

1 Complete view of MEMS adapter and driver boards.

## DRIVING ELECTRONICS FOR THE EVALUATION OF 1D AND 2D RESONANT MEMS SCANNERS

### Description

The “**Simple MEMS Driver**” is an electronic module for the control of 1D and 2D resonant scanning mirrors with electrostatic drive.

It consists of two boards – a “Driver board” and a “MEMS board”, which are interconnected via plug-in connectors.

The basic design of the MEMS board aims at a simple redesign, allowing for the generation of individual layouts of this board for certain MEMS. The driver board is directly plugged into the MEMS board. On request the MEMS board can either be equipped with a rectangular or straight plug-in connector, enabling the driver board to be plugged in either lengthwise or in a 90 degree angle.

The driver board includes all driving electronics but excludes the preamplifier for the position sensor system and the configuration EEPROM, which are directly placed on the MEMS board. The MEMS scanner can be plugged into a socket located on the MEMS board. This board can be easily integrated in LINOS® Microbench assemblies.

Also included:

- Software: User Interface for MEMS scanner parameter control

### Fraunhofer Institute for Photonic Microsystems IPMS

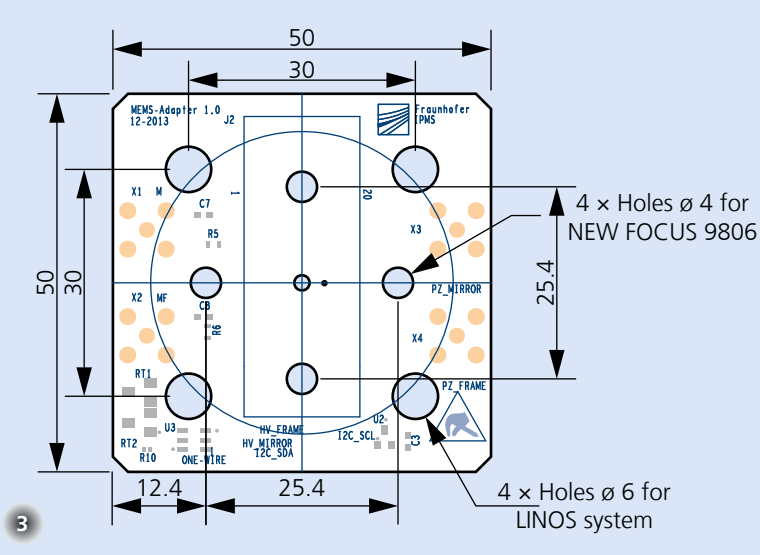
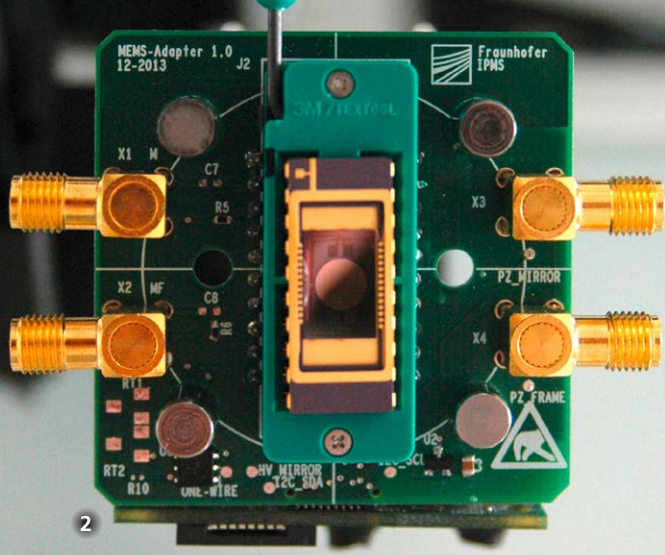
Maria-Reiche-Str. 2  
01109 Dresden

#### Contact

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

Dr. Markus Schwarzenberg  
Phone +49 351 8823-0  
schwarz@ipms.fraunhofer.de

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



### Components of the driver board:

- 2 high voltage driver stages incl. high voltage generation
- Clock signal generator
- Right-angle connector to MEMS board (straight option available)
- Microcontroller
- USB interface (Micro-USB)
- A/D converter for position signal evaluation
- External interface with synchronization signals and 6 additional on demand assignable pins
- Dimensions: 77 × 46 mm<sup>2</sup>

### Components of the MEMS board:

- ZIF socket or alternative contacting options for the MEMS micro mirror
- Preamplifier circuitry for position sensors, if applicable
- EEPROM for storage of MEMS-specific configuration parameters
- Dimensions: 50 × 50 mm<sup>2</sup>

### Voltage Supply

- USB power
  - External 5 V or 15 V (equipping option) power supply for standalone operation
- External supply is necessary for scanners in 2D operation mode or with operating frequencies of > 25 kHz.

### 1st Scanning Axis (X, "Mirror")

Parameter	Specification
Voltage Range	20 ... 210 V
Voltage Error	< 1 V
$f_x$ Frequency Range (mech.)	50 Hz ... 150 kHz
$f_x$ Frequency Adjustment Error	≤ 5 ppm ( $f \leq 45$ kHz), ≤ 15 ppm ( $f \leq 125$ kHz)

### 2nd Scanning Axis (Y, "Frame")

Parameter	Specification
Voltage Range	20 ... 200 V
Voltage Error	< 1 V
$f_y$ Frequency Range (mech.)	< 10 Hz ... > 20 kHz
$f_y$ Frequency Adjustment	Exact integer ratio $f_x/f_y$ is possible, otherwise: error: ≤ 42 ppm ( $f \leq 1$ kHz), ≤ 0.08% ( $f \leq 20$ kHz)

Please note that all information is supplied without guarantee and is subject to change without notice.

- 2 View of MEMS adapter board.  
3 Schematic drawing of MEMS adapter board.