Optically Addressed Spatial Light Modulator - NIR

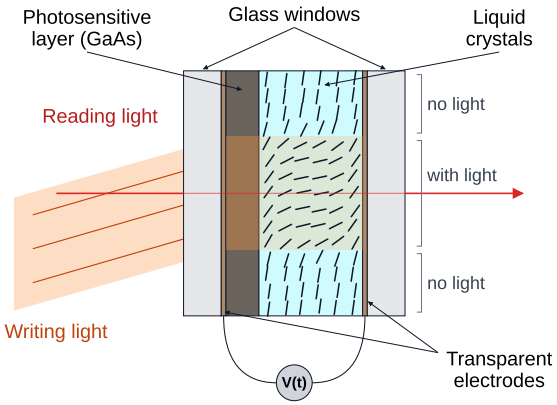
FEATURES

Liquid-crystal *Optically Addressed Spatial Light Modulator* with a continuous photosensitive substrate in place of pixels.

- Photosensitive substrate in the NIR (writing light)
- Reading light above 950 nm: transmission or reflection mode
- Reading light below 950 nm: reflection mode
- Spatial resolution 80 µm
- Phase or amplitude modulation
- Phase shift up to 3.5 π at 1550 nm (example)
- Response time from tens of ms to about 1 s
- Clear aperture 20 mm

DESCRIPTION

The OASLM-NIR, also called a Light-Valve (LV), is a spatial light modulator made with a photoconductive layer of semi-insulating GaAs instead of pixels.

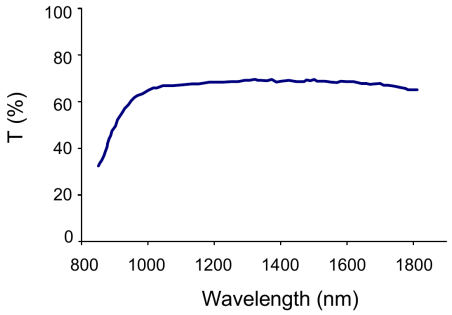


The addressing (writing) is made optically by shining the GaAs side with light in the near infrared; the sensitivity range is 800 – 1550 nm. “NIR” refers to this writing wavelength: the reading light to be modulated can be different.

Reading beams above 950 nm can be used in transmission or in reflection. Below 950 nm, where GaAs is opaque, the device works in reflection only.

Without writing light the LC molecules stay close to the plane of the plates; where the writing light falls they turn towards the beam axis. The refractive index seen by the reading light therefore follows the intensity profile of the addressing light.

Spectral transmission is shown from 850 to 1850 nm; light is linearly polarized along the LC director.



The device can modulate the reading light in phase, or in intensity if placed between crossed polarizers. The OASLM-NIR also provides a Kerr-like optical response with a tunable nonlinear coefficient.

The OASLM-NIR is mounted in a compact aluminum housing, with an SMA connector for electrical driving.

Each OASLM is designed for its application: the liquid crystal, its thickness and the photoconductor set the speed, the sensitivity and the modulation depth. The values given here are examples measured on HOASYS devices.

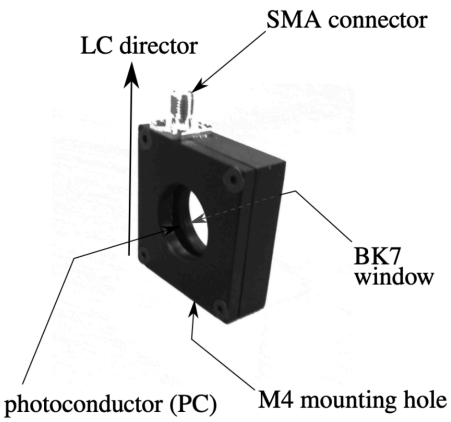
APPLICATIONS

- Reconfigurable phase, intensity and polarization masks
- Laser beam shaping and beam cleanup
- Wavelength conversion
- Holography, interferometry, optical sensors
- Microscopy, imaging systems
- Nonlinear optics and optical wave-mixing
- Optical neural networks: nonlinear optical activation functions
- Optical computing and complex optics, vortex beams



Optically Addressed Spatial Light Modulator - NIR

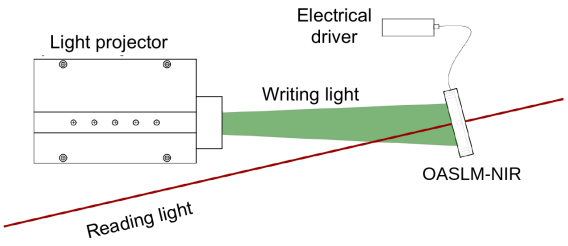
VIEWS



DEVELOPMENT KIT

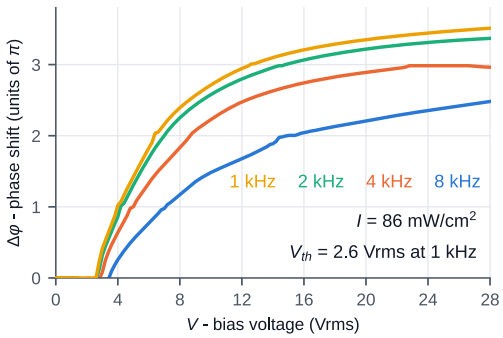
A development kit includes the OASLM-NIR, its electrical driver and its specifically designed light projector.

Software for controlling the driver and for generating the optical masks is provided with the kit.



CHARACTERISTICS

Item	OASLM-NIR
Operating mode, reading light > 950 nm	Transmission or reflection
Operating mode, reading light < 950 nm	Reflection
Power consumption (V = 20 Vrms, f = 1 kHz)	< 80 mW
AR coating	NIR (or custom wavelength)
Optical transmission (λ = 1030 nm)	> 65 %
Phase modulation (example: 1550 nm, 28 Vrms)	up to 3.5 π
Transverse spatial resolution	80 µm
Clear aperture	20 mm
LC thickness	9 ± 0.05 µm
Weight	70 g
Dimensions	40 mm × 40 mm × 20 mm



EXAMPLE OF PHASE RESPONSE

Phase shift of a 1550 nm beam that both writes and reads the device, in transmission (self-phase modulation), against the bias voltage at four bias frequencies; light intensity 86 mW/cm^2. Up to 3.5 π.

RECOMMENDED OPERATING CONDITIONS

	Minimum	Typical	Maximum	Units
Supply AC* voltage	7	20	28	Vrms
Driving voltage frequency	30	1k	10k	Hz
Driving voltage waveform		Sinusoidal		
Writing light optical wavelength	800		1550	nm
Writing light intensity	0.2		3.5	mW/cm^2
Working temperature	4		80	°C

* The optimized response of the device is obtained for an applied AC voltage with no DC component. An electrostatic or DC voltage applied for several hours could permanently damage the device.