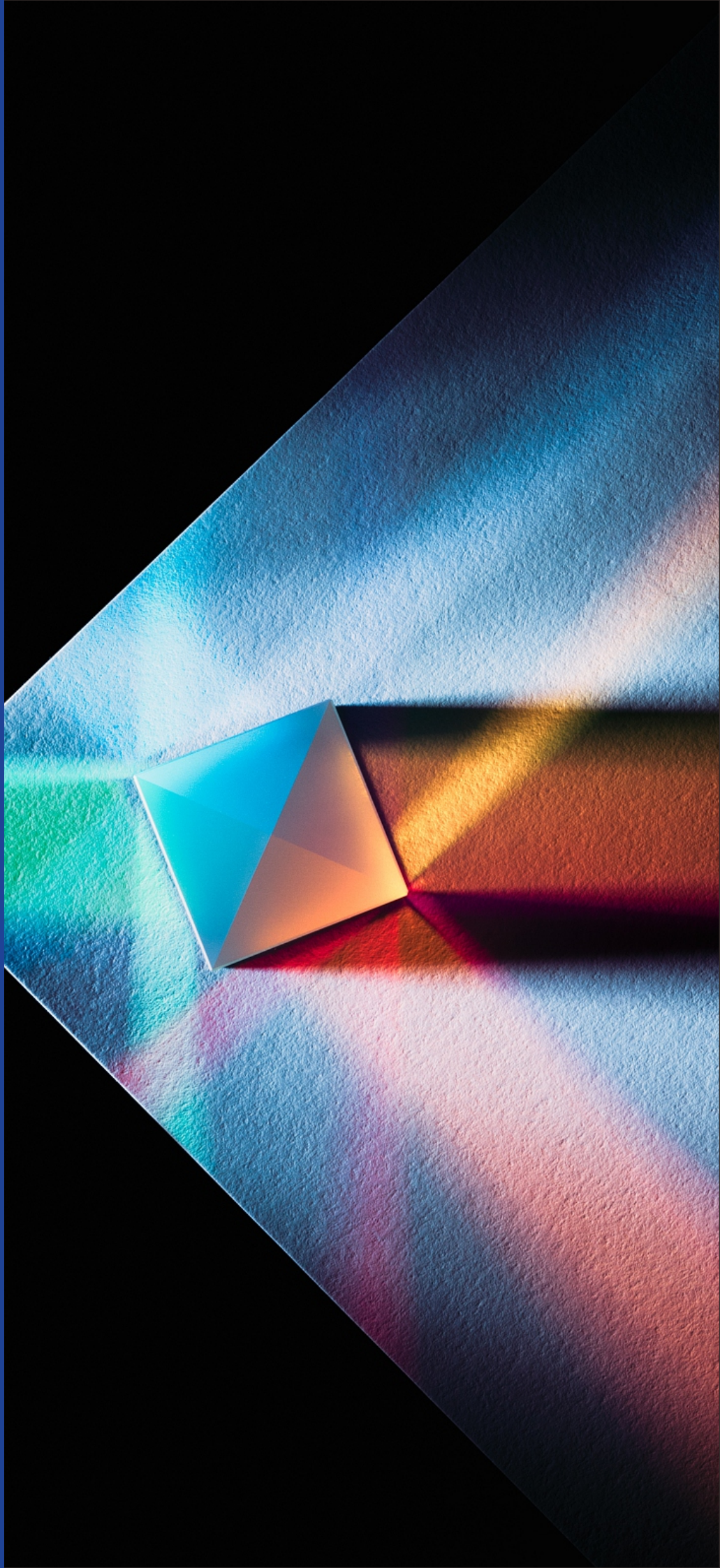


Spatial Light Modulator Products Manual



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Company Profile

UPOLabs is committed to provide leading light wave phase devices, highly specialized technical services as well as diversified custom development solutions based on high-quality experimental systems and opto-mechanical and electrical modules.

Exploring photonics technology for more than 10 years, we are providing products in two categories of spatial light modulators and structured light products in extension of more than 100 models. Our products are widely used in laser beam shaping, computational optics, adaptive optics, holographic displays, laser processing, machine vision and other cutting-edge technologies.

To know more about UPOLabs, please visit our website: <http://www.upolabs.com/>

Overview of LCoS Liquid Crystal Spatial Light Modulators

HDSLM80R Series

0.003π@24h phase stability | 1920*1200 resolution | 8μm pixels | Full wave band for scientific research



HDSLM80R Plus



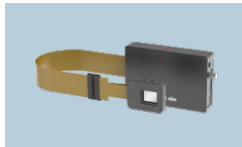
HDSLM80R Pro



HDSLM80R Smart



HDSLM80RT



HDSLM80R DC Series

Product Parameter

Version	Types	Wavelength	Modulation Mode
Bit depth: 8bit	HDSLM80R	420~1100nm	Phase-only / Amplitude-only (A*)
8bit/10bit Configurable	HDSLM80R Plus	1064±100nm (NIR*Near infrared)	
TEC Temperature Controlled Version	HDSLM80R Pro	1550±100nm (TELCO* Communicationband)	
Industrial Smart Version	HDSLM80R Smart	532nm±50nm (G* Special coating)	
High-Efficiency Version	HDSLM80R DC	800 (1064) ±30nm	
Transmission Version (Customized)	HDSLM80RT	Customized	

* If the product-coating is in the near infrared band, "-NIR" is added after the letter R in the type number, e.g. HDSLM80R-NIR.

* If the product-coating is in the communication band, "-TELCO" is added after the letter R in the type number, e.g. HDSLM80R-TELCO.

* If the product-coating is in the green band, "-G" is added after the letter R in the type number, e.g. HDSLM80R-G.

