All Digital
Time Domain Imaging™
QXGA SLM
3.1 Megapixel Pure Binary Phase Modulator

FEATURES

Pure binary phase modulation between 0 and π

2048* 1536 pixels

8.2µm pixel pitch, square pixels

>94% fill factor

40µs Liquid Crystal switching time

Up to 5.76 kHz binary frame rate[1]

Different display addressing sequences available

Image on-demand or video interfaces available

Proven technology, long term availability

The QXGA spatial light modulator (SLM) is a reflective ferroelectric liquid crystal on silicon (FLCOS) device with a resolution of 2048 x 1536 and pixel pitch of 8.2µm.

The anisotropic structure of the FLC molecules gives them uniaxial birefringence, with the long dimension of the molecules being the slow axis and defining the optic axis of the material.

The molecules have two stable orientations which can be switched between by controlling the electric field across the FLC material. The FLC material is aligned such that, in one orientation, the molecules, and therefore the optic axis, are nominally parallel to the short dimension of the display. Inversion of the electric field polarity rotates the molecules through an angle, known as the dynamic switching angle (DSA), into their alternate stable state.

Interaction between incident coherent, polarized light and the FLC molecules in one of their two states allows a π phase difference to be established in the output , with the SLM acting as a binary phase modulator.
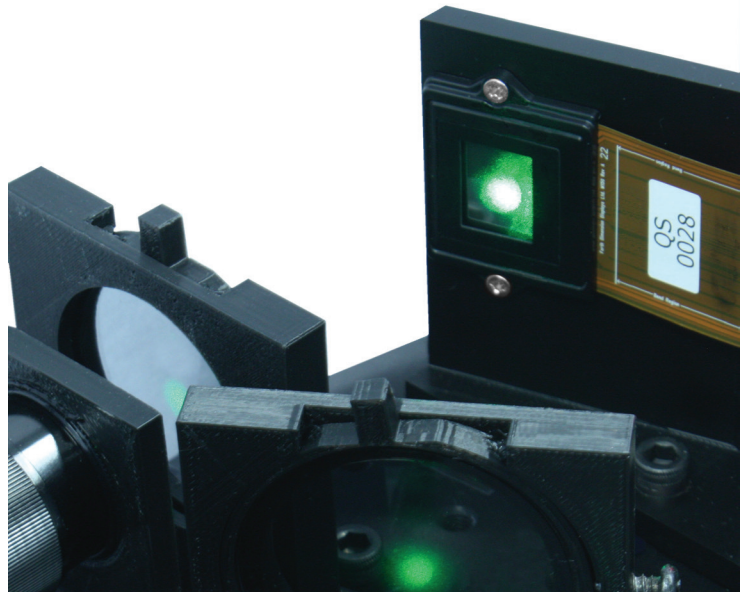
APPLICATIONS

Laser beam steering

Optical tweezers

Super resolution microscopy

Wave front manipulation

Holographic projection

Polarization control
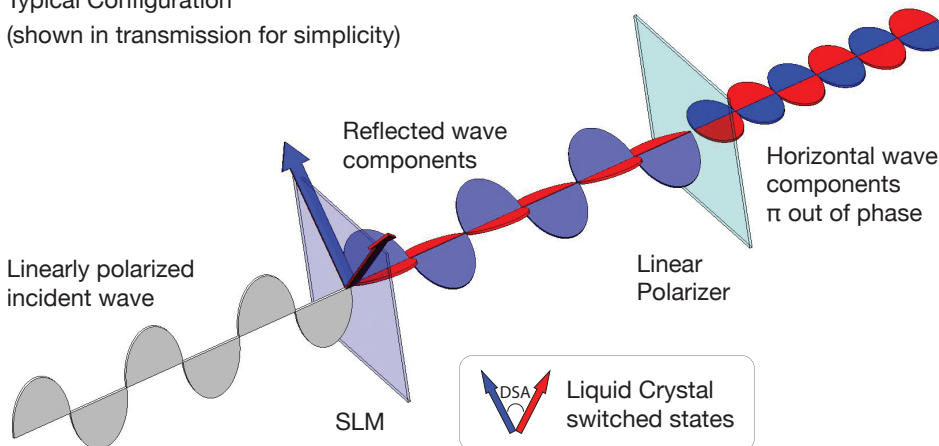
Beam aberration correction

FORTH DIMENSION DISPLAYS
A subsidiary of Kopin Corporation

1. SXGA native resolution

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PHASE MODE OPERATION

Typical Configuration
(shown in transmission for simplicity)

Reflected wave
components

Horizontal wave
components
π out of phase

Linearly polarized
incident wave

Linear
Polarizer

SLM

DSA — Liquid Crystal
switched states

Holographic projection showing
±1st order patterns centred
around zero order spot. Fast
averaging of multiple phase
masks reduces speckle.

SLM SPECIFICATIONS

Resolution	2048 x 1536	
Device Diagonal	0.83"	
LC Material	Ferroelectric	
Fill Factor	>94%	
Pixel Pitch	8.2µm	
Wavelength Range	430nm-700nm	1
1st Order Diffraction Efficiency	> 10%	1
Dynamic Switching Angle	33.5°	
Operating Temperature	0 °C to + 50 °C	

1. Maximum efficiency at 550nm, efficiency drops at other wavelengths

INTERFACE SOLUTIONS

Two interface types are available: video interface and non-video interface.

Video interfaces allow real-time updating of the SLM at binary-rates up to 5.7 kHz over a DisplayPort interface (operating at SXGA resolution). Display addressing sequences control the unpacking and display timing of the video data at the SLM

The non-video interface version provides non-volatile storage accessible over USB for on-demand images at the SLM. The interface is controlled by custom scripts and synchronisation signals.

Ordering Codes	
QXGA-R9	SLM with video interface
QXGA-R9-AUX	SLM with video interface and sync card
QXGA-3DM	SLM with non-video interface

**For further information or to
receive a quotation please contact:**

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4D FORTH DIMENSION DISPLAYS

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