

# Cellular-resolution Photostimulation

## Polygon DMD Pattern Illuminators

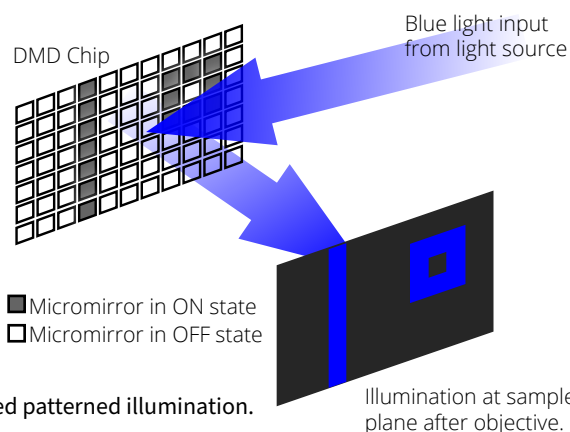


## INTRODUCTION

The Polygon DMD pattern illuminators are Mightex's market-leading modules for targeted photostimulation. The Polygon provides precise spatio-temporal control of light with subcellular resolution, making it the perfect illumination tool for scientific research. Compatible with any upright or inverted microscope, the Polygon enables researchers to send light to anywhere on their specimen, and in any shape, size and complexity now within a large projection field of view. In addition, multiple regions-of-interest (ROIs) can be illuminated simultaneously, and patterns can be switched at kHz speeds. Different wavelengths of light can be used with the Polygon for virtual simultaneous multi-color illumination of unique ROIs. Polygon systems seamlessly integrate via TTL with other equipment such as electrophysiology tools or cameras.

## DMD TECHNOLOGY

The Polygon uses digital micromirror device (DMD) technology to illuminate multiple ROIs simultaneously. A DMD chip is composed of up to millions of micromirrors that can be individually turned ON/OFF to reflect light onto the sample. Thus, you can assign each mirror to control the area(s) of illumination and create any number of different-sized ROIs simultaneously.



**Figure 1.** DMD-based patterned illumination.

## FEATURES

- Illuminate any Shape or Size Within Large Field of View
- Multi-Wavelength Illumination of Distinct ROIs
- Simultaneous Multi-Region Illumination
- Fast Pattern Switching Speed
- Fits on any Microscope
- External Equipment Synchronization

## APPLICATIONS

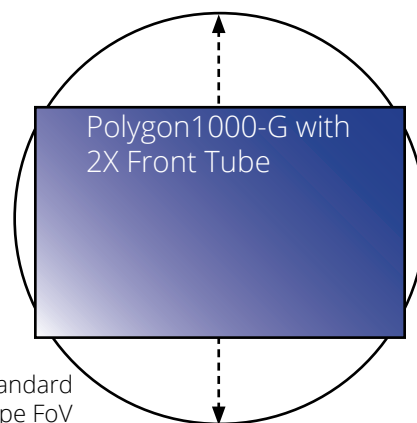
- Neuroscience: Single-cell Resolution Optogenetics
- Cell Biology: Subcellular Resolution Optogenetics
- Freely-Behaving Optogenetics
- Cortex-Wide Optogenetics
- Photoactivation, Photoconversion & Photoswitching
- Uncaging
- Photopatterning

## POLYGON1000

## FEATURE-RICH DMD DESIGN

**1** Large field of view.  
Fine resolution.

Large DMD chip combined with front tube optics enables large field of view without compromising resolution and power.

**2** Faster than anything else in the market.

High maximum frame rate means better temporal resolution for advanced physiologically-relevant experiments and virtually simultaneous 2-color illumination of distinct ROIs.

**1000**  
SERIES

6,600 fps\*

\*in External Trigger Mode

**3** Real-time projection.  
Closed-loop experiments.

Faster uploading time enables the Polygon1000 to perform real-time pattern illumination for closed-loop experiments.