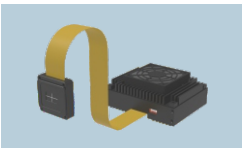
*For High-Efficiency products, the letter DC is added after the letter R in the type number, e.g., HDSLM80R DC1064 for amplitude type products of high-efficiency version.

*For amplitude modulation products, the letter A is added after the letter R in the type number, e.g., HDSLM36RA for amplitude type products of high-speed basic version.

4K High Resolution Series

HDSLM36R Series

4K Resolution | Tiny pixels | Applicable for holographic algorithm research



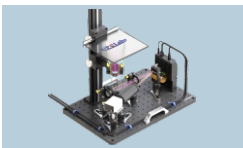
HDSLM36R



HDSLM36R Lite



HDSLM38R



HDSLM36RKit



HDSLM36R PCIe

Product Parameter

Version	Types	Wavelength	Modulation Mode
High-speed Standard Version	HDSLM36R	420~670nm (VIS)	Phase-only / Amplitude-only
High-speed Holographic Set	HDSLM36R-Kit		
High-speed Compact Version	HDSLM36R-Lite		
PCIe Multi-channel Version	HDSLM36R PCIe		
High-stability Version	HDSLM38R	420-1100nm Near infrared 1064±100nm (NIR)	

Cost-effective Series

HDSLM45R/HDSLM64R/HDSLM64RA Series

4.5μm/6.37μm | 1080P HD resolution | Dynamic holography research applicable for commercialization
OEM version available



HDSLM45R



HDSLM64R/64RA

Product Parameters

Version	Types	Wavelength	Modulation Mode
Ultra High-frame Rate Version	HDSLM45R	420~650nm	Phase-only
Omnipotent version	HDSLM64R	400~700nm	
	HDSLM64RA		Amplitude-only

High Stability Liquid Crystal Spatial Light Modulator

HDSLM80R Series



Covering the full wave band in range of 420nm~1550nm, HDSLM80R Series satisfy the phase requirements of infrared band and 1550nm communication band. The Series provide phase modulation depth $>2\pi$, $8\mu\text{m}$ pixel size and 1920×1200 resolution. According to the diversified coating optimization designs, we provide four phase-only models and one amplitude-only model.

Product Parameter

Types	Modulation Mode	Resolution	Frame Rate	Pixel Size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM80R	Phase-only	1920*1200	60Hz	8 μm	8bit	> 95%	/	2.6 π @1064nm	420~1100nm
HDSLM80R-NIR								2.5 π @1064nm	1064 $\pm$ 100nm
HDSLM80R-TELCO								2.6 π @1550nm	1550 $\pm$ 100nm
HDSLM80R-G								2.8 π @532nm	420~600nm
HDSLM80RA	Amplitude-only						~1000 : 1	/	420~700nm

Phase stability: 0.0003 π @24h

Linearity: 99.9% [Test method: power test demodulated phase, 25°C ambient temperature, 532nm laser source]

Damage threshold: >5W/cm², >10W/cm² for water-cooled version

Application Fields

We offer highly specialized solutions for custom development and volume commercial R&D based on HDSLM80R Series in the fields of optical field modulation, optical communications, optical storage and optical computers, and manufacturers developing holographic optical tweezers, nano-lithography, optical communications WSS modules, laser cutting, and stealth dicing equipment.

Invisible Laser cutting

HDSLM80R Series are applicable in cutting equipment for hard, thin, brittle, and transparent materials, verified for threshold over 10W above continuous power and 140μJ femtosecond laser.

Projection lithography

HDSLM80R Series have been verified in low power 2W/cm² 405nm wavelength projection lithography. The amplitude-type HDSLM80R Series are core devices for developing 3D printers and exposure machines. The phase-type HDSLM80R Series are typically used to develop holographic printing and nanolithography application devices.

WSS development

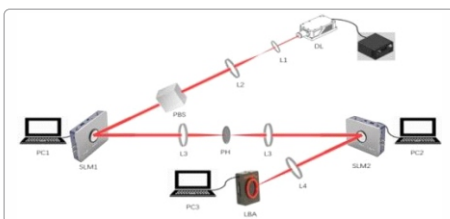
HDSLM80R Series are used as the core component for the development of WSS, TOF and other optical device products.

Beam deflection

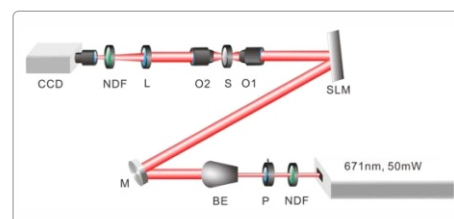
1550nm model is the core beam control device for the development of multi-point laser tracker and vibrometer. Its high stable beam pointing ability with tunable laser source supports to achieve long time high precision tracking.

Thesis Case

1. «Generalized phase calibration method of liquid crystal spatial light modulator with absolute reference system of obnoxious background light», Optics and Lasers in Engineering 132 (2020) 106132.
2. «Single-shot wavelength-selective quantitative phase microscopy by partial aperture imaging and polarization-phase-division multiplexing», Optics Express Vol. 28, Issue 23, pp. 34825-34834 (2020).
3. «Multi-beams engineered to increase patterns of vortex lattices by employing zero lines of the coherent non-diffracting field», Optics Express Vol. 27, Issue 15, pp. 21652-21666 (2019).
4. «Polygonal shaping and multi-singularity manipulation of optical vortices via high-order cross-phase», Optics Express Vol. 28, Issue 18, pp. 26257-26266 (2020).
5. «Reprogrammable meta-hologram for optical encryption», [Nature Communications](#) volume 11, Article number: 5484 (2020).



