Technology advancements in ultrasonics and in micro- and nanotechnology have given rise to new optical methods to make ultra high frequency (UHF) measurements of mechanical vibration. Laser-based, non-contact optical testing is the best choice.

Laser-Doppler Vibrometers (LDV) can characterize the out-of-plane vibrations at ultra high frequencies. Polytec's UHF-120 extends the vibration frequency bandwidth up to 1.2 GHz. Complete with a new optical arrangement, the system retains the advantages and features familiar to LDV users.

The UHF-120 Vibrometer consists of a heterodyne interferometer with a controller box. The optical head provides a heterodyne detector signal that is acquired with a fast digital oscilloscope. The digitized detector signal is transferred to a PC where the heterodyne carrier is demodulated by a new module in Polytec's Vibsoft software.

The system has a gate function for reducing light power to minimize the energy transfer from the measurement beam to the measurement spot and for easy alignment of the beam on the specimen. In addition, an integrated camera and an integrated bright-field microscope illumination control the measurement spot positioning.

Typical Applications

- RF MEMS
- BAW/SAW filters
- NEMS
- MEMS programmable clock oscillators
- Ultrasonic motors
- Ultrasound imaging
- Laser ultrasonics

UHF-120 Ultra High Frequency Vibrometer

A Sensor for Ultra High Frequency Vibration Measurements up to 1200 MHz

Datasheet

Technical Data

Interferometer Optics	
Laser wavelength	532 nm
Output power	< 5 mW (Laser class 3R) (with gate function to minimize energy transfer to specimen)

Bright Field Objective				
Objective properties			**Properties UHF-120 with objective**	
Objective manufacturer[1]	Zoom factor x-times	Working distance (WD)[2] mm	Spot diameter (1/e²) µm	Field of view mm x mm
Mitutoyo	20	≥ 20	< 2.5	approx. 0.71 x 0.55
Optional:				
Mitutoyo	1	13[3]	< 50	approx. 14.2 x 11
	2	34	< 21	approx. 7.10 x 5.50
	5	≥ 34	< 10	approx. 2.84 x 2.20
	10	≥ 33.5	< 4.5	approx. 1.42 x 1.10
	50	≥ 13	< 2	approx. 0.28 x 0.22
	100	≥ 6	< 1	approx. 0.14 x 0.11
Polytec	3.6	53	< 12	approx. 3.90 x 3.00
	10	48.9[4]	< 4.5	approx. 1.42 x 1.10

Heterodyne Detector Signal	
NESD (Noise equivalent surface displacement)*	< 0.6 - 10^{-7} nm $(W/Hz)^{1/2}$
Carrier frequency	> 600 MHz

WavePro Oscilloscope	
Max. number of samples of a measurement	19531250
Data memory	2 x 20 MB (for two channels)
Channels	4 (max. 2 can be used at 10 GS/s interlaced)
Max. sample rate	40 GS/s
Vertical resolution	8 bit

Demodulated Displacement Signal (in VibSoft)	
Max. vibration frequency	1200 MHz
Displacement-amplitude resolution	1.5pm at 2.5kHz resolution bandwidth (corresponds to 30 fm/√(Hz))
Best frequency resolution	256 Hz [1]

[1] You will find the numeric aperture on the objective. If applicable, please contact the manufacturer of the objective or the local Polytec representative.

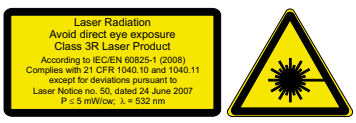
[2] The working distance (WD) results from the parfocal length (95mm) minus the length of the objective mounted. You can ask for the exact working distance, by indicating the objective type, at the manufacturer or the local Polytec representative.

[3] The working distance (WD) is for objectives without λ/4-plates. The λ/4-plates that belongs to the objective may not be used for measurements with the UHF-120!

[4] The parfocal length of this objective is 135mm. To measure at a vacuum measurement station with a 6mm thick glass window, you can remove the first glass element in the clamping ring. Thus the working distance (WD) will be increased up to 56mm.

* Measured on the photo detector

[1] With highest FFT bandwidth and FFT lines number



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