCD linear array, 3648 pixels
<b>Signal/Noise</b>	350:1
<b>AD converter</b>	16-bit, 1 MHz
<b>Integration time</b>	10 $\mu$ s - 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>	3.7 ms /scan
<b>Data transfer speed</b>	3.7 ms /scan (USB2) 750 ms/scan (RS-232)
<b>Digital IO</b>	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, synchronization
<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



## Grating selection table for AvaSpec-ULS3648

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	145-100*	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 3648 pixels will be used for the useable range

## Resolution table (FWHM in nm) for AvaSpec-ULS3648

Grating (lines/mm)	Slit size (µm)					
	10	25	50	100	200	500
<b>300</b>	0.60 - 0.70*	1.10-1.30*	2.20-2.40*	4.60	9.00	20.0
<b>600</b>	0.30 - 0.36*	0.58-0.68*	1.17	2.20	4.50	10.0
<b>830</b>	0.25	0.48	0.93	1.70	3.40	8.0
<b>1200</b>	0.14 - 0.18*	0.30	0.62	1.08	2.20	5.0
<b>1800</b>	0.09 - 0.11*	0.18	0.36-0.40*	0.78	1.50	3.7
<b>2400</b>	0.07 - 0.09*	0.13 - 0.15*	0.26-0.32*	0.52-0.64*	1.10	2.7
<b>3600</b>	0.05 - 0.06*	0.10	0.19	0.40	0.80	2.0

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

## Ordering Information

### AvaSpec-ULS3648-USB2

- Fiber-optic Spectrometer, 75 mm AvaBench, 3648 pixel CCD detector, USB powered, high-speed USB2 interface, incl. AvaSoft-Basic, USB interface cable. Specify grating, wavelength range and options

## Options

<b>-SPU2</b>	• incl. switch for USB powered 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>	• Quartz Detector Collection Lens (200-1100 nm)
<b>SLIT-XX</b>	• Slit size, please specify XX = 5, 10, 25, 50, 100, 200 or 500 $\mu\text{m}$
<b>SLIT-XX-RS</b>	• Replaceable slit with SMA connector, specify slit size XX=25, 50, 100, 200 or 500 $\mu\text{m}$ . Only in combination with AvaSpec-ULS3648-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, recommended with OSF-305
<b>OSC-UA</b>	• Order-sorting coating with 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

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フォトテクニカ株式会社

〒336-0017 埼玉県さいたま市南区南浦和 1-2-17

TEL:048-871-0067 FAX:048-871-0068

e-mail: voc@phototechnica.co.jp

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.

# AvaSpec-Fast StarLine Ultra-fast Spectrometer for High-speed Applications

## AvaSpec-Fast



For ultra-fast spectral acquisition the AvaSpec-Fast offers the best solution. Up to 5637 spectra can be stored at 0.20 ms per scan using Avantes unique store-to-RAM functionality. Depending on the configuration chosen, between 1254 and 5637, spectra can be stored during one burst.

The AvaSpec-FAST series is available in five different configurations; the difference being the number of active pixels. More pixels provide higher resolution or more bandwidth, but slower minimum integration time. For all models, start/stop pixels can be set in our software to increase the number of scans stored on board over a shorter wavelength range.

The AvaSpec-FAST can be configured in CR or SS mode. CR, or continuous run mode, means a single external trigger (through the DB26-connector) results in a customer-set number of scans automatically to be measured. SS-mode, for single scan, means a single spectrum is acquired at every external trigger. CR or SS mode must be specified at the time of order.

Possible configurations are single or dual channel, desktop or Rack-mounted. The instrument is available with all the options and gratings of the AvaSpec-ULS2048. The AvaSpec Fast series is based on the AvaSpec-ULS2048. Optional it can also be based upon the AvaSpec-ULS2048L.

## Technical Data

FAST Series Model	Min Integration Time	Pixels	Max. Frequency (Hz) in CR-Store to RAM	Max amount of spectra Store to RAM
AvaSpec-ULS350F-USB2	0.20 ms	350	5000	5637
AvaSpec-ULS750F-USB2	0.40 ms	750	2500	2716
AvaSpec-ULS950F-USB2	0.50 ms	950	2000	2157
AvaSpec-ULS1350F-USB2	0.70 ms	1350	1400	1528
AvaSpec-ULS1650F-USB2	0.85 ms	1650	1100	1254

## Grating Selection Table for AvaSpec-FAST

Grating	Lines/mm	Spectral range AvaSpec-ULS350F (nm)	Spectral range AvaSpec-ULS750F (nm)	Spectral range AvaSpec-ULS950F (nm)	Spectral range AvaSpec-ULS1350F (nm)	Spectral range AvaSpec-ULS1650F (nm)
Z	150	400	850	900	n.a.	n.a.
A	300	190	400	520	750	900
B	600	90	200	250	360	450
C	1200	45	100	120	180	210
D	1800	30	60	80	110	140
E	2400	20	45	50	80	100
F	3600	10	27	30	50	60

## Ordering Information

<b>AvaSpec-ULS350F-USB2</b>	<ul style="list-style-type: none"> <li>Ultra-fast Fiber-optic Spectrometer, 75 mm low stray-light AvaBench, 350 pixel CCD detector, USB/RS-232 interface, incl. AvaSoft-Basic, USB2 cable. Specify grating, wavelength range and options</li> </ul>
<b>AvaSpec-ULS750F-USB2</b>	<ul style="list-style-type: none"> <li>As AvaSpec-ULS350F-USB2, but 750 pixel CCD detector</li> </ul>
<b>AvaSpec-ULS950F-USB2</b>	<ul style="list-style-type: none"> <li>As AvaSpec-ULS350F-USB2, but 950 pixel CCD detector</li> </ul>
<b>AvaSpec-ULS1350F-USB2</b>	<ul style="list-style-type: none"> <li>As AvaSpec-ULS350F-USB2, but 1350 pixel CCD detector</li> </ul>
<b>AvaSpec-ULS1650F-USB2</b>	<ul style="list-style-type: none"> <li>As AvaSpec-ULS350F-USB2, but 1650 pixel CCD detector</li> </ul>

## Options

- See AvaSpec-ULS2048-USB2