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- 1 240 x 200 micro mirror array for dynamic high-resolution optical phase control.
- 2 Imaged USAF test chart with introduced aberration (a) and corrected by the Fraunhofer IPMS micro mirror array (b)

MEMS PHASE FORMER KIT

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The MEMS Phase Former Kit is a complete spatial light modulator system based on a piston-type micro mirror array to be used for high-resolution, high-precision and high-speed optical phase control. It has been designed for an easy system integration into the user's own application specific environment to provide a tool for first practical proof-of-concept investigations to explore new applications as well as to support prototyping in research and development. Besides the micro mirror chip itself, the kit also comprises the complete drive electronics together with a user-friendly software interface for Windows XP® based PCs allowing for an easy device programming and control.

Micro Mirror Device

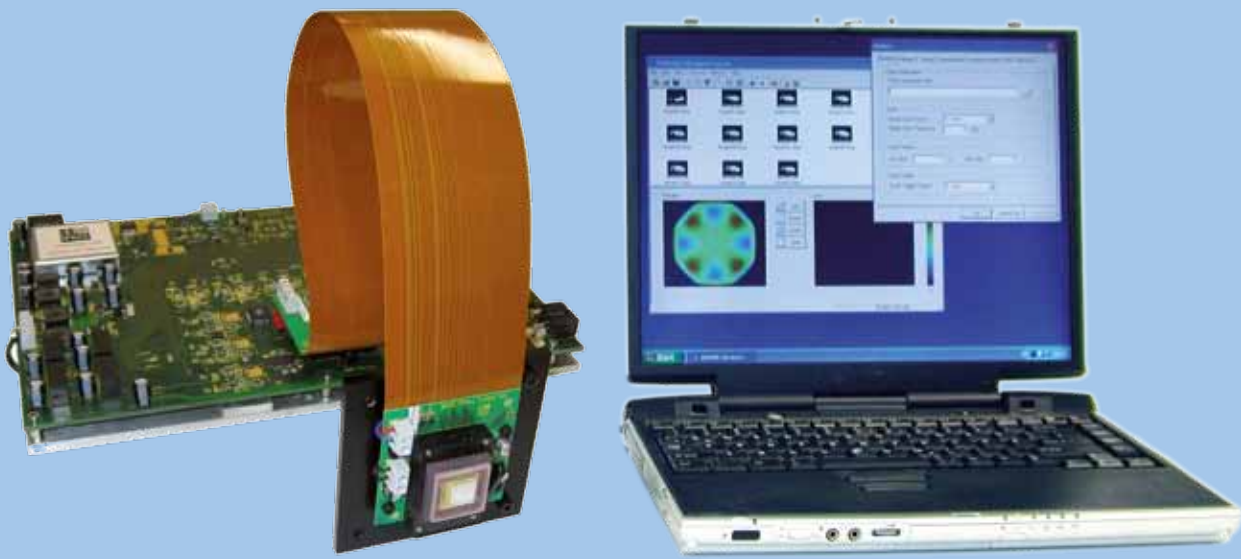
The micro mirror device consists of a segmented 240 x 200 array of 40 µm piston-type mirror elements capable of a

continuous vertical deflection for a pure phase alteration of the incident light. By using an integrated CMOS backplane address circuitry each mirror element can be independently addressed and deflected at an 8 bit resolution. With the mirrors' driving characteristic implemented on the driving board any desired deflection pattern can be applied directly in one iteration step without any iterative cycling.

PC User Interface

To provide full user programmability and control a comfortable PC software interface is included with the Kit. Running under Windows XP it offers two basic modules. One is a Graphical User Interface (GUI) for an autonomous operation with pre-defined data patterns stored on the user PC, where all relevant parameter settings and control can be performed on a menu-driven basis, enabling maximum data transfer rates of





up to 100 frames/s (PC hardware dependent). Second, for highest possible flexibility also an ActiveX® programming interface is provided allowing a full integration of all necessary data transfer and control functionalities into the user's own software environment for a completely automated preparation and feed-through of real-time data, e.g. for closed-loop operation.

Communication with the mirror's driving board is established via a high-speed IEEE1394 FireWire interface allowing also a direct data transfer from an external data source with the PC serving as control device only.

Applications

Possible applications range from higher-order wavefront correction in various fields of optical imaging enhancement and image recognition to laser beam shaping and temporal laser pulse modulation.

- Ophthalmology
- Astronomy
- Microscopy
- Machine Vision
- Laser Beam Shaping
- Ultra-fast Laser Pulse Modulation

The Complete Phase Former Kit comprises

- Micro Mirror Chip
- Electronic Driving Board
- Separate Chip Mount with Flex Extension
- Driver Software for Windows XP PC
- Power Supply and IEEE1394 Interconnect
- User Manual

Main Characteristics*

Format	240 x 200 piston mirrors, 40 µm pixel size
Stroke	0.5 µm (to be extended to 2.0 µm)**
Resolution	8 bit
Fill Factor	81% (to be extended to > 95%)**
Reflectivity	> 90% (in the VIS)
Spectral Range	UV ... NIR
Mean Light Intensity	< 10 W/cm ²
Frame Rate	5 kHz (Mirror), 500 Hz (FireWire), 100 Hz (PC)
Data Format	Bitmap or ASCII with 8 bit deflection data
Software Interface	GUI and ActiveX® Programming Interface

*: customized adaptations to be discussed

** : in progress