

AvaSpec-2048 Standard Fiber Optic Spectrometer

The AvaSpec-2048 Fiber Optic Spectrometer is based on the AvaBench-75 symmetrical Czerny-Turner design with 2048 pixel CCD Detector Array. The spectrometer has a fiber optic entrance connector (standard SMA, others possible), collimating and focusing mirror and diffractive grating. A choice of 16 different gratings with different dispersion and blaze angles enable applications in the 200-1100nm range. The AvaSpec-2048 can be delivered with 2 platforms of electronics; either with USB1.1 with 14 bit AD converter or USB2.0 interface with 16 bit AD converter. The AvaSpec-2048 is especially suitable for low light level and high resolution applications. An optional detector coating enhances the CCD performance for the UV range and a detector collection lens offers high sensitivity. Digital I/O ports enable external triggering and control of shutter and pulsed light sources from the Avantes line of instruments.

The AvaSpec-2048 is also available as dual channel or multi-channel instrument (up to 8 channels), where all spectra are taken simultaneously.

The AvaSpec-2048 comes with AvaSoft-basic, a complete manual, USB interface cable and a PS-12V/1.0A power supply. AvaSoft-full and application software can be ordered separately. Alternatively the AvaSpec-2048-SPU has a switch to run on USB power or external power.

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The AvaSpec2048-USB2 has a USB2 interface with ultrafast datasampling of 900 spectra per second and datatransfer in 1.8ms and supports analog in- and outputs as well. Optional Bluetooth® (-BT) communication and an SD card for on-board saving of spectra can be added. The AvaSpec-2048-USB2 runs on USB power and comes with AvaSoft-basic, a complete manual and USB interface cable. Multiple (up to 127) USB2 spectrometers with different detectors can be externally coupled (see section multichannel spectrometers, page 37).

Technical Data



Spectrometer platform	AvaSpec-2048	AvaSpec-2048-USB2
Optical Bench	Symmetrical Czerny-Turner, 75 mm focal length	
Wavelength range	200-1100 nm	
Resolution	0.04 –20 nm, depending on configuration (see table)	
Stray light	< 0.1%	
Sensitivity (AvaLight-HAL, 8 µm fiber) in counts/µW -per ms integration time	5,000 (14-bit AD)	20,000 (16-bit AD)
Detector	CCD linear array, 2048 pixels	
Signal/Noise	200:1	
AD converter	14 bit, 1.33 MHz	16 bit, 2 MHz
Integration time	2 ms – 60 seconds	1.1 ms – 10 minutes
Interface	USB 1.1, 12 Mbps RS-232, 115.200 bps	USB 2.0 high speed, 480 Mbps RS-232, 115.200 bps
Sample speed with on-board averaging	17 ms / scan	1.11 ms /scan
Data transfer speed	14-31 ms / scan (depending on # pixels transferred)	1.8 ms / scan (USB2) 430 ms / scan (RS-232)
Digital IO	DB-15 connector, 2 Digital in, 12 Digital out	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, sync.
Power supply	12 VDC, reverse polarity protection, 160 mA (PS-12V/1.0A) or 5VDC USB power	Default USB power, 350 mA. Or with SPU2 external 12VDC, 350 mA
Dimensions, weight	175 x 110 x 44 mm (1 channel), 716 grams	

Grating selection table for AvaSpec-2048

Use	Useable range	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1100**	900**	300	300	UA
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	220-400	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	600-1100**	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) for AvaSpec-2048

Grating (lines/mm)	Slit size (μm)					
	10	25	50	100	200	500
300	0.8	1.4	2.4	4.3	8.0	20.0
600	0.4	0.7	1.2	2.1	4.1	10.0
1200	0.1-0.2*	0.2-0.3*	0.4-0.6*	0.7-1.0*	1.4-2.0*	3.3-4.8*
1800	0.07-0.12*	0.12-0.21*	0.2-0.36*	0.4-0.7*	0.7-1.4*	1.7-3.3*
2400	0.05-0.09*	0.08-0.15*	0.14-0.25*	0.3-0.5*	0.5-0.9*	1.2-2.2*
3600	0.04-0.06*	0.07-0.10*	0.11-0.16*	0.2-0.3*	0.4-0.6*	0.9-1.4*

