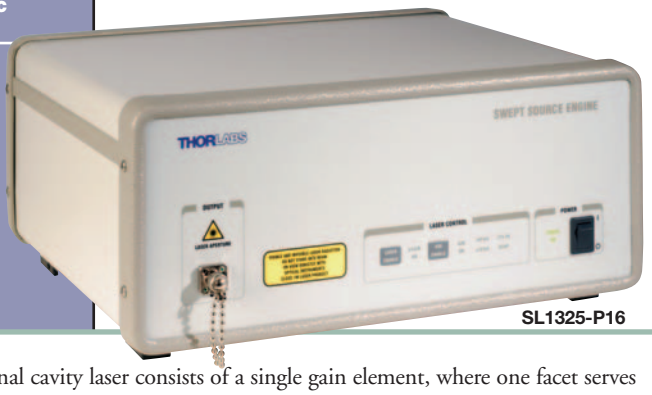
Tunable Lasers
Femtosecond Laser
WDM Laser Sources
Benchtop Laser Sources
HeNe Lasers
ASE Sources
Terahertz
Electro-Optic Modulators

Frequency Swept Laser Source...Page 1 of 2

Thorlabs' Frequency Swept Tunable Lasers are specifically designed for SS-OCT applications. Swept Source Optical Coherence Tomography (SS-OCT) and Optical Frequency Domain Reflectometry (OFDR) provide real-time high resolution cross-sectional imaging of turbid media. These applications require a specially designed laser source that can sweep a wide wavelength range at very high speeds. A wide spectral tuning range is required for high axial resolution OCT images, and a high sweep speed is needed to obtain real-time 2D and 3D OCT imaging speeds. Thorlabs now offers a variety of frequency swept laser sources based on an external cavity semiconductor tunable laser designed and optimized for SS-OCT and OFDR applications.

Now available with center wavelengths at 850nm, 1050nm, 1325nm, and 1550nm, these broadband frequency swept lasers are a versatile family of specialty laser sources covering the spectral regions most often used in OCT applications. The compact design, robust alignment, and high repetition rate make these systems ideal for both research and OEM applications. Recently redesigned, these lasers now offer even greater stability in a smaller desktop housing.



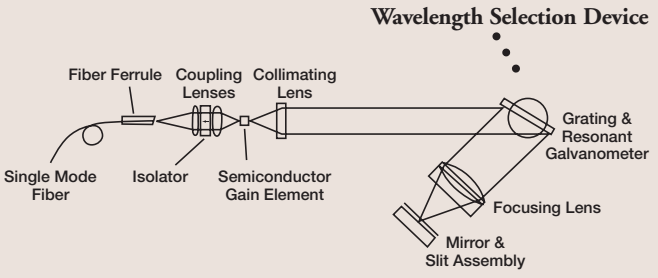
SL1325-P16

All the Thorlabs swept source lasers are easily integrated into OEM systems. This family of swept source lasers is available in key wavelengths used for many biological and material science applications. For ophthalmic systems, the sample is mostly water, making the SL850-P16 and the SL1050-P16 ideal due to the minimal absorption of water in the 700 to 1000nm spectral range. In many other biological tissue samples, wavelengths of 1000nm or longer provide enhanced imaging and deeper penetration depths. In addition, the availability of robust inexpensive optics and components optimized for telecom wavelengths make the SL1325-P16 and SL1550-P16 lasers ideal for other imaging and OEM system applications.

The external cavity laser consists of a single gain element, where one facet serves as an end mirror for the cavity and the extended cavity is comprised of a single collimating lens and a Cat-Eye wavelength selection device.

The intra-cavity side of the semiconductor gain element is AR coated, providing a residual reflectivity of less than 10^{-4} thus allowing for the efficient formation of an extended cavity. Wavelength selection is achieved using a diffraction-grating mounted on a scanner with a focusing lens, mirror, and slit assembly providing active wavelength selection. The focusing lens and slit/mirror assembly are separated by the focal length of the lens. This configuration is commonly referred to as a Cat-Eye and is highly insensitive to angular misalignment. Output from the laser cavity is coupled into a fiber, using a lens system containing an isolator that prevents optical feedback into the cavity.

