



# HASO

## SWIR FAST

Wavefront sensor  
**Fast Shack-Hartmann for SWIR**

- High-speed
- High accuracy
- Minimized delay



Preliminary  
Datasheet



# HASO SWIR FAST +

**Ideal for FSO and SatCom,  
the HASO SWIR FAST  
Shack-Hartmann  
wavefront sensor  
meets all demanding  
applications in SWIR AO  
with its frame rate of  
4.5kHz**



This HASO is included in CIAO SWIR, our standard and simple solution to integrate adaptive optics on a telescope.

## APPLICATIONS

Successfully used in the most demanding applications in optical metrology that require high speed for Short Wave Infra Red characterization, Free Space Optics and satellite communication, the HASO SWIR FAST performs multiple functions :

- + Quantify atmospheric turbulence in SWIR
- + Quantify the pointing stability of high frame rate laser
- + Drive a deformable mirror in high frame rate adaptive optics setups

## FEATURES

- + Direct wavefront acquisition of converging and diverging F/5 beams with an accuracy of  $\lambda/100$  RMS including astigmatism and high-order aberrations
- + Perfect knowledge of the measurement time by using the external trigger feature
- + Latency optimized to less than 1 ms, including wavefront measurement, allowing high performance adaptive optics
- + Only 0.2 nW power level needed on the sensor to acquire the wavefront with an accuracy of 30 nm RMS at 4 kHz
- + Patented technology for simultaneous and independent measurements of phase and intensity : no bias in presence of strong scintillations



High performance Dual Camera  
Link frame grabber

# SPECIFICATIONS\*

## OPERATING SPECS

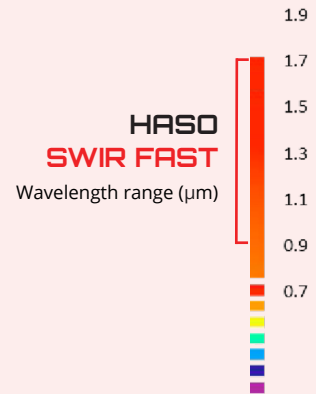
Aperture dimension	1.75 x 1.75 mm <sup>2</sup>
Number of microlenses	11 x 11
Maximum acquisition frequency	4.5 kHz
Calibrated wavelength range	0.9 - 1.7 μm
Minimum power	0.1 nW
External trigger	TTL signal
Operating system	Windows 10 & 11

## OPTICAL SPECS

Repeatability	λ/200 RMS
Absolute wavefront measurement accuracy	15 nm RMS
Spatial sampling	150 μm
Tilt dynamics range	> ± 3°
Focus dynamics range	± 0.008 m to ± ∞

## MISC

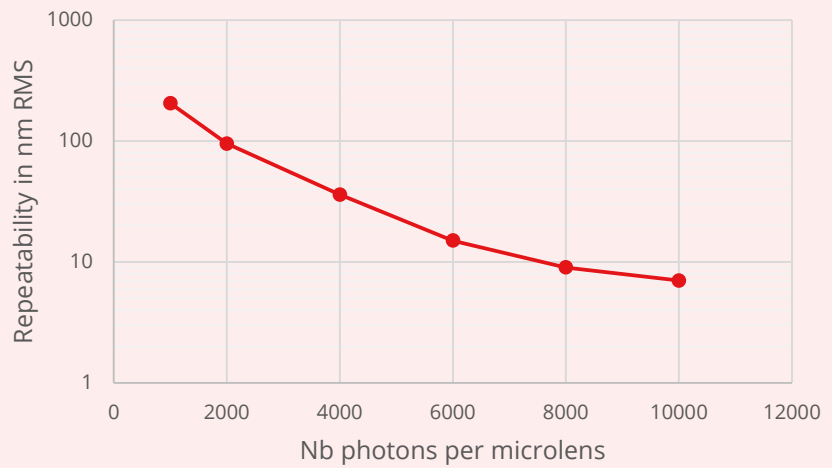
Dimensions (Height x Width x Length)	56 x 62.6 x 73.4 mm <sup>3</sup>
Working temperature	15 - 30 °C
Interface	Dual camera link frame grabber
Power consumption	1.5 A / 12 V