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

ORDERING INFORMATION	
AvaSpec-2048	Fiber Optic Spectrometer, 75 mm Avabench, 2048 pixel CCD detector, USB1.1/RS-232 interface, incl. AvaSoft-Basic, USB cable and PS-12V/1.0A power supply, specify grating, wavelength range and options
AvaSpec-2048-USB2	Fiber Optic Spectrometer, 75 mm Avabench, 2048 pixel CCD detector, USB powered high speed USB2 interface, incl. AvaSoft-Basic, USB interface cable, specify grating, wavelength range and options
Options	
-SPU	incl. switch for USB powered USB1 or external power for RS-232
-SPU2	incl. switch for USB powered USB2 or external power for RS-232/BT
-SPU2-BT	Bluetooth® interface for USB2 platform only, including antenna and switch
SDXXX	Internal XXX MB SD card for on board data saving, for USB2 platform only
DUV	Deep UV detector coating >150 nm
DCL-UV/VIS	Detector Collection Lens to enhance sensitivity, Quartz, 200-1100 nm
SLIT-XX	Slit size, please specify XX = 10, 25, 50, 100, 200, 500 μm
OSF-YYY-3	Order sorting filter for reduction of 2 nd order effects, 3 mm thick, please specify YYY= 385, 475, 515, 550, 600 nm
OSC	Order sorting coating with 590nm long pass filter for VA, BB (>350nm) and VB gratings in AvaSpec-2048
OSC-UA	Order sorting coating with 350 and 590nm longpass filter for UA gratings in AvaSpec-2048
OSC-UB	Order sorting coating with 350 and 590nm longpass filter for UB or BB (<350nm) gratings in AvaSpec-2048

AvaSpec-3648 High Resolution Fiber Optic Spectrometer

The AvaSpec-3648 Fiber Optic Spectrometers is based on the AvaBench-75 symmetrical Czerny-Turner design with 3648 pixel CCD Detector Array. The spectrometer has a fiber optic entrance connector (standard SMA, others possible), collimating and focusing mirror and diffractive grating. A choice of 16 different gratings with different dispersion and blaze angles enable applications in the 200-1100nm range. The AvaSpec-3648 comes with a 16 bit AD converter, and USB2.0 high speed interface.

The AvaSpec- 3648 is especially suitable for measuring high resolution applications and, thanks to the 10 μ s electronic shutter, has a wide dynamic range. An optional detector coating enhances the CCD performance for the UV range and a detector collection lens offers high sensitivity.

Digital IO ports enable external triggering and control of shutter and pulsed light sources from the Avantes line of instruments.

The AvaSpec-3648 has a USB2 interface with fast data sampling of 270 spectra per second and data transfer in 3.7 ms. It supports analog in- and outputs as well. Optional Bluetooth[®]

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(-BT) communication and an SD card for on-board saving of spectra can be added. The AvaSpec-3648-USB2 runs on USB power and comes with AvaSoft-basic, a complete manual and USB interface cable. Multiple (up to 127) USB2 spectrometers with different detectors can be externally coupled (see section multichannel spectrometers, page 37).