Experimental cases of beam shaping at Xi'an Jiaotong University



Experimental case of vortex beam orbital angular momentum measurement at Xi'an University of Electronic Science and Technology (XUET)

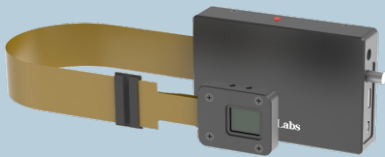
High Stability Liquid Crystal Spatial Light Modulator

HDSLM80R Plus Series



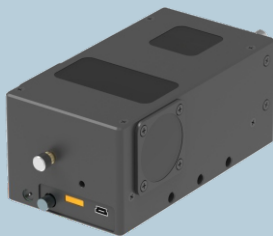
HDSLM80R Plus Integrated Type

- ▶ Small size allowing easy integration
- ▶ LCoS angle pitch-adjustable
- ▶ Lifting and lowering adjustable body
- ▶ Built-in water cooling



HDSLM80R Plus Separated Type

- ▶ Separated design of SLM screen and drive plate, allowing flexible optical path
- ▶ Good thermal stability



HDSLM80RT Transmissive Type (Customization required)

- ▶ Avoid repeated commissioning, one-stop optical path setup
- ▶ Coaxial version of incident outgoing optical path based on Plus
- ▶ Innovative structural design, easy to use

Compared with HDSLM80R series, HDSLM80R Plus series feature in 10bit /1024 grey scale, one click to switch between 8bit/10bit, image switching synchronous pulse, programmed control GPIO, built-in zero level deviation. We provide three structure versions for HDSLM80R Plus series: integrated, separated, and transmissive structure (customization required).

Product Parameter

Types	Modulation Mode	Resolution	Frame Rate	Pixel Size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM80R Plus	Phase-only	1920*1200	60Hz	8μm	Freely configuration of 8bit/10bit	> 95%	/	2.6π@1064nm	420~1100nm
HDSLM80R Plus-NIR								2.5π@1064nm	1064±100nm
HDSLM80R Plus-TELCO								2.6π@1550nm	1550±100nm
HDSLM80R Plus-G								2.8π@532nm	420~600nm
HDSLM80RA Plus	Only amplitude						~1000 : 1	/	420~700nm

Phase stability: 0.003π@24h

Linearity: 99.9% [Test method: power test demodulated phase, 25°C ambient temperature, 532nm laser source]

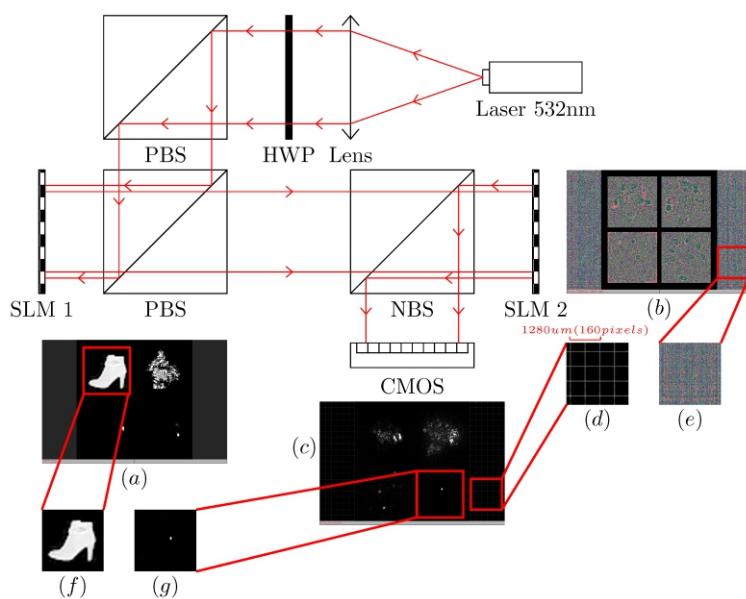
Damage threshold: >5W/cm², >10W/cm² for water-cooled version

Application Fields

Laser processing, projection lithography, holographic applications, optical field control, laser, microscope, optical network neural computing and other fields.

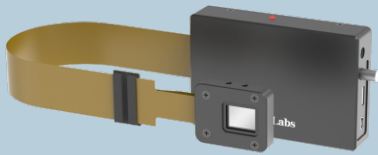
Thesis Case

«Partitionable High-Efficiency Multilayer Diffractive Optical Neural Network» Sensors 2022, 22, 7110.



High-Efficiency Liquid Crystal Spatial Light Modulator

HDSLM80R DC Series



HDSLM80R-DC800

- ▶ Water-cooling Structure
- ▶ Analog Driving Circuits
- ▶ Dielectric Coating for Higher Reflectivity

Distinguishing from conventional aluminum films, Modulator HDSLM80R-DC800 is featured with a specialized film stack designed targeting the 800nm absorption peak.

- 1 An Iterative Version Designed for Quantum Research Application
- 2 The reflectivity has been increased to a max of 92%
- 3 Thermal stability Improved by 10 times comparing with HDSLM80R version

Product Parameter

Type	Resolution	Pixel Size	Reflectance	Wavelength	Diffraction Efficiency (16th level)	Linearity	Phase Stability	Damage Threshold	Bit Depth
HDSLM80R DC 800	1920*1200	8μm	Typ: 89% Max: 92%	800±30nm	85%	$R^2 > 99.98\%$	$\sim 0.003\pi$	100W/cm ²	8bit / 10bit

Phase stability: 2.39π@808nm

Application Fields

Optogenetics

Biological Imaging

Diamond Cutting

Special Material Processing

Quantum precision measurement

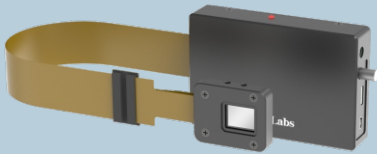
Optical Field Manipulation

Atomic Manipulation

Particle Trapping

Optical Tweezers

HDSLM80R DC Series



HDSLM80R-DC1064

- ▶ Reflectivity up to 88%~92%
- ▶ Diffraction Efficiency up to 85%

- 1 An Iterative Version Designed for High-power Laser Applications
- 2 The damage threshold at peak power has been increased to 100W/cm².
- 3 Optimized Design of Heat Dissipation Structure to Satisfy High-power Laser Processing