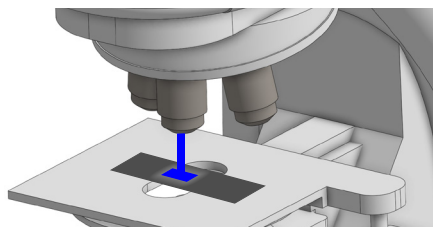
**up to 4ms**  
uploading speed per  
frame



**CLOSED-LOOP  
CONTROL**

**4** More power. Extra flexibility.

Large chip and optimized optics enhance transmission efficiency enabling the Polygon1000 to achieve high power densities power density at the specimen level, and giving the researcher room for intensity control.



## POLYGON MODELS

### 1000 SERIES

#### POLYGON1000-G

P/N: DSI-K3-000

- Accepts a 3mm-core liquid lightguide.
- Can be used with any light source.
- Wavelength range: 350-1000nm.\*
- Add-on front tube available for large field of view.

#### POLYGON1000-DL

P/N: DSI-K3-L20

- Accepts SMA-connectorized optical fiber patch cord (400 $\mu$ m, 0.22NA recommended).
- Compatible with laser sources.
- Wavelength range: 400-1000nm.\*

\*For wavelengths greater than 700nm, user may need to refocus the front tube.



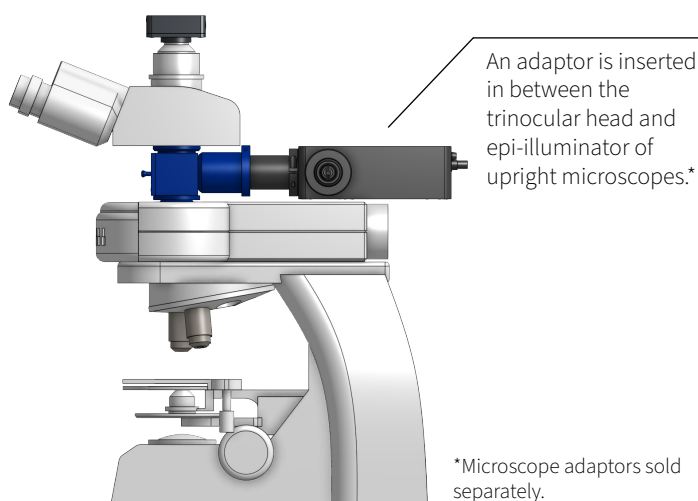
## MICROSCOPE INTEGRATION

The Polygon can be coupled to most commercially available inverted and upright microscopes (Nikon, Leica, Zeiss, Olympus) in the following configurations:

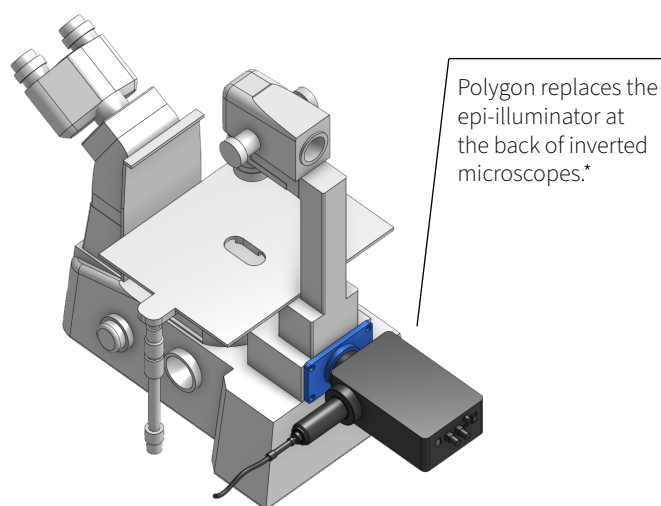
### INFINITY PATH CONFIGURATION

This configuration projects the spatial patterns at infinity, and hence it is mounted directly into the infinity path of a microscope by using a beam-combiner (for upright microscopes) along with an adaptor that matches the exact make/model of the microscope.

