DHM® Stroboscopic module

For in-plane / out-of-plane full-field 3D measurements of ultra-fast moving micro-structures within a single acquisition

Used in conjunction with DHM, the Lyncée Tec stroboscopic module delivers dynamic contactless characterization of micro-devices with nanometer vertical resolution. Key features of the module are:

- frequency range up to 25 MHz
- user-selectable laser pulse freezing time down to 7.5 ns
- generation of any periodic or repeated impulse driving signal for characterization of key micro-structure parameters
- recording of external input signals
- continuous frequency scan to approach resonance

The stroboscopic package for DHM family of reflection and transmission configurations enables 3D dynamic response measurements and analysis of your products as they move for both material and life science applications.

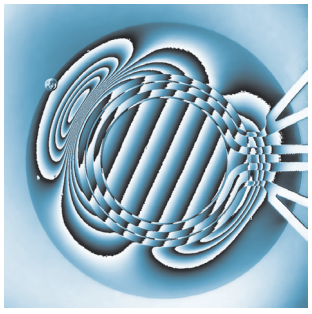
Fields of application include inertial and pressure sensors, inkjet heads, optical and RF MEMS/ MOEMS, cantilevers, micro-mirrors, micro-fuel cells, biochips, micro-fluidic devices… Packaged devices can easily be characterized through any glass window, as well as immerged samples.

Key device parameters can be characterized such as:

- shape, deformation, distortion and tilt / angle
- dynamic response
- critical dimensions
- surface texture
- thermal dilatation, elastic modulus...

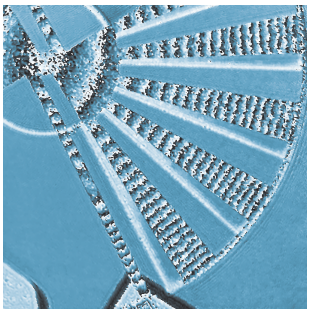
The modular design of DHM and its proprietary stroboscopic electronics permit its integration to MEMS probe stations and can control and drive up to max. 256 I/O cards simultaneously. Each one delivers a driving signal and allows the recording of synchronized digital and analog signals. The stroboscopic parameters can be adjusted at any moment by software and the response can be visualized in real-time. Furthermore non periodic movement capturing can be enhanced with an optional ultra fast camera.

The stroboscopic module comes with intuitive and powerful software integrated into Koala Software to synchronize illumination with device movements, to record, visualize and analyze the micro-device's functionality and true dynamic response.



a

b



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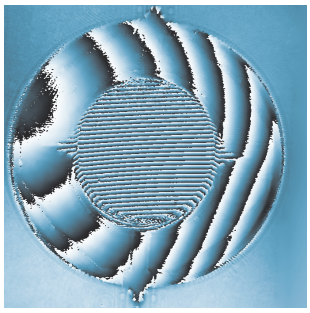

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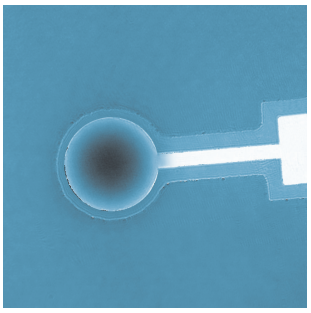

e

Precise measurements of displacements through extremely sensitive phase interpretation:
(a) Fabry-Perot cavity mirror
(b) Cantilever at resonance
(c) Variable capacitor
(d) High frequency mirror
(e) Membrane