Product Parameter

Type	Resolution	Pixel Size	Reflectance	Wavelength	Diffraction Efficiency (16th level)	Linearity	Phase Stability	Damage Threshold	Bit Depth
HDSLM80R DC 1064	1920*1200	8μm	Typ: 89% Max: 92%	1064±30nm	85%	R ² > 99.98%	~0.003π	100W/cm ²	8bit / 10bit

Phase stability: 2.48π@1064nm

应用领域

Optogenetics

Biological Imaging

Nanostructure Etching

Micro-nano Fabrication

Glass/Silicon Carbide/
Wafer Hidden Cutting Processing

Special Material
Processing Research

Beam Manipulation
Optical Field Control

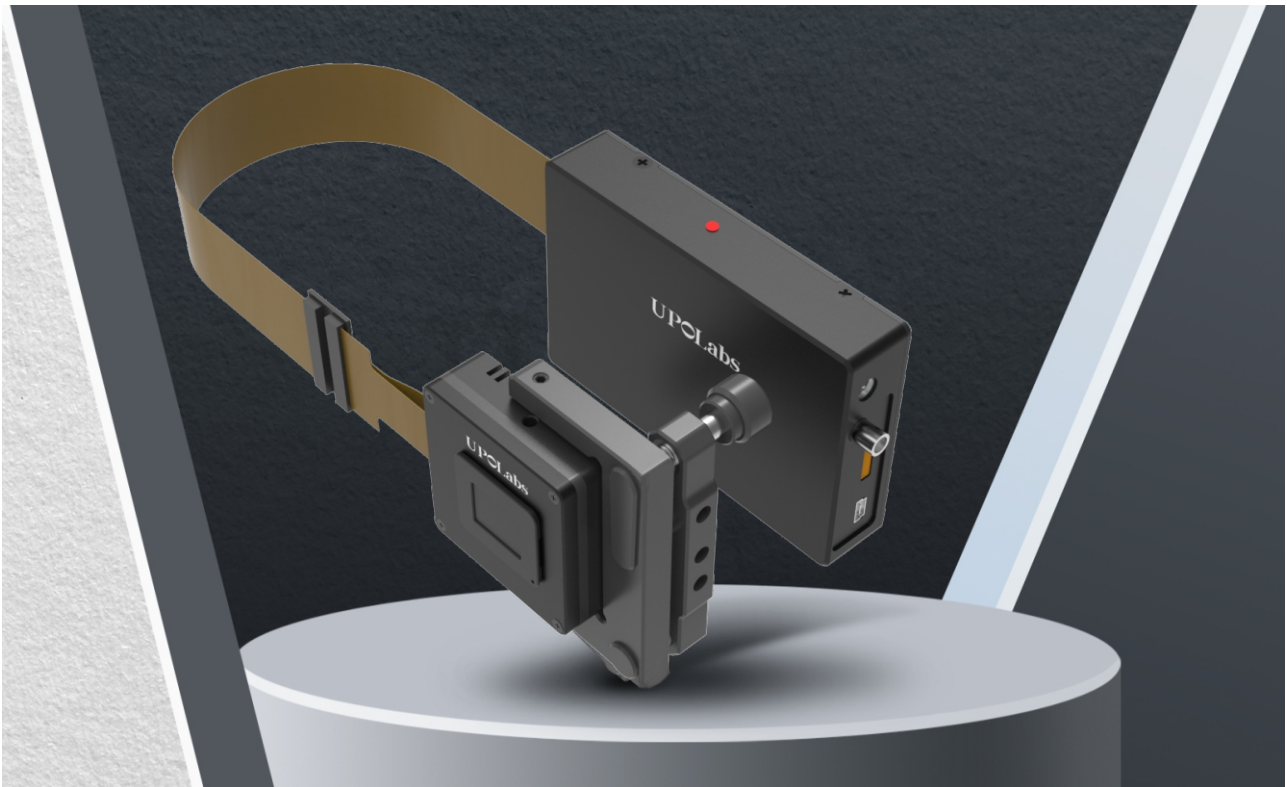
Laser Direct
Writing Lithography

Precise Phase Measurement

TEC Temperature Controlled Version Liquid Crystal Spatial Light Modulator

HDSLM80R Pro Series

The HDSLM80R Pro Liquid Crystal Spatial Light Modulator consists of a driver, FPC flexible cable, and LCoS temperature controller. Configured with the TEC controller and LETO TEC CONTROLLER software, it is used to set the operating temperature of the LCoS optical chip based on the ambient requirement.



Product Parameter

Types	Modulation Mode	Resolution	Frame Rate	Pixel Size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM80R Pro	Phase-only	1920*1200	60Hz	8μm	8 / 10bit	> 95%	/	2.6π@1064nm	420~1100nm
HDSLM80R Pro-NIR								2.5π@1064nm	1064±100nm
HDSLM80R Pro-TELCO								2.6π@1550nm	1550±100nm
HDSLM80R Pro-G								2.8π@532nm	420~600nm
HDSLM80RA Pro	Amplitude-only						~1000 : 1	/	420~700nm

Phase stability: 0.003π@24h

Linearity: 99.9% [Test method: power test demodulated phase, 25°C ambient temperature, 532nm laser source]

Damage threshold: >5W/cm², >10W/cm² for water-cooled version

Temperature Control Systems

The temperature setting of the LCoS optical chip is realized by the temperature control system, which consists of the LCoS temperature controller, the TEC controller and the LETO TEC CONTROLLER temperature control software. The three modules in the system work together to realize the temperature regulation and constancy of the LCoS optical chip. Further more, the system is a modular structure which allows easy replacement according to custom application requirements.

