

All Digital
Time Domain Imaging™

2K Microdisplay

Ferroelectric Liquid Crystal on Silicon Technology

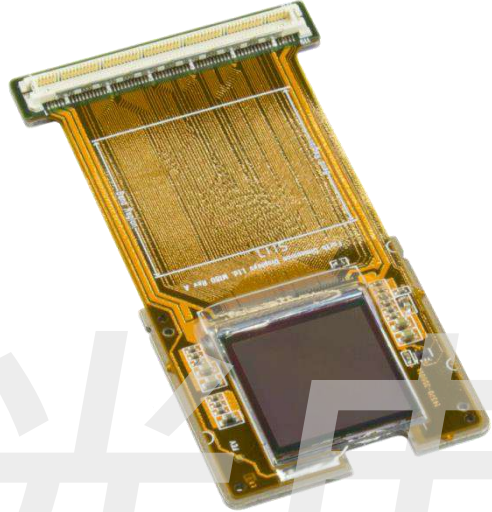
Forth Dimension Displays offers the 2K microdisplay, specifically designed to meet the demands for high resolution and high fidelity imaging. See next page for using the 2K as a Spatial Light Modulator (SLM) for binary phase modulation.

The 2K (2048 x 2048 pixels) reflective ferroelectric liquid crystal on silicon (FLCOS) is a digitally controlled microdisplay for binary amplitude modulation suitable for imaging or projection.

The microdisplay is an electro-optical device that takes a 2D 1-bit binary array as its input and maps it to its corresponding pixel array. Each pixel can be 'on' or 'off' according to the value of the corresponding input bit. Using Time Domain Imaging™ techniques, a diverse range of applications can be served.

Interfacing the 2K with the two established board variants, the R10 for video or the R11 for memory-based applications, will ensure optimal usability ranging from medical imaging to structured light projection for 3D optical metrology.

The microdisplay also works at large angles of incidence making it an ideal choice for off-axis projection systems using the Scheimpflug condition. Achievable contrast ratio can be >1000:1 depending on the optical system parameters such as f/# of illumination, polarising component selection and inter-display alignment.



No sub-pixels, customisable colour gamut, no image burn-in of static content and fast refresh make the 2K microdisplay particularly suitable for applications requiring high fidelity images. Optional ancillaries include a LED driver and a low profile RGB LED illuminator. ForthDD's highly experienced engineering support will shorten your design-in time.

FEATURES

- Fully digital, fast binary FLC microdisplay
- 2048 x 2048 pixels plus a 64 pixel border
- 23.7 mm (0.94") image diagonal
- 8.2 µm pixel pitch, square pixels
- >94% fill factor
- 40µs liquid crystal switching time
- Up to 75 Hz at 24-bit colour (R10 interface)
- Up to 432 Hz frame-rate at 8-bit greyscale (R11 interface)
- Different display addressing sequences available
- Proven technology, long term availability
- On-board temperature sensor
- Frame and Mask

APPLICATIONS

- Monocular /binocular (stereoscopic) viewers
- Bi-ocular viewers
- Head Mounted Displays (HMD)
- Head Up Displays (HUD)
- Helmet Mounted Visual Systems (HMVS)
- Image injection for surgical microscopes
- Structured light projection
- Ophthalmic metrology
- 3D optical metrology
- 3D Solder Paste Inspection (SPI)
- 3D Automated Optical Inspection (AOI)



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All Digital

Fast Binary 2K

Spatial Light Modulator

The reflective 2K SLM has a square aspect ratio which is ideal for efficient optical set-ups. The 4.1 Megapixel binary SLM can be addressed via a video interface (R10) or a flash memory based interface (R11). Both systems support a binary phase modulation with π phase retardance in applications ranging from optical correlation to super resolution fluorescent microscopy. Published SRM techniques using Forth Dimension Displays' SLMs are LLSM, TIRF, SPIM, SMLM, Scanning, RIM. For these and other published applications of binary phase modulation, please consult on our website the [Tutorial for Binary Phase Modulation](#).

Compared to the often used SXGA (1280 x 1024 pixels) the 2K SLM delivers significant improvements on speed, active area (+16%), line pairs per mm (+65%) and pixel count (x3.2). The larger angular deviation into the first diffractive order and the increased active area enable optical systems with shorter path lengths and larger field of view.

FEATURES

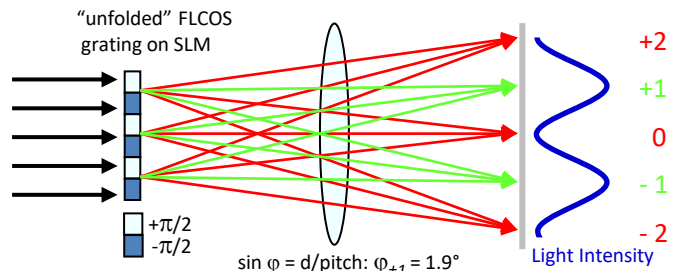
- 4.1 Megapixel
- 8.2 μm pixel pitch
- Line resolution 61 lp/mm
- Angular deviation of first order $\varphi_{\pm 1} = 1.9^\circ$ at 550 nm
- Planarized pixel mirror
- Up to 1.8 kHz 1-bit video at full resolution (R10 interface)
- Up to 5.76 kHz 1-bit video in 1280 x 1024 window (R10 interface)
- Up to 3.6 kHz binary frame-rate (R11 interface)
- Measured device efficiency $\eta_{\pm 1} = 10\%$ each at 550 nm

APPLICATIONS

- Optogenetics
- Fast Holographic Optical Tweezers (HOT)
- Super resolution microscopy (LLSM, TIRF, SPIM, RIM, etc.)
- Optical correlation in optical computing

2K SLM parameters	
Pixel Resolution	2048 x 2048 pixels
Image Diagonal	23.7 mm (0.94")
Border Width	64 pixels (additional)
LC Material	Ferroelectric
Fill Factor	>94 %
Pixel Pitch	8.2 μm
Wavelength Range	430 nm – 700 nm (optimised for 550 nm)
Reflectance *	55%
Operating Temperature	0°C to + 50°C
Weight	18 g

* Photopic Reflectance – this value includes polarisation conversion efficiency, transmission/reflection, absorption and fill-factor losses but does not include initial light polarisation or duty-cycle.



Ordering Codes for Starter Kits

2K-R10-STR	2K microdisplay/SLM with video interface
2K-R11-STR	2K microdisplay/SLM with flash memory-based interface



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