Technical Data



Optical Bench	Symmetrical Czerny-Turner, 75 mm focal length
Wavelength range	200-1100 nm
Resolution	0.025 –20 nm, depending on configuration (see table)
Stray light	< 0.1%
Sensitivity (AvaLight-HAL, 8 μ m fiber)	14,000 counts (16-bit AD)/ μ W -per ms integration time
Detector	CCD linear array, 3648 pixels
Signal/Noise	350:1
AD converter	16 bit, 1MHz
Integration time	10 μ s – 10 minutes
Interface	USB 2.0 high speed, 480 Mbps or RS-232, 115.200 bps
Sample speed with on-board averaging	3.7 ms / scan
Data transfer speed	3.7 ms / scan (USB2) 750 ms / scan (RS-232)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, synchronization
Power supply	Default USB power, 350 mA. Or with SPU2 external 12VDC, 350 mA
Dimensions, weight	175 x 110 x 44 mm (1 channel), 716 grams

Grating selection table for AvaSpec-3648

Use	Useable range	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1100**	900**	300	300	UA
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	220-400	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	350-640	75-50*	2400	VIS	VE
NIR	500-1050	500	600	750	NB
NIR	500-1050	220-150*	1200	750	NC
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) for AvaSpec-3648

Grating (lines/mm)	Slit size (µm)					
	10	25	50	100	200	500
300	0.5	1.4	2.4	4.3	8.0	20.0
600	0.32	0.7	1.2	2.1	4.1	10.0
1200	0.07-0.13*	0.2-0.3*	0.4-0.6*	0.7-1.0*	1.4-2.0*	3.3-4.8*
1800	0.05-0.08*	0.12-0.21*	0.2-0.36*	0.4-0.7*	0.7-1.4*	1.7-3.3*
2400	0.04-0.07*	0.08-0.15*	0.14-0.25*	0.3-0.5*	0.5-0.9*	1.2-2.2*
3600	0.025-0.04*	0.07-0.10*	0.11-0.16*	0.2-0.3*	0.4-0.6*	0.9-1.4*

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

ORDERING INFORMATION

AvaSpec-3648-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	
-SPU2	incl. switch for USB powered or external power for RS-232/BT
-SPU2-BT	Bluetooth® interface for USB2 platform only, including antenna and switch
SDXXX	Internal XXX MB SD card for on board data saving, for USB2 platform only
DUV	Deep UV detector coating >150 nm
DCL-UV/VIS	Detector Collection Lens to enhance sensitivity, Quartz, 200-1100 nm
DCL-UV/VIS-200	Quartz Detector Collection Lens (200-1100nm) for >200µm fibers
SLIT-XX	Slit size, please specify XX = 10, 25, 50, 100, 200, 500 µm
OSF-YYY-3	Order sorting filter for reduction of 2 nd order effects, 3 mm thick, please specify YYY= 385, 475, 515, 550, 600 nm
OSC	Order sorting coating with 590nm long pass filter for VA, BB (>350nm) and VB gratings in AvaSpec-3648
OSC-UA	Order sorting coating with 350 and 590nm longpass filter for UA gratings in AvaSpec-3648
OSC-UB	Order sorting coating with 350 and 590nm longpass filter for UB or BB (<350nm) gratings in AvaSpec-3648

AvaSpec-2048x14 High UV-sensitivity back-thinned CCD Spectrometer

The AvaSpec-2048x14 Fiber Optic Spectrometer is a back-thinned type CCD spectrometer with high quantum efficiency and high UV sensitivity. The optical design is based on the AvaBench-75 symmetrical Czerny-Turner design with a 2048x14 pixels high UV sensitive CCD image sensor. The image sensor is used as a linear array of 2048 pixels binning the vertical 14 pixels to optimize efficiency. The spectrometer has a fiber optic entrance connector (standard SMA, others possible), collimating and focusing mirror and a diffractive grating. A choice of 16 different gratings with different dispersion and blaze angles enable applications in the 200-1160nm range. The AvaSpec-2048x14 comes with a 16 bit AD converter, and USB2.0 high speed interface. The AvaSpec-2048x14 is especially suitable for measuring low light, fluorescence and UV-applications. Digital IO ports enable external triggering and control of shutter and pulsed light sources from the Avantes line of instruments.

The AvaSpec-2048x14 has a USB2 interface with fast data sampling of 450 spectra per second and data transfer in 2.24 ms and supports analog in- and outputs as well. Optional Bluetooth® (-BT) communication and an SD card for on-board saving of spectra can be added. The AvaSpec-2048x14-USB2

AvaSpec-2048x14



runs on USB power and comes with AvaSoft-basic, a complete manual and USB interface cable. Multiple (up to 127) USB2 spectrometers with different detector types can be externally coupled (see section multi-channel spectrometers, page 37).

