



1 *Layout of part of a 1D Light Modulator.*

2 *Wire bonded Light Modulator.*

## ONE-DIMENSIONAL LIGHT MODULATOR

### Fraunhofer Institute for Photonic Microsystems IPMS

Maria-Reiche-Str. 2  
01109 Dresden

#### Contact

Dr. Michael Scholles  
Phone +49 351 8823-201  
michael.scholles@ipms.fraunhofer.de

Dr. Michael Wagner  
Phone +49 351 8823-225  
michael.wagner@ipms.fraunhofer.de

[www.ipms.fraunhofer.de](http://www.ipms.fraunhofer.de)

The Fraunhofer IPMS develops and manufactures micro mirror based light modulators (MOEMS, micro opto electro-mechanical system) in a wide variety of types and configurations. A very versatile type among that is the One-Dimensional (1D) Light Modulator.

Such a device can be used in a wide range of applications. Examples are computer to plate (CTP), laser direct imaging (LDI), waferlevel packaging / interconnect, holography, material marking and processing and IP protection.

A 1D Light Modulator device consists of up to several thousand pixels arranged in a line. Each pixel can be switched to black, white or even arbitrary gray values with very high speed. The micro mirror design is optimized for a high frame rate by means of low mass, minimized momentum of inertia and optimized damping. The micro mirror surface can be optically coated for improved reflectivity. The micro mirror pitch is 10  $\mu\text{m}$ .

Each pixel is composed of a number of micro mirrors, aligned in a row and deflecting similarly. These mirrors can tilt and thereby create a dark spot in the corresponding image plane. This concept allows for, in principle, very long pixels with uniform surface properties. Illumination of the larger area in turn allows for reduction of power density at the light modulator surface and hence enables the way to high power applications.

The key features are:

- resolution: up to 8000 pixels
- analogue gray values
- frame rate: 1.0 MHz  
(future perspective: up to 1.6 MHz)
- Ultraviolet to visible wavelength range  
(future option: near-infrared)