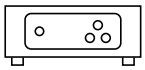


Linewidth Analyzer

LWA-1k 780

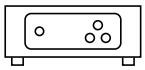
HighFinesse
The Standard of Accuracy

Wavelength Range	min.	typ.	max.
760 – 1064 nm	760 nm	780 nm	1064 nm

Required Input Power [2]			
1 – 15 mW	1 mW	10 mW	15 mW

1) According to a –3 dB criterion.

2) Best performance with typical input power. Noise sensitivity scales inversly with input power.



Linewidth Analyzer

LWA-1k 780

HighFinesse
The Standard of Accuracy

Analyzer Unit

Laser type	CW and single-mode
Input type	SM-FC/APC

Spectral and Frequency Noise Specifications [3]

		10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	> 1 Mhz
Noise floor $N_{\Delta\nu}$ @ typ. input power and wavelength [4]	Hz/√Hz	200	75	30	30	25	15
Laser phase noise floor @typ. input power and wavelength [5] [6]	rad/√Hz	20	750 m	30 m	3 m	250 µ	15 µ
	dBrad/√Hz	26	–2.5	–30	–50	–72	–96
Equivalent interferometer signal noise @typ. input power and wavelength [6] [7]	rad/√Hz/m	6.2 µ	2.3 µ	920 n	920 n	770 n	460 n
	dBrad/√Hz/m	–104	–112	–120	-120	–122	-126
Optical frequency resolution		3 kHz					
Frequency noise bandwidth [1]		10 Hz – 10 MHz					
Frequency noise sensitivity		< 50 Hz/√Hz – 10 MHz/√Hz					
Intrinsic linewidth range [8]		< 3 kHz					
Effective linewidth [9] range (β-separation)		< 10 kHz – 20 MHz					

1) According to a –3 dB criterion.

3) Frequency noise and lineshape specifications are derived from measurements at 780 nm.

4) $N_{\Delta\nu}$ is the noise floor of the instrument in terms of the square root of the power spectral density of the frequency noise.

5) The phase noise floor corresponds to the noise floor of the square root of the power spectral density of the phase. It is calculated from $N_{\Delta\nu}$ by the formula $1/f \times N_{\Delta\nu}$ .Aditionally, phase noise is often specified in terms of $\mathcal{L}(f)$ which can be calculated with the formula $\mathcal{L}(f) = 1/f^2 \times N^2_{\Delta\nu}/2$.

6) Not included in the software, can be calculated by the user from exported data.

7) This is the calculated noise of the interferometer phase of a two path interferometer with length imbalance L (in meters). The alculation is performed for a given frequency noise density floor by $2\pi nL/c \times N_{\Delta\nu}$ with n being the refractive index of the reference fiber interferometer material and c being the speed of light in vacuum. Values in the table are given for an refractive index of n = 1.46 and a reference length of 1 meter.

8) Intrinsic linewidth: Limited by fundamental quantum processes and laser design. Determined by the noise floor (white noise) of the frequency noise spectrum and calculated by: noise density (in Hz^2/Hz) times π (rule of thumb). This value is most commonly denoted as “laser linewidth” by laser manufacturer.

9) Effective linewidth: Combination of intrinsic linewidth and additional broadening mechanisms (thermal, electronical and acoustic noise). Determination by β-separation method (noise density spectrum) or curvefitting procedure (lineshape spectrum).

Analyzer Unit

Lineshape Specifications [3)]

Effective linewidth [8)] range (FWHM)	< 10 kHz – 10 MHz
Optical frequency resolution	20 kHz
Dynamic range	60 dB

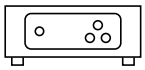
Miscellaneous

Interface	2 × USB 3.0
Analog Output / error signal [10)]	BNC ± 7.5 (50 Ω) ± 15 (high impedance) V, single ended
Cutoff (highpass filter)	10 Hz, 1 kHz, 10 kHz, 100 kHz
Dimensions	220 mm × 334 mm × 96 mm
Weight	8 kg

3) Frequency noise and lineshape specifications are derived from measurements at 780 nm.

8) Intrinsic linewidth: Limited by fundamental quantum processes and laser design. Determined by the noise floor (white noise) of the frequency noise spectrum and calculated by: noise density (in Hz^2/Hz) times π (rule of thumb). This value is most commonly denoted as “laser linewidth” by laser manufacturer.

10) Linewidth reduction/control: Analog output as error signal for use in combination with PID controller (not included) for frequency noise or RIN reduction.



Linewidth Analyzer

LWA-1k 780

HighFinesse
The Standard of Accuracy

Digitizer Unit

Sample rate	62.5 (max.) MSa/s
Resolution	16 bits
Acquisition time	1 – 100 ms
Evaluation time	< 1 (typ.) s

Miscellaneous

Communication	USB 3.0 type B
Dimensions	210 mm × 200 mm × 74 mm
Weight	2 kg

Software

Operating system	Microsoft® Windows® 10 or newer
CPU (recommended)	Intel® i5 8600 / AMD Ryzen™ 5 2600 or better
Memory (recommended)	16 GB RAM or more
Graphical evaluation options	Frequency noise density spectrum, lineshape spectrum, intrinsic (Lorentzian) linewidth, effective (optical) linewidth

Further Information

For further technical information, application examples, diagrams and for customisation of linewidth analyzers please contact:

HighFinesse Service
service@highfinesse.de

HighFinesse GmbH
Wöhrdstraße 4
72072 Tübingen, Germany

T + 49 (0) 7071 - 53 918 0
F + 49 (0) 7071 - 53 918 99
M info@highfinesse.com

Additional information
and distributors:
www.highfinesse.com