



- 1 Example of micro-mirror array in PGA package.
- 2 SEM close-up of a single tilt mirror, $16 \times 16 \mu\text{m}^2$, and neighboring area where the mirror plate was removed to reveal the structure of the MEMS actuator.

DIFFRACTIVE MEMS KIT: TILT MICRO-MIRROR ARRAY

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Fraunhofer IPMS develops customized micro-mirror arrays to be used as spatial light modulators (SLMs) in the deep-UV to the near-infrared spectral range.

The present "DIFFRACTIVE MEMS KIT" has been designed for proof-of-concept investigations in order to explore new applications as well as to support prototyping in research and development.

The SLM module is based on an array of *analogue tilting micro-mirrors*. It supports high-resolution optical phase control at high-speed. Besides the micro-mirror chip itself, the "DIFFRACTIVE MEMS KIT" comprises the complete address electronics together with a quick-start software and a flexible PC-interface library.

Micro-Mirror Device

The diffractive MEMS device consists of a segmented 256×256 array of $16 \mu\text{m}$ tilt-type mirror elements capable of a continuous torsion for the pure phase modulation of the incident light. Each mirror element can be independently addressed and deflected quasi continuously between zero up to the blaze angle at deep-UV or higher wavelengths. Any desired deflection pattern can be programmed for the whole array at high-speed without iterative cycling.



MMA Characteristics

MEMS Array	256 × 256 tilt mirrors, 16 μm pixel size
Fill Factor	>90%
Mirror Tip Deflection	0 ... 250 nm (450 nm on request)
Angular Resolution	<200 μrad
Spectral Range	193 nm ... 1000 nm (1600 nm on request)
Average Illumination Intensity	<1 W/cm ²
Frame Rate	1 kHz onboard, >100 Hz PC-USB

3 *Micro-mirror array and driving electronics.*

Applications

- Pattern projection (real time grey levels)
- Structured illumination
- Programmable grating
- Optical switch

Acknowledgement

Part of the development was funded by

- The **French National Research Agency** "ANR" and the **German Federal Ministry of Education and Research** "BMBF" in the frame of the "Programme Inter Carnot Fraunhofer", Project "Micro-mirror Enhanced Microscopic Imaging for high-speed angular and spatial light control in spectral Optogenetics & Photomanipulation in biological applications" (MEMI-OP, Project Reference: PICF2011).

- The **European Union** within the "Framework Program 7", Project "Micro-mirror enhanced micro-imaging" (MEMI, Project Reference: 215597).