

MD-100 Optical Probe Station

Maple Leaf Photonic's multi-die probe station characterizes multiple dies in a single test run. The MD-100 consists of a chip stage, alignment optics, a fiber positioner capable of both edge- and vertical-coupling, rack-mount controllers, and the fotonica software suite. The fotonica suite of tools includes specialized fiber alignment routines, instrument controls, and user-defined test routines. Characterization that can take days using manual positioners can be accomplished in a few hours with the MD-100. The basic MD-100 can be upgraded with additional fiber positioners, electric probes, extended temperature control and specialized optics to expand its capabilities.





Maple Leaf Photonics is located in Seattle, Washington For inquiries please email us at info@mlp.global

FEATURES

Automatic Optical Alignment

2-D scanning to get "first light" quickly2-D and 3-D algorithms optimize coupling

fotonica Software Suite

Intuitive control of motion and test routines with chip registration and data collection. Can be integrated with user routines.

Application Specific Aligners

Motorized stages that optimize speed or resolution for different needs.

Multi-vendor Instrument Support

Drivers for standard instruments allow users to use existing equipment.

Multi-die Handling

In addition to a 25 x 25 mm single die mount, the MD-100 has multi-die stages for chips ranging in size from 1x3 to 5x8 mm. Both edges of the dies are exposed to facilitate fiber \leftrightarrow chip \leftrightarrow fiber testing.

The long travel range of the Motorized Die Handler (shown left) allows the die carrier to be unloaded away from the probes and fiber.



HARDWARE



Chip Stage

- 6 DOF, 4 motorized axes (XYZ and Z rotation)
- · Goniometers (XY rotations) close to chip surface
- · Large single die mount and or multi-die mount included
- · Integrated TEC with a thermal sensor for thermal tuning
- Chip mounts thermally tuned, option to actively cool sink to increase temperature range

Motorized XY Integrated Optics (Top View) Configurable Vertical / Edge Coupling Support

Fiber Aligner

- 6 DOF, 4 motorized axes (XYZ and fiber array rotation)
- Piezo stages (26 mm in XY, 12 mm in Z) with 2 nm encoder resolution
- Motorized fiber rotation for single fibers or fiber arrays
 ° Vertically-coupled (X rotation): 0° to 40°
 - ° Edge-coupled (Y rotation): ±5°
- Optional alignment optics move in XY (with fiber) and provide a top-view of the fiber and on-chip devices

CONTROL MODULES



System Control Module (SCM) (Standard)

Industrial grade PC with expandable memory, additional PCIe slots, 6x USB ports, and dual-monitor support hosts the fotonica software and drivers.



Motor Control Module (MCM) (Standard)

Motion and contact sensor circuitry to control chip stage and fiber aligner movements. Inegrated trigger logic for scans and sweeps when using external lasers and detectors.



Photonics Control Module (PCM) (Optional)

A laser, detector, polarization control, and optical switches dedicated to fiber alignment. 8-64 channel voltage or current source measurement unit to bias on-chip circuitry.



Environmental Control (ECM) (Optional)

Sensors and controls to manage the testing environment: water pump, reservoir, and radiator to thermally tune the chip-stage heat sink. TEC controller.



SOFTWARE

The fotonica software suite executes complex, parametric tests involving many instruments and on-chip devices. Users can operate the system from a GUI that connects instruments, registers the chip, selects devices, executes tests, and logs results. A script interface allows users to customize tests, include other instruments or parameterize routines for temperature control or electrical biasing. Alternatively, the API allows fotonica's core functionality to be integrated into existing environments.



Instrument and Motion Control

fotonica provides the necessary instrument settings, motion control, and routines (such as wavelength sweeps and fiber alignments) required for automated testing



Automated Testing

A powerful feature involves the automated test control allowing users to test hundreds of devices in a single run or do parametric testing over temperature or current and voltage.