#### UPRIGHT



#### INVERTED



**PLEASE CONTACT MIGHTEX FOR INTEGRATION OF MULTIPLE POLYGONS AND ALTERNATIVE MICROSCOPE INTEGRATION SOLUTIONS.**

## IPX INFINITY PORT EXPANDER

Mightex's IPX expands an infinity-path port on a microscope into a maximum of 4 ports. It is compatible with all Mightex Polygon models as well as with Mightex and 3rd party widefield epi-fluorescent illumination sources via standard 3mm core liquid lightguide. It also supports cameras and laser scanners via appropriate adaptors. Ports 2, 3 and 4 feature pitch-yaw adjustable dichroic holders for centering FOV and each port can be mounted on either sides of the main IPX chassis, to avoid mechanical conflict with surrounding environment.

### C-MOUNT CONFIGURATION

If the infinity path of your microscope is unavailable, this configuration can be mounted onto one of the standard C-mount camera ports of your microscope.



### LAPP CONFIGURATION

Do you have a Nikon microscope with a LAPP modular illumination system? We provide a Polygon format that is LAPP compatible. Please contact Mightex for more information.



# TECHNICAL SPECIFICATIONS

## ILLUMINATION FIELD-OF-VIEW & RESOLUTION

Model	Field of View	Projection Area Dimensions	Commercial Microscope (1X Objective) <sup>a</sup>			
			Leica	Nikon	Olympus	Zeiss
1000 SERIES						
POLYGON1000-G	Standard	Height   mm	6.2	6.2	5.5	5.1
		Width   mm	9.9	9.9	8.9	8.1
		Diagonal   mm	11.6	11.6	10.5	9.6
		Pixel Size   μm	7.6	7.6	6.9	6.3
	Large <sup>c</sup>	Height   mm	12.4	12.4	11	10.2
		Width   mm	19.8	19.8	17.8	16.2
		Diagonal   mm	23.2	23.2	21	19.2
		Pixel Size   μm	15.2	15.2	13.8	12.6
POLYGON1000-DL <sup>b</sup>	Standard	Diameter <sup>b</sup>   mm	12.4	12.4	11	10.2
		Pixel Size   μm	15.2	15.2	13.8	12.6

<sup>a</sup> To calculate illumination field-of-view and pixel resolution at the specimen, simply divide the above numbers by the magnification of the objective.

<sup>b</sup> Polygon1000-DL has a circular illumination field-of-view.

<sup>c</sup> Large field-of-view front tube lens required. Sold separately.

## CONTROL & TIMING

	1000 SERIES
Maximum Frame Rate <sup>a</sup>   fps	6,600
Input Trigger	TTL, BNC connector
Input Trigger Current	Minimum 8mA
Input Trigger Delay   $\mu\text{s}$	50
Output Trigger	TTL, BNC connector
Output Trigger Delay	User Programmable
Input Uploading Speed   ms/frame	4

<sup>a</sup> Values at 1bit depth. For grayscale features please contact Mightex for more information.



## SYSTEM & COMMUNICATION

<b>Operating System<sup>§</sup></b>	Windows 7, 8,10 and 11
<b>Software</b>	Mightex PolyScan4 Nikon NIS Elements µManager
<b>Interface</b>	SuperSpeed USB3.0
<b>Power Supply</b>	5Vdc 3A input power
<b>Screen Resolution</b>	1,366x768 or higher

<sup>§</sup> Polygon1000 supported by 64bit systems only.

## ORDER NOW

Our primary goal is to help you find the optimal solution for your research. We have a dedicated technical support and sales team committed to providing expert guidance on our Polygon models and other Mightex products.



Please visit <https://www.lectlite.co.jp/inquiry/>  
to submit an inquiry form today!

## CONTACT US

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