Temperature Control System	
Temperature setting range	30°C~55°C
Target temperature setting accuracy	± within 0.1°C
Operating ambient temperature range	Room temperature
Maximum incident laser power	10W/cm ² (in passive cooling mode)



LCoS Temperature-controlled Heat Sink

- ▶ Operating at room temperature, it can keep the working temperature of LCoS optical chip backplane constant at any temperature value from 30°C to 55°C, and can be heated up to 65°C. (Note: Unless specially customized, the performance of most LCoS chips on the market will be degraded at 65°C)
- ▶ Use passive heat sinks to exchange heat with the environment, avoiding the introduction of fan vibration using air cooling mode
- ▶ With two-dimensional adjustment frame to fine-tune the pitch/deflection angle of the LCoS optical chip



TEC Controller

- ▶ Connect the LCoS temperature control heat sink head with the host computer and send software commands to the LCoS temperature control heat sink head to control its operation
- ▶ Maximum operating temperature 65°C



LETO TEC CONTROLLER Software System

- ▶ LCoS Optical Chip Temperature Setting, algorithm Adjustment, real-time Display of Temperature Control Curve, recording Temperature Test Record, etc
- ▶ Read the temperature of LCoS optical chip and work with hardware system to stabilize it at the set temperature

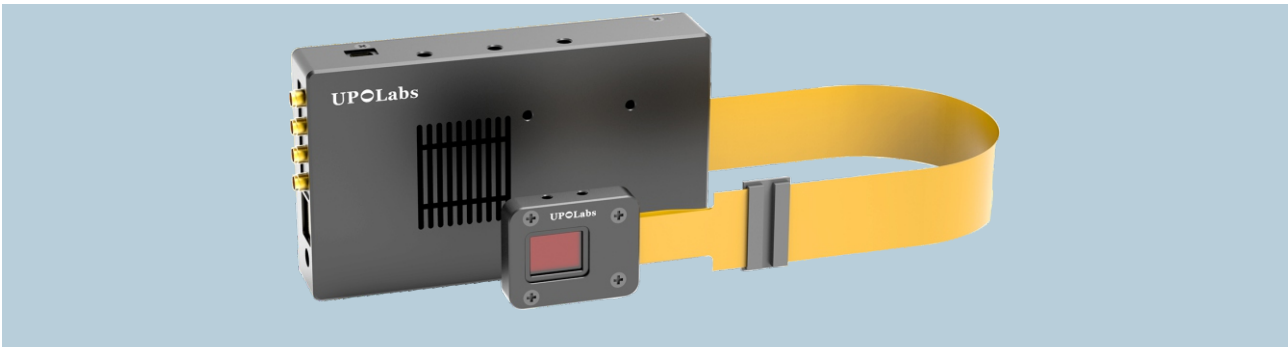
Application Fields

Space optical communication, quantum research, cold atom control and other scenarios requiring high phase accuracy and stability.

Industrial Intelligent Version Liquid Crystal Spatial Light Modulator

HDSLM80R Smart Series

The HDSLM80R Smart Series of liquid crystal spatial light modulators is a groundbreaking, Gigabit Ethernet port designed to support multiple SLMs simultaneously, with an open JTAG interface and a technical development service support team to assist customers in customizing and integrating individual beam modulation functions for light field modulation, holographic computing, beam manipulation, ultra-fast laser processing, optical computing, bio-imaging, quantum manipulation, and spatial optical communication.



Product Parameter

Types	HDSLM80R Smart	HDSLM80R Smart -NIR	HDSLM80R Smart -TELCO	HDSLM80R Smart-G	HDSLM80RA Smart
Modulation Mode	Phase-only				Amplitude-only
Resolution	1920*1200				
Frame Rate	60Hz				
Pixel Size	8μm				
Bit Depth	8/10bit				
Fill Factor	> 95%				
Amplitude Contrast	/	/	/	/	~1000 : 1
Phase Retardance	2.6π@1064nm	2.5π@1064nm	2.6π@1550nm	2.8π@532nm	/
Wavelength	420~1100nm	1064±100nm	1550±100nm	420~600nm	420~700nm
Damage Threshold	20W/cm²				
Storage Space	128GByte (Equivalence > 34,000 bitmaps)				
Memory Space	1GByte (Equivalence>300 bitmaps)				
Data Interface	Gigabit Ethernet port				
Control Interface	Gigabit Ethernet port / USB2.0 / TTL level interface				
Trigger Interface	4 standard SMA interfaces				
Computational Capacity	Millions of computing logic gate resources / JTAG opening				

Product Features

Adaptive hardware driving technology

- ▶ Water cooling mechanism, 24-hour phase stability 0.003π
- ▶ Network interface and PLC level control
- ▶ Phase addressing mechanism for graph-free operations

IP protection mechanism for public protocols and private interfaces

- ▶ The phase control model can be privately encrypted and cannot be cracked
- ▶ Pure level signal control protocol, directly connected to PLC control
- ▶ The FPGA has a built-in mapping table and private key mechanism

Applicable for laser closed-loop control interface design

- ▶ Allowing integration into fiber laser
- ▶ Four SMA interfaces allowing customized functional attributes
- ▶ Allowing connection to a sensor signal closed-loop control

Application Fields

Scientific Research Field

Optical field manipulation, holographic computing, beam manipulation, optical computing, bio-imaging, quantum manipulation, space optical communication, etc.