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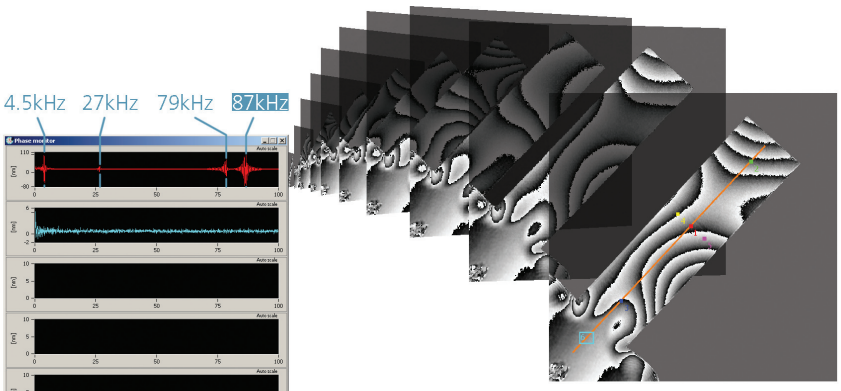
Represented by

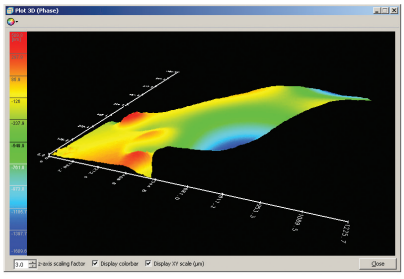
System configuration and performances

Fundamental frequency analog output:	0.1 Hz to 25 MHz	
Measurement points per fundamental cycle:	frequency dependent: up to 2^{15} points	
Laser pulse length:	down to 7.5 ns, up to 2^{32} repetitions	
Synchronization precision:	< 5 ps	
Waveform amplitude resolution:	14 bits	
Waveform generator:	predefined DC, sine, triangular, rectangular or user-defined form	
Analog output and offset:	0 to ±10 Volts with ±2% accuracy (up to ±200 Volts with optional M-22100, max. 100 kHz)	
Analog output impedance / max. current:	50 Ω / 100 mA	
Number of inputs:	2 analog (-10 V to +10 V) and 2 digital 3.3-5 V TTL, synchronized with the measurement	
Analog input impedance:	100 kΩ	
Device control:	preset or user-defined amplitude and / or frequency scanning duty cycle	
Stroboscopic module configuration:	M-16000	basic stroboscopic module including master board and one I/O card (M-22100)
	M-22100	additional I/O card for master board (M-16000) or slave board (M22040)
		includes 1 analog output ±10 V, max. 25 MHz, I_{max} 100 mA
		up to 4 I/O cards per board
	M-22040	additional slave board for up to 4 additional I/O cards (M-22100)
		max. 64 boards, 256 excitation signals
High power module configuration:	M-16010	motherboard for up to 2 amplification cards (M-22110)
	M-22110	×20 amplification card for 1 analog output ±200 V, max. 100 kHz, I_{max} 10 mA
Compatibility:	DHM R1100 series & DHM T1001	

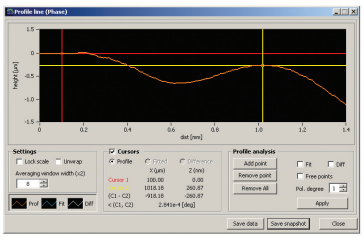


Dynamic response analysis
Scan of your sample through frequency and amplitude of its excitation signal. Recording of its response for given sample points:
(red) on moving part
(cyan) on static part

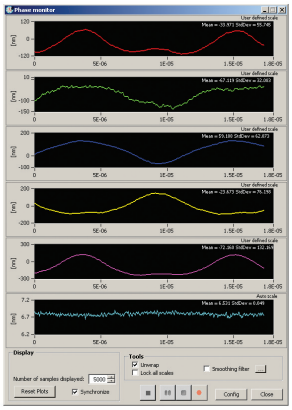
Sample topography
Full field dynamical measurement of shape and displacements of the sample over its movement cycle



3D View
Three dimensional representation of the movement for impressive presentations of your results.



Profile extraction
Dynamic analysis of the sample deformation along profiles.



Time monitoring
Analysis of vertical displacements of points or areas of the sample along the excitation cycle

Specifications are subject to change without notice