

# ARIS

Compact USB spectrometer for portable and industrial integration

## Key Features

- Significantly improved sensitivity
- Superior stray light performance
- Miniature size
- More affordable than ever



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 five standard wavelength ranges that can be customized using a large choice of available diffraction gratings. The default entrance slit of 20  $\mu\text{m}$  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)

\* Measured with halogen lamp and long-pass filter

## Wavelength ranges and resolutions

Configuration	Wavelength range	Resolution (FWHM)	
		typ.	max.
Wide	185 – 970 nm	1.10	1.40 nm
UV/VIS	185 – 550 nm	0.40	0.60 nm
UV	185 – 420 nm	0.33	0.40 nm
VIS	350 – 840 nm	0.65	0.80 nm
VIS/NIR	510 – 1020 nm	0.80	1.00 nm

Resolutions are given for the default 20  $\mu\text{m}$  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

	Toshiba TCD1304DG	Hamamatsu S11639-01
Number of pixels	3648	2048
Exposure time range	3 $\mu\text{s}$ – 35 min	54 $\mu\text{s}$ – 35 min
Signal-to-Noise Ratio *	350	600
Dynamic Range **	1900 : 1	5000 : 1
Pixel readout speed	1 MHz	2 MHz
UV sensitivity	excellent	good
Suitable for fast-changing signals	moderate	very good
Trigger jitter	$\leq$ 1 exposure time	10 $\mu\text{s}$

\* Maximum Signal-to-Noise Ratio without averaging

\*\* Without averaging, for a single pixel

## Custom option

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

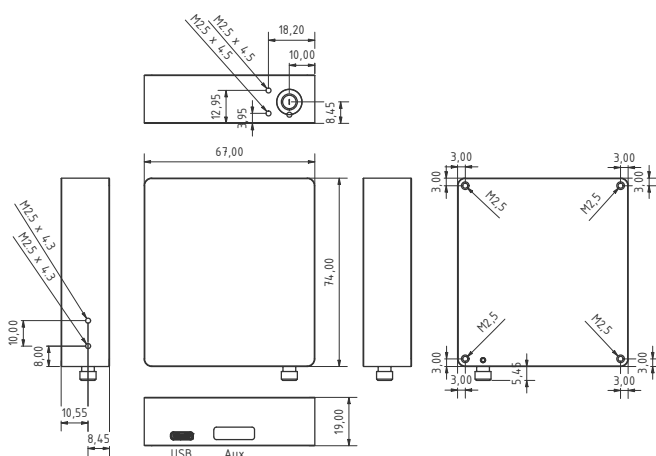
## Electronics

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)
Minimum repetition time	4 ms (Toshiba TCD1304DG) 2.5 ms (Hamamatsu S11639-01)
Transfer time to host PC via USB	17 ms (Toshiba TCD1304DG) 13 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 On request: UART, SPI, I <sup>2</sup> C
I/O connections	Analog in, Analog out. On request: Trigger in, Trigger out, 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



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

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## 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)
- Fiber-optical patch cables
- Cosine corrector
- SMA collimator
- Direct-attach collimator

## Included software

- Application software (Windows 7 and later)
- Software Development Kit (SDK) with Demo code and software library

## 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.



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