This design enables a robust alignment due to the cat's eye configuration of the back-reflector, which provides superior long-term stability compared to designs with a quasi-collimated beam on the laser cavity back-reflector.



Patent Pending

Cat-Eye External Cavity Laser

Figure 1: Schematic of the Swept Source Laser

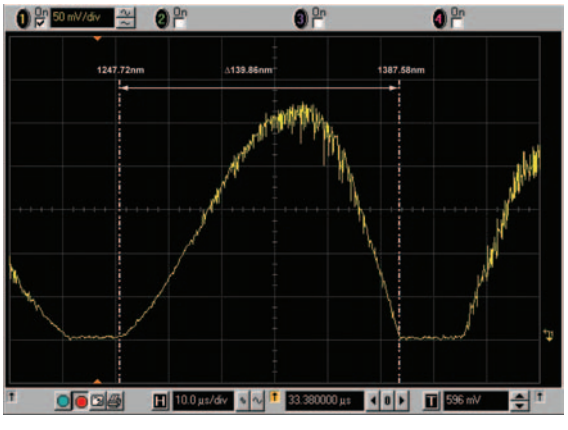


Figure 2: The Power Monitor signal accessible from the rear panel shows optical power as a function of time.

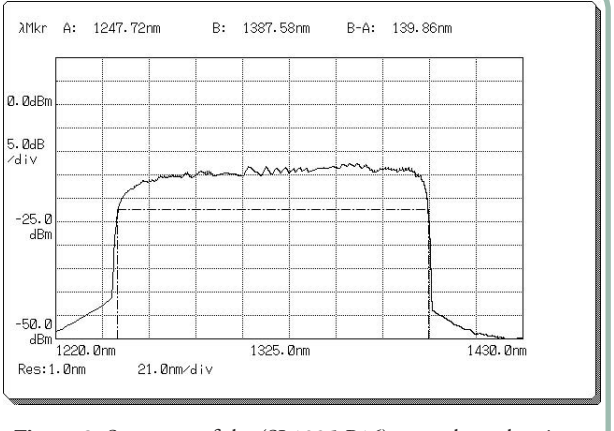


Figure 3: Spectrum of the (SL1325-P16) swept laser showing an active wavelength tuning range of 155nm centered around 1325nm.

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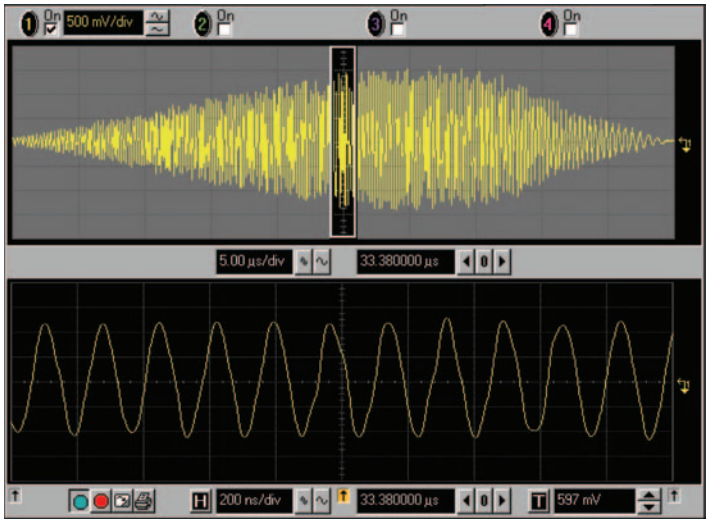
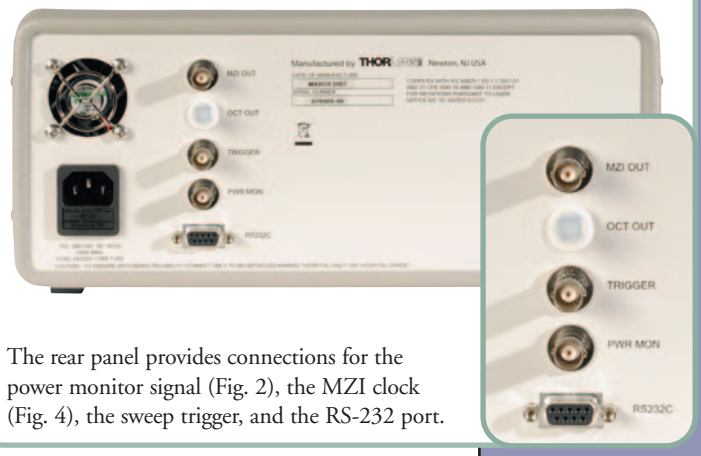