First Light and Fiber Alignment Algorithms

The raster scan features gets first light quickly and allows users to set up a coordinate system to address every device on the chip.



fotonica GUI and API

The GUI provides controls to automated tests and perform 2D and 3D alignments (shown). The API allows further customization and integration to be created by the user.



MD-100 PROBE STATION SPECS

Chip Stage	Specifications	Notes
DOF, motorized axes	6, 4	1. Option: carriers for other die sizes available
Х, Ү	25 mm, 200 mm, motorized, <1 μm enc. res.	2. Option: up to 80°C available
Z	10 mm, motorized, <1 µm encoder resolution	3. 5 DOF for edge-coupled configuration
XY rotation	±2°, manual	4. Other single and fiber array size mounts optional
Z rotation	±5°, motorized, 7.5 m° enc. resolution	5. Option: 3x mag., 2.4 mm FOV
Die mount ¹	22 x 22 mm plateau with vacuum port	6. Option: 0.6-7x mag., 1-12 mm FOV, manual fine focus illumination 18 MP sensor 84 mm WD
	Eight chip carrier for 3 x 5 mm die	7. Option: 0.6-7x mag., 1-12 mm EOV, manual fine
Thermal tuning ²	25-35 °C	focus, 18 MP sensor, 150 mm WD
Fiber Stage		8. Field of view, diagonal measure for 1/2.5" sensor
DOF ³ , motorized axes	6, 4	9. Option: Upgrade CPU, RAM, or SSD
XY, Z	26 mm, 12 mm, motorized, 2 nm enc. res.	10. Option: needle-based contact sensor
YZ rotation (chip and fiber orthogonality)	±2°, manual	11. Option: water pump, radiator and reservoir to
Edge coupled rotation (Y axis)	$\pm 2^{\circ}$, motorized, 10 μ° enc. resolution	12. Option: 8 to 96 voltage and/or current controlled
Vertically coupled rotation (X axis)	0-40°, motorized 10 μ° enc. resolution	
Fiber mount ⁴	Fiber arrays up to 3.5 mm wide	Ò
Alignment Optics Details		
Fiber top-view⁵	Moves with fiber, 2x magnification, 3.6 mm FOV ⁸ , manual positioning, 5 MP sensor	
Chip top-view ⁶	Mounted to XYZ stage (12mm, manual), 0.75x mag., 9.6 mm FOV ⁸ , 5 MP sensor	
Side view ⁷	Mounted to XYZ stage (12mm, manual), 2x mag., 3.6 mm FOV ⁸ , 5 MP sensor	
Control Modules		
System Control Module (SCM) ⁹	Industrial grade PC with Intel i5 CPU, 16 GB RAM, 500 GB SSD, and Windows 10 Pro	
Motion Control Module(MCM) ¹⁰	Motor controllers and trigger logic	
Environment Control Module (ECM) ¹¹	TEC controller; 20 to 50° C	
Photonics Control Module (PCM) ¹²	Alignment laser, dual channel detector, polarization switch, and multi-channel sources	

Instrument Drivers (as of 6/30/19)

Swept Lasers: Agilent 8164A/81682A; Keysight 8164B/81606A, N7711A, N7714; EXFO (Yenista) T100S-HP; Santec TSL 510, 550

Optical Spectrum Analyzers: Anritsu MS9740A; Yokogawa AQ6370B

Optical Power Meters: Agilent 8163A; EXFO CTP 10; Keysight N7744A, N7748A, N7745, N7447; Thorlabs PM100, PM100D

Thermoelectric Coolers (TEC): MLP TEC; Arroyo 53305, 5240; Newport (ILX) LDT-5910B; Stanford Research PTC10

Source Measurement Units (SMU): MLP SMU; Nicslab XPOW; Keysight U2722A, U2723A; Tektronix (Keithley) 2400

Contact factory for recent additions or for quotation for specific instruments. Specifications are subject to change without notice.