ARIS

Compact UV/VIS spectrometer for scientific and industrial applications

Key Features

- Wavelengths between 185 and 1100 nm
- Significantly improved sensitivity
- Superior stray light performance
- Flexibility and reliability for industrial integration

The Aris spectrometer is the next step into the future of embedded spectroscopy. A laboratory-grade instrument that also meets the size, price and reliability requirements for portable and industrial applications.

With its high-throughput optical design, the Aris delivers 2 to 4 times better sensitivity than other spectrometers in this price range. An optimized stray light suppression enables the measurement of larger absorbance values.

The Aris offers an unsurpassed flexibility to adapt the spectrometer to the requirements of a specific application. It is available in six standard wavelength ranges that can be customized using a large choice of available diffraction gratings. The default entrance slit of 20 µm is user-replaceable and can be easily exchanged to obtain better sensitivity. Standard configurations include one of two image sensors (see below) with more choices available on request. The powerful microcontroller performs on-board auto exposure, averaging, buffering and spectrum processing. In addition, it enables the implementation of application-specific spectrum evaluation.

With its proven reliability in rough conditions and compact size, the Aris bridges the gap between laboratory and field spectrometers.

Optics

Optical design	Symmetrical high-throughput Czerny-Turner
Focal length	50 mm
Numerical aperture	0.16 (equivalent area)
Stray light	0.08 %
Detector lens	Included
Order sorting filter	Included (if required)
Optical interface	SMA connector (other interfaces on request)

Wavelength ranges and resolutions

The Aris is available in the following standard configurations. Contact us for customized wavelength range.

Configuration	Wavelength range	Resolution (FWHM) typ.	max.
ARIS Wide	185 – 1000 nm	1.00	1.20 nm
ARIS UV/VIS	185 – 550 nm	0.40	0.60 nm
ARIS UV	185 – 420 nm	0.33	0.40 nm
ARIS VIS	350 – 840 nm	0.60	0.70 nm
ARIS VIS/NIR	510 – 1020 nm	0.80	1.00 nm
ARIS Wide NIR	300 – 1100 nm	1.10	1.40 nm

Resolutions are given for the default 20 µm entrance slit and the Toshiba image sensor. A larger entrance slit typically increase both the resolution and the sensitivity proportional to its width. The wavelength accuracy is typically 1/3 of the resolution.

Image Sensors

The Aris is available with a choice of three image sensors:

- The Toshiba TCD1304 is more affordable, offers slightly better straylight performance and allows smaller exposure times.
- The Hamamatsu S11639-01 offers better sensitivity (mostly due to lower readout noise) and is much better suited for fast-changing signals and precise external triggering.
- The Hamamatsu S13496 is very similar, but has twice as many pixels. This improves the resolution, but decreases the sensitivity for weak signals.

	Toshiba TCD1304	Hamamatsu S11639-01	Hamamatsu S13496
Sensor type	CCD	CMOS	CMOS
Number of pixels	3648	2048	4096
Exposure times	3 µs – 35 min	54 µs – 35 min	54 µs – 35 min
SNR *	350	600	550
Dynamic Range **	1900 : 1	6000 : 1	5500 : 1
Readout noise ***	35 counts	11 counts	11 counts
Suitable for fast signals	moderate	very good	very good
Trigger jitter	≤ 1 exp. time	≤ 1 µs	≤ 1 µs

* Maximum Signal-to-Noise Ratio without averaging
** Without averaging, for a single pixel
*** Typical RMS value for a single exposure, scaled to 16 bit

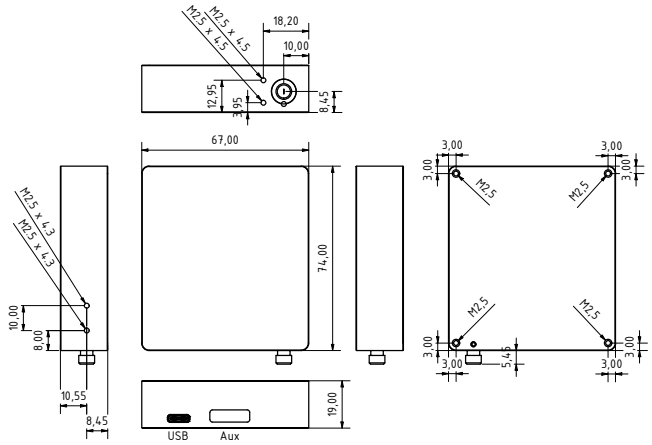
Electronics

Power supply	5 V via USB or Aux connector
Supply voltage range	4.4 – 5.5 V
Power consumption	≤ 70 mA
A/D converter	16 bit, 2 MHz
Non-linearity	< 1 %
Spectrum buffer size	35 spectra (Toshiba TCD1304DG) 63 spectra (Hamamatsu S11639-01)
Auto exposure	On-board during measurement (exposure time and averaging)
Fastest repetition time	4.0 ms (Toshiba TCD1304DG) 2.3 ms (Hamamatsu S11639-01)
Transfer time to host PC via USB (32 bit)	18 ms (Toshiba TCD1304DG) 10 ms (Hamamatsu S11639-01)
Transfer time to host PC via USB (16 bit)	9.5 ms (Toshiba TCD1304DG) 5.5 ms (Hamamatsu S11639-01)
On-board processing	Averaging, buffering and spectrum processing (offset, non-linearity, dark and reference spectrum)
Digital interfaces	USB 2.0 full speed, UART On request: SPI, I²C
I/O connections	Trigger in, Trigger out, Analog in, Analog out. On request: programmable I/O pins (GPIO), Pulse generator for flash lamps
Connectors	USB Type-C 16-pin Aux connector (IDC)

Absolute maximum ratings

	Minimum	Maximum (power on)	Maximum (power off)
Supply voltage	-0.3 V	5.5 V	
Analog input pins	-0.3 V	4.0 V	3.6 V
Digital input pins	-0.3 V	6.0 V	3.6 V
Output pins	do not apply any voltage		
Temperature	-40 °C	70 °C	70 °C

Technical Drawing



Mechanics and environmental conditions

Dimensions	67.0 × 74.0 × 19.0 mm *
Weight	122 g
Storage temperature	-40 to 70 °C
Operating temperature	-20 to 60 °C
Humidity	0 to 90 % non-condensing

* Without optical interface, see technical drawing below.

Included accessories

- USB cable
- USB memory stick with software and documentation
- Quick start guide
- Calibration and test report

Optional accessories

- Larger entrance slits (user-replaceable)
  Available slit sizes: 10, 20, 50, 75, 100, 150, 200, 300 µm
- Fiber-optical patch cables
- Cosine corrector
- SMA collimator
- Direct-attach collimator

Custom options

- Custom wavelength ranges and blaze wavelengths
- Different image sensors
- Additional optical filters
- Application-specific processing and evaluation

Included software

- Application software (Windows 7 and later)
- Software Development Kit (SDK) with Demo code, drivers and protocol documentation

Compliance

The Aris complies with the relevant EU regulations and standards concerning electromagnetic compatibility (2014/30/EU), RoHS (Restriction of Hazardous Substances) SVHC (Substances Of Very High Concern) as well as the U.S. Congo Conflict Minerals Act. Details can be found in the user manual.

Ordering Information

Part number: ARIS-AAA-BBB-CC-DDD

AAA: Start wavelength in nm
BBB: End wavelength in nm
CC: Entrance slit width in µm
DDD: Image sensor: TCD = Toshiba TCD1304,
S11 = Hamamatsu S11639, S4K = Hamamatsu S13496

All information is subject to change. The most recent version of this datasheet can be found on our website.

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