Industrial Field

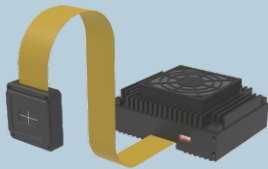
In Ultra-fast laser processing, it is used to accomplish functions such as light wave phase compensation, beam shaping, and dynamic multi-focus control of the stealth dicing system. It is applicable for the development of the following equipment systems:

Thin film laser parallel processing system, precision micro and nano processing system, precision metal surface structured quenching, texture modification system, intelligent wafer stealth dicing processing system, cold atom confinement manipulation, quantum research, two-photon, multi-photon micro-imaging and optical genetics system, biological 3D printing system, holographic optical tweezers and intelligent microscope illumination control module.

4K High Resolution Liquid Crystal Spatial Light Modulator

HDSLM36R Series

The HDSLM80R Smart Series of liquid crystal spatial light modulators is a groundbreaking, Gigabit Ethernet port designed to support multiple SLMs simultaneously, with an open JTAG interface and a technical development service support team to assist customers in customizing and integrating individual beam modulation functions for light field modulation, holographic computing, beam manipulation, ultra-fast laser processing, optical computing, bio-imaging, quantum manipulation, and spatial optical communication.



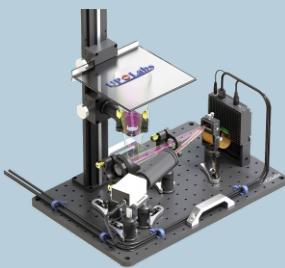
HDSLM36R / HDSLM36RA High-speed Basic Version

- ▶ LCoS optical chip section is adjusted leftwards and rightward as well as tilted upwards and downwards
- ▶ Long FPC data line, LCoS optical chip part is small and easy for integration
- ▶ High space bandwidth product, high imaging resolution



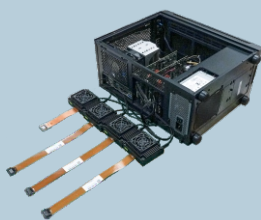
HDSLM36R- Lite High Speed Compact Version

- ▶ FPC cable is designed in a removable mode
- ▶ Separated-structure design with small control panel for compact space



HDSLM36R- Kit High Speed Holographic Kit

- ▶ Integrated design, avoid light path setup
- ▶ Plugged-in available



HDSLM36R- PCIe PCIe Multichannel

- ▶ One driver integrated with 4 LCoS heads
- ▶ Applicable for splicing 8K4K applications, supports splicing control up to 16K8K
- ▶ Applicable for multi-SLM cascade optical computing applications with hybrid amplitude-phase modulation
- ▶ Separated structure design

Product Parameter

Types	Modulation Mode	Resolution	Pixel Size	Pixel size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM36R	Phase-only	4096*2240 (3840*2160)	60Hz 180Hz	3.6μm	8bit	> 90%	/	> 2.3π@638nm	420~670nm
HDSLM36R-TELCO								> 2.3π@1550nm	1550nm
HDSLM36RA	Amplitude-only						100 : 1	/	420~670nm

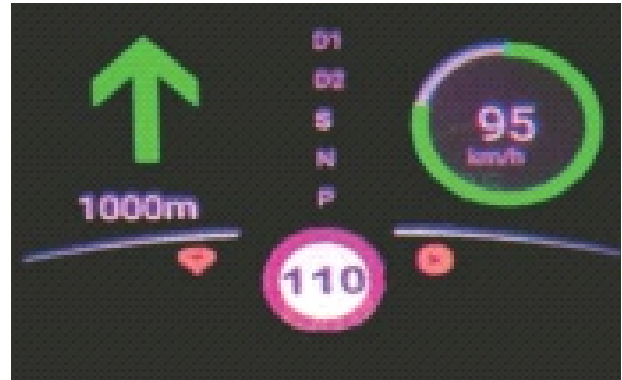
Note: The design of diversified models are determined by wavelengths , which are determined by coating parameters and liquid crystal box thicknesses.

The HDSLM36R LCoS data interface supports 3840*2160 resolution only.

Application Fields

Optical Field Regulation Beam Deflection Optical Split-Interleave-Multiplexing Free Space Optical Communication Ultra High Resolution Imaging Laser Processing/3D Printing Computational Holography Holographic Projection Holographic Storage.

Holographic Case Diagram



Thesis Case

1. «Conjugate wavefront encoding: an efficient eyebox extension approach for holographic Maxwellian near eye display» Optics Express Vol. 29, Issue 4, pp. 4927-4935 (2021).
2. «Generation of distortion-free scaled holograms using light field data conversion» Optics Express , Vol. 29, Issue 1, pp. 487-508 (2021).

4K High Resolution Liquid Crystal Spatial Light Modulator

HDSLM38R Series



3.8μm small pixel, compact size and integrated design, high integration, the LCoS screen allows adjustment leftwards and rightwards as well as pitch adjustment 1064nm and 1550nm band coating versions are available, self-developed Gamma correction method to realize real-time Gamma and high linearity.

Product Parameter

Types	Modulation Mode	Resolution	Frame Rate	Pixel Size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM38R	Phase-only	4096*2160	60Hz	3.8μm	8bit	> 90%	/	> 2.3π@532nm	420~640nm
HDSLM38R-NIR								> 2π@1064nm	1064±100nm
HDSLM38R-TELCO								> 2π@1550nm	1550±100nm
HDSLM38RA	Amplitude-only						1000 : 1	/	420~700nm

Application Fields

Optical field modulation

Holographic projection

Laser processing
3D printing

Optical interpolation
multiplexing

Computational holography

Beam deflection

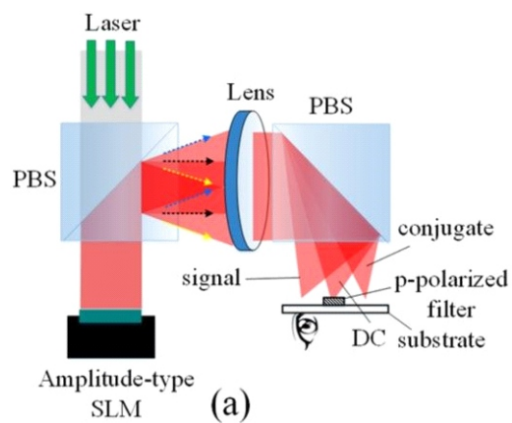
Thesis Case

Wuhan University : for holography research and ultra-surface micro- and nanostructures.