Technical Data



Optical Bench	Symmetrical Czerny-Turner, 75 mm focal length
Wavelength range	200-1160 nm
Resolution	0.04 –20 nm, depending on configuration (see table)
Stray light	< 0.1%
Sensitivity (AvaLight-HAL, 8 µm fiber)	16,000 counts (16-bit AD)/µW -per ms integration time
UV Quantum efficiency	35-65% (200-300nm)
Detector	Back-thinned CCD image sensor 2048x14 pixels
Signal/Noise	500:1
AD converter	16 bit, 1.5MHz
Integration time	2.24 ms – 10 minutes
Interface	USB 2.0 high speed, 480 Mbps or RS-232, 115.200 bps
Sample speed with on-board averaging	2.24 ms / scan
Data transfer speed	2.24 ms / scan (USB2) 432 ms / scan (RS-232)
Digital IO	HD-26 connector, 2 Analog in, 2 Analog out, 3 Digital in, 12 Digital out, trigger, synchronization
Power supply	Default USB power, 350 mA. Or with SPU2 external 12VDC, 350 mA
Dimensions, weight	175 x 110 x 44 mm (1 channel), 716 grams

Grating selection table for AvaSpec-2048x14

Use	Useable range	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1160**	900**	300	300	UA
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	220-400	70-45*	3600	UV	UF
UV/VIS	250-850	520	600	400	BB
VIS/NIR	300-1160**	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	350-640	75-50*	2400	VIS	VE
NIR	500-1050	500	600	750	NB
NIR	500-1050	220-150*	1200	750	NC
NIR	600-1160**	500**	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) for AvaSpec-2048x14

Grating (lines/mm)	Slit size (μm)					
	10	25	50	100	200	500
300	0.8	1.4	2.4	4.3	8.0	20.0
600	0.4	0.7	1.2	2.1	4.1	10.0
1200	0.1-0.2*	0.2-0.3*	0.4-0.6*	0.7-1.0*	1.4-2.0*	3.3-4.8*
1800	0.07-0.12*	0.12-0.21*	0.2-0.36*	0.4-0.7*	0.7-1.4*	1.7-3.3*
2400	0.05-0.09*	0.08-0.15*	0.14-0.25*	0.3-0.5*	0.5-0.9*	1.2-2.2*
3600	0.04-0.06*	0.07-0.10*	0.11-0.16*	0.2-0.3*	0.4-0.6*	0.9-1.4*

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

ORDERING INFORMATION

AvaSpec-2048x14-USB2	Fiber Optic Spectrometer, 75 mm Avabench, 2048x14 pixel back-thinned CCD detector, USB powered high speed USB2 interface, incl. AvaSoft-Basic, USB interface cable, specify grating, wavelength range and options
Options	
-SPU2	incl. switch for USB power or external power for RS-232/BT
-SPU2-BT	Bluetooth® interface for USB2 platform only, including antenna and switch
SDXXX	Internal XXX MB SD card for on-board data saving
DCL-UV/VIS-200	Quarz Detector Collection Lens (200-1100nm)
SLIT-XX	Slit size, please specify XX = 10, 25, 50, 100, 200, 500 μm
OSF-YYY-3	Order sorting filter for reduction of 2 nd order effects, 3 mm thick, please specify YYY= 385, 475, 515, 550, 600 nm
OSC	Order sorting coating with 590nm long pass filter for VA, BB (>350nm) and VB gratings in AvaSpec-2048x14
OSC-UA	Order sorting coating with 350 and 590nm longpass filter for UA gratings in AvaSpec-2048x14
OSC-UB	Order sorting coating with 350 and 590nm longpass filter for UB or BB (<350nm) gratings in AvaSpec-2048x14