Figure 4: At fast-frequency sweep speeds, the laser frequency varies sinusoidally in time. For OCT imaging, accurate and reliable recalibration of the interference output is required so that the samples are equidistant in frequency. Thorlabs' swept source laser is ideal for this application. The laser features a built-in Mach-Zehnder Interferometer (MZI) with balanced detector output, which can be used as a frequency clock because the zero crossing of the interference fringe signal is equally spaced in optical frequency (k-space). This clock, while useful for resampling OCT data sets, can also be used to synchronize other measurements.

Key Features:

- Multiple Wavelength Versions: 850nm, 1050nm, 1325nm, and 1550nm
- Fast Wavelength Sweep Rate: 16kHz
- Single Mode Fiber Output
- Compact Housing: 12.4" x 11.6" x 5.8" (315 x 295 x 146mm)

Rear Panel of Swept Source Laser



The rear panel provides connections for the power monitor signal (Fig. 2), the MZI clock (Fig. 4), the sweep trigger, and the RS-232 port.

OCT Swept Laser Source Specifications

Parameter	SL850-P16	SL1050-P16	SL1325-P16	SL1550-P16
Center Wavelength (nm) Typical	850	1050	1325	1550
Center Wavelength Range (nm)	835-855	1040-1060	1310-1340	1535-1565
Tuning Range (nm) @ -10dB Cut Off Point	60-80	70-90	120-150	140-180
Repetition Rate (kHz) ±200Hz	16	16	16	16
Average Optical Output Power (mW) Scanning	3	3	12	10
Optical Output Power (mW) Static	6	6	24	20
Signal Source Spontaneous Emission (dB)	25	25	25	25
Coherence Length Range (mm)	5-7	5-7	6-8	6-8
Laser Classification (per IEC 60825-1)	Class 1M	Class 1M	Class 1M	Class 1M
Operating Temperature (°C)	10 - 40			
Physical Size (W x D x H)	12.4" x 11.6" x 5.8" (315 x 295 x 146mm)			
Weight	21lbs (9.5kg)			
Input Voltage	100 - 240VAC 50 - 60Hz			
Optical Output	Single Mode Fiber			
Output Connector	FC/APC			
Electrical Output Connectors	BNC			
RS-232 Interface	DB9-F			

Note: Specification subject to change due to on going engineering improvements.

ITEM#	$	£	€	RMB	DESCRIPTION
SL850-P16	$ 35,000.00	£ 22,050.00	€ 32.550,00	¥ 334,250.00	16kHz Frequency Swept Laser Source @850nm
SL1050-P16	$ 35,000.00	£ 22,050.00	€ 32.550,00	¥ 334,250.00	16kHz Frequency Swept Laser Source @1050nm
SL1325-P16	$ 35,000.00	£ 22,050.00	€ 32.550,00	¥ 334,250.00	16kHz Frequency Swept Laser Source @1325nm
SL1550-P16	$ 35,000.00	£ 22,050.00	€ 32.550,00	¥ 334,250.00	16kHz Frequency Swept Laser Source @1550nm