China University of Geosciences : research on light field modulation.

Xi'an Jiaotong University : beam manipulation and beam deflection research.

Experimental case of holographic display in Hefei University of Technology.



«Conjugate wavefront encoding: an efficient eyebox extension approach for holographic Maxwellian neareye display»

Cost-effective Liquid Crystal Spatial Light Modulator



HDSLM45R Series

- ▶ 1080P resolution, 4.5μm small pixel, large diffraction angle
- ▶ 60Hz for color mode, 180Hz for single color mode
- ▶ Phase modulation in visible bands $> 2\pi$
- ▶ Small size, easy to integrate



HDSLM64R Series

- ▶ 1080P resolution, 6.37μm pixels, $> 93\%$ fill factor
- ▶ Panel angle allows pitch adjustment
- ▶ Small size, easy to integrate

HDSLM high frame rate liquid crystal spatial light modulators feature in fast refreshing speed, small size, easy to integrate, optimized only for visible light applications as well as high cost-effective. The HDSLM64R series are available in 4.5μm and 6.37μm pixel sizes, which satisfies the requirements of speed-critical applications.

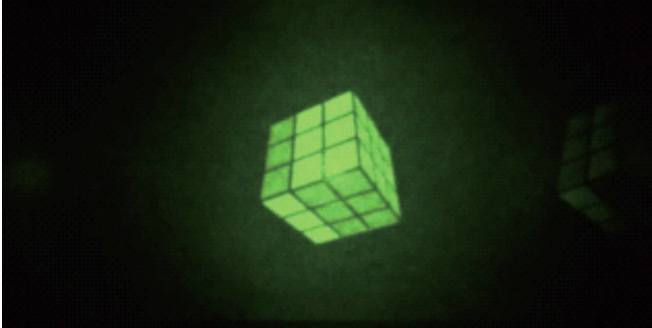
Product Parameter

Types	Modulation Mode	Resolution	Frame Rate	Pixel Size	Bit Depth	Fill Factor	Amplitude Contrast	Phase Retardance	Wavelength
HDSLM45R	Phase-only	1920*1080	60/180Hz	4.5μm	8bit	> 91%	/	>2.3π@638nm	420~650nm
HDSLM64R			60Hz	6.37μm		> 93%		>3π@532nm	400~700nm
HDSLM64RA	Amplitude-only						200 : 1	/	

Product Features

- ▶ RGB sequential overall refresh rate 120Hz, applicable for color holographic applications
- ▶ Equipped with RGB light source and time sequence control, easy for a fast setup of the experimental platform
- ▶ Available in 4.5μm pixel size, a very small size for 1080P SLM
- ▶ Self-developed Gamma Software allowing dynamical change of time sequence

Holographic Case Diagram

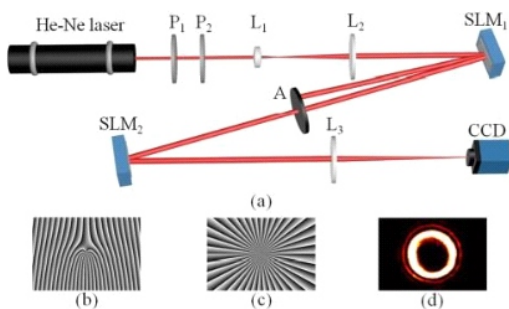


Application Fields

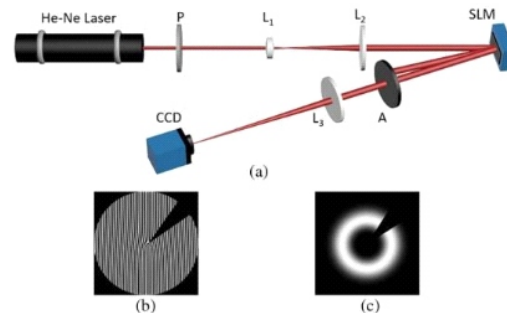
Optical field regulation, holographic projection, commercial projection optical machine development, holographic module development, special dimming field, vortex beam, 3D display, holographic reproduction, laser regulation, multi-spectral imaging, physical optics experiment, AR equipment development, computational imaging and coherent diffraction, projection imaging and structural light.

Thesis Case

1. «Controllable rotation of multiplexing elliptic optical vortices» Journal of Physics D: Applied Physics, Volume 52, Number 49.
2. «Phase retrieval exact solution based on structured window modulation without direct reference waves» Optics and Lasers in Engineering 122 (2019) 89–96
3. «Generation of coherence vortex by modulating the correlation structure of random lights» Photonics Research Vol.7, Issue12, pp.1485-1492 (2019)
4. «Scalable detection of photonic topological charge using radial phase grating» APPLIED PHYSICS LETTERS 112, 122602 (2018)
5. «Detecting the topological charge of optical vortex beams using a sectorial screen» Applied Optics Vol. 56, Issue 16, pp. 4868-4872 (2017)



Orbital angular momentum measurement at the University of Science and Technology of China



University of Science and Technology of China (USTC), University of Dayton (UD), Shanghai University of Science and Technology (SUST)
Vortex Beam Topology Charge Detection Experiments

MagicHolo® Light Manipulation Experiment Software

Integrated with a broad range of light field regulation algorithms, the UPO Labs MagicHolo® Light Manipulation Experiment Software is applicable for modulating spatial light modulators of arbitrary resolution and pixel size.

