

**DFM**

Danish National Metrology Institute

ABOUT DFM

DFM is the Danish National Metrology Institute, maintaining and developing a range of national standards.

DFM provides metrology services and technology, primarily to high-tech companies within the pharmaceutical, photonics and advanced manufacturing industries.

DFM offers calibrations, certified reference materials and other metrology related products.

DFM is ISO 9001 certified.

Stabilaser 1542



A breakthrough in metrology

The Stabilaser 1542 is an acetylene-stabilized fiber laser that exhibits both narrow linewidth, excellent long-term stability and high accuracy. The design maintains the short-term linewidth of a high-end fiber laser, and adds the long term stability and accuracy from a molecular transition of acetylene. The result is a high-performance laser source offering continuous trouble-free operation without user intervention.

Enabling next-level applications

Thanks to the Stabilaser 1542, affordable access to the high levels of performance needed for cutting edge scientific research, is now available. A diverse and growing range of applications include stabilization of frequency combs and length metrology. As a reference, the Stabilaser 1542 is an essential component for stabilization and line narrowing of lasers for spectroscopy or laser cooling on narrow-line atomic or molecular transitions, as well as in dual comb spectroscopy.

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CALIBRATION SERVICES

DFM offers a wide range of calibration services within photonics, nanometrology, electrochemistry and acoustics as well as primary level calibration services for mass, length, CMM, and DC electricity.

All measurements are traceable to recognized national and international standards. A majority of our calibrations are performed under ISO 17025 accreditation.

CONTRACT RESEARCH

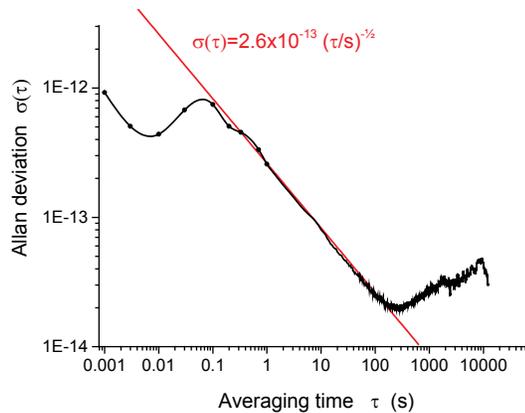
DFM offers metrology related contract research such as development of new measurement technology, assistance in obtaining accreditation and other areas where specialized metrology competences are required.

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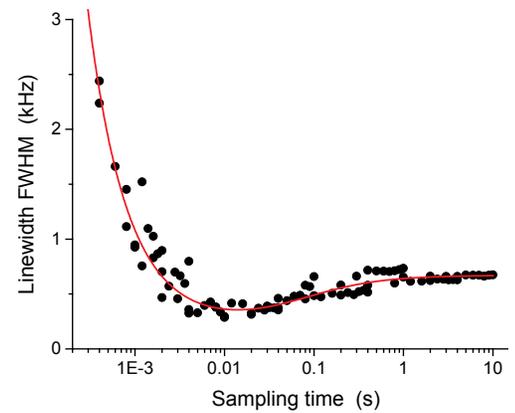
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Specifications

Wavelength:	1542.3843472 nm (vacuum)
Linewidth:	300 Hz (short term)
Stability:	$\leq 3 \times 10^{-13}$ (ADEV ≥ 1 s)
Long-term accuracy:	$\leq 2 \times 10^{-12}$ drift per year
Output power, locked:	10 mW (nominal)
Output power, unlocked:	100 mW (nominal)
Power requirements:	100 – 240 VAC, 50 or 60 Hz
Dimensions:	22 cm (H) x 52 cm (W) x 51 cm (D)



The figure shows a typical Allan Deviation (ADEV) plot for a Stabilaser 1542.



The Stabilaser 1542 linewidth vs. sampling time, Fourier limited at short times.

Technology

At the heart of the Stabilaser 1542 is a compact ultra low-noise fiber laser stabilized to the acetylene $^{13}\text{C}_2\text{H}_2$ P(16) (v1 + v3) transition at $\lambda = 1542.3837$ nm, corresponding to the frequency $f = c/\lambda = 194\,369\,569\,384$ kHz (laser output is shifted 80 MHz due to internal modulation). The laser meets the conditions of the CIPM recommendation on standard frequencies and can be used as a primary standard with an uncertainty of 5 kHz. The proprietary optical design and control software ensure both autonomous operation and a high quality laser output. The Stabilaser 1542 is available in a 19 inch chassis and is controlled by an external PC.

Proven record

Professor Michael Drewsen, Aarhus University, Denmark, explains: *“We have applied Stabilaser 1542 as a frequency reference for a frequency comb for over a year now. The ease with which the comb teeth are short-term stabilized to sub-kHz linewidths, as well as the long term absolute accuracy-drift have impressed us very much. The stability of Stabilaser 1542 is simply amazing.”*