## HASO SWIR FAST

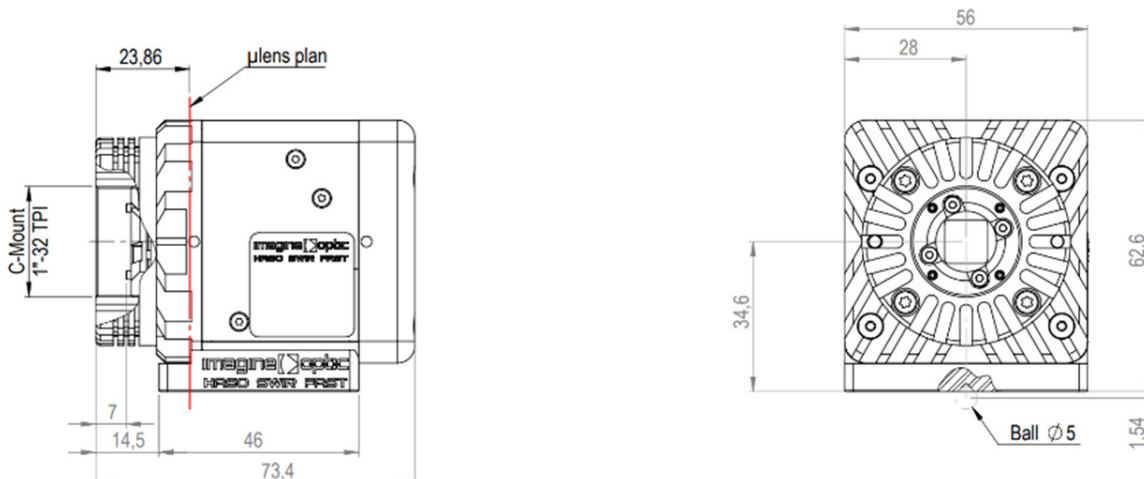
Repeatability at low flux

HASO SWIR FAST repeatability @1.55μm



\*Subject to changes without further notice

## DIMENSIONS (mm)



# SOFTWARE

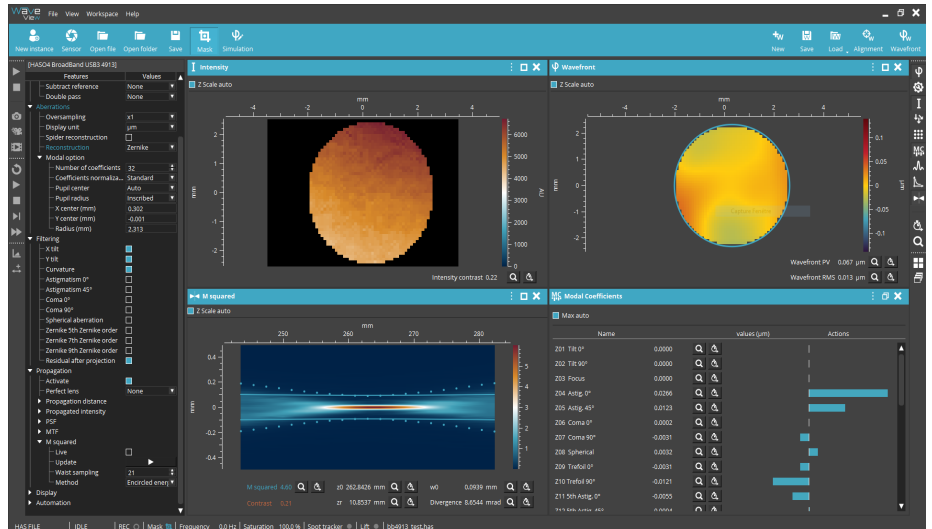
## WAVEVIEW Metrology Software

WAVEVIEW is the most advanced wavefront measurement and analysis software.

It offers more than 150 features and tools optimized for a wide range of highly demanding applications.

### Options :

- + Extensions for PSF, MTF and Strehl ratio
- + Optional SDK in C/C++, LabVIEW and Python



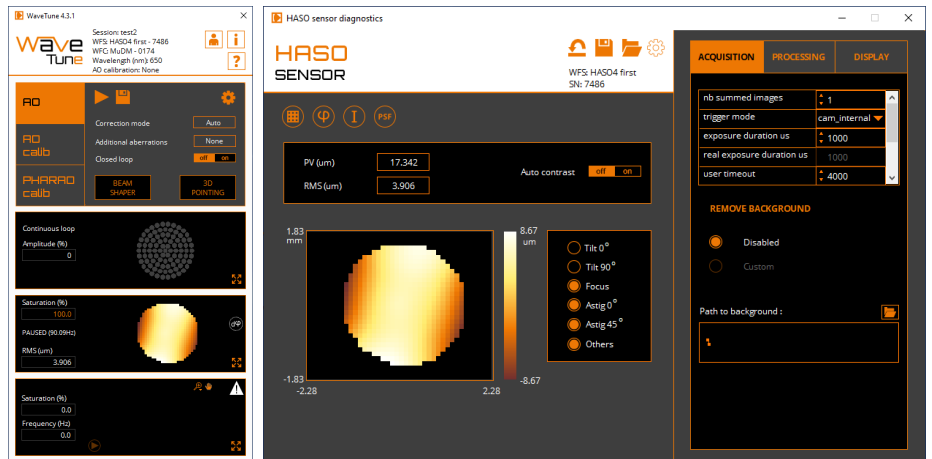
## WAVETUNE Adaptive Optics Software

WAVETUNE is a unique software that seamlessly combines wavefront measurement and correction features with extensive instrument diagnostics.

It is perfectly adapted to our HASO wavefront sensors, ILAO STAR, MIRAO and mu-DM deformable mirrors, as well as to a wide range of active components.

### Options :

- + Optional SDK in C/C++, LabVIEW and Python



## WAVESKY Adaptive Optics for Astronomy Software

WAVESKY is an AO software optimized in terms of speed and latency to drive fast deformable mirrors and remove high speed turbulences.

Simply connect your program to WAVESKY kernel and switch on AO when you need it.

This software is compatible with Python.



## CONTACT US

**Imagine Optic Headquarters**  
18, rue Charles de Gaulle  
91400 ORSAY · France  
Phone +33 (0)1 64 86 15 60  
sales@imagine-optic.com  
www.imagine-optic.com