The UPO Labs MagicHolo® software allows generating a broad range of special light fields in common use as well as performing spatial superposition and functional superposition to realize various transformations.



Physical optics



Diffractive optical element



Digital holography



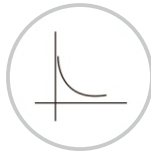
Vortex beam



Diffraction-free beams



Color dynamic holography



Liquid Crystal Photoelectric Characterization Measurement



Computational ghost imaging



Turbulence simulation



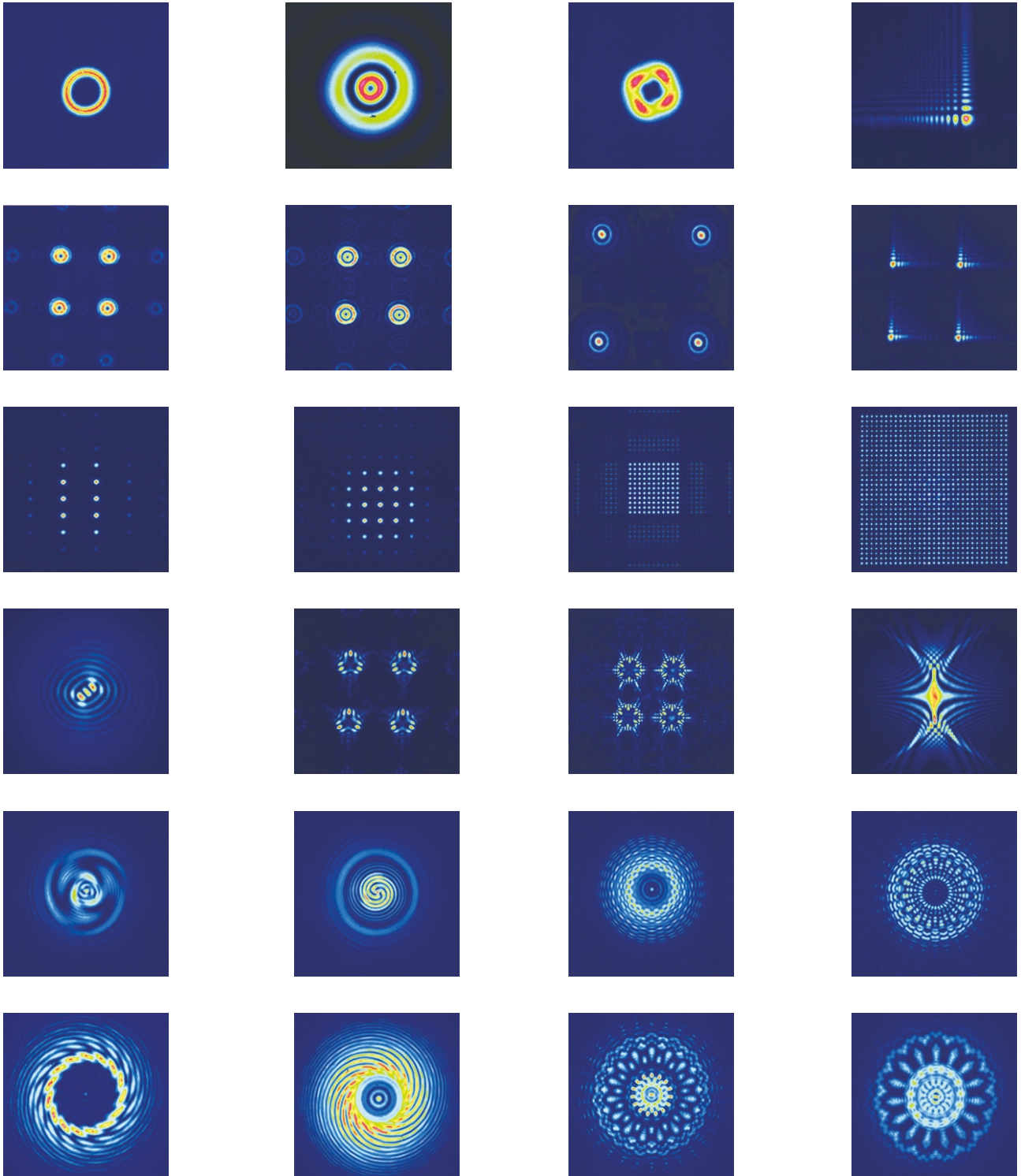
Light field regulation

MagicHolo® Software Function List

Helical Phase	Dislocation Grating	Specially Tuned Beam	DOE Simulation	Aberration
Foundation helix phase	Plane wave dislocation grating	One-dimensional Airy beam	Shining grating	Spherical aberration (optics)
High order spiral phase	Spherical wave dislocation grating	Two-dimensional Airy beam	Sine grating	Coma
Limit spiral phase effective area	Array dislocation grating	Bessel beam	Checkerboard	Astigmatism
Binary helical phase	Axis Cone Dislocation Grating	Pierce beam	Random phase	Depth from defocus
Array helical phase	Fresnel dislocation grating	Super-gaussian beam	Hole simulation	Tilt
Axial conical screw		Symmetric Airy vortex	Space bisector array	
Fresnel spiral		Flat-topped light	Axial conical lens	
Double helix phase		Airy array	Dammann grating	
		Bessel array	Cylindrical lens	
			Random stack array of focal length	

* The phase patterns listed above are the mostly widely used groups of images in MagicHolo® Light Manipulation Experiment Software. More other patterns are typically freely stacked and combined by you in the MagicHolo® software.

Light Regulation Examples of MagicHolo® Light Manipulation Experiment Software





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