

Tunable Lasers



TSL-770



TSL-570

What is a Tunable Laser?

In conventional lasers, the tunability of the laser is determined by the laser's medium and cannot be changed freely. By changing the resonator structure or changing the laser medium, the wavelength can be varied within a certain range. There are various configurations of tunable lasers which include free electron, dye and laser excitation. However, applications continue to expand for the semiconductor tunable lasers, since the laser medium can be produced easily at a lower cost. A semiconductor laser operates by passing a current through a semiconductor to allow the laser to oscillate. The light emission mechanism is similar to that of a light emitting diode (LED). The current flows in the forward direction of the p-n junction. When connected to the power supply, the p-side becomes positive and the n-side becomes negative. Electrons flow from the n-side toward the positive. This configuration is seen in a wide range of applications such as the light activation for semiconductor diode pumped solid state (DPSS) lasers, gas sensing, bar code scanners, laser pointers, optical fiber communications, and material processing.

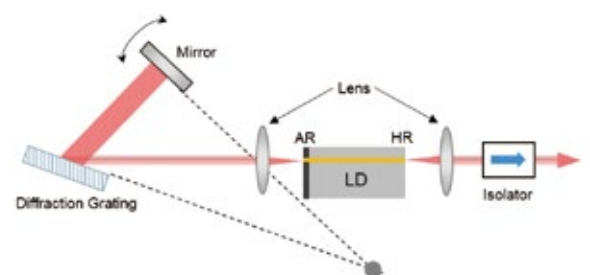
Santec's Laser Technology

In 1987, we released the first commercially available stand-alone external cavity tunable laser which is operational in single longitudinal mode using a semiconductor laser medium. Since then, for over 30 years, we have been continuously developing and manufacturing products to improve performance.



Benchtop External Cavity Tunable Laser

Our company manufactures and sells tunable lasers (the TSL series) which can achieve external longitudinal single mode oscillation using a grating to select wavelength. The laser is in a Littman Metcalf configuration and the full range is mode hop free because the wavelength is selectable by changing the resonator length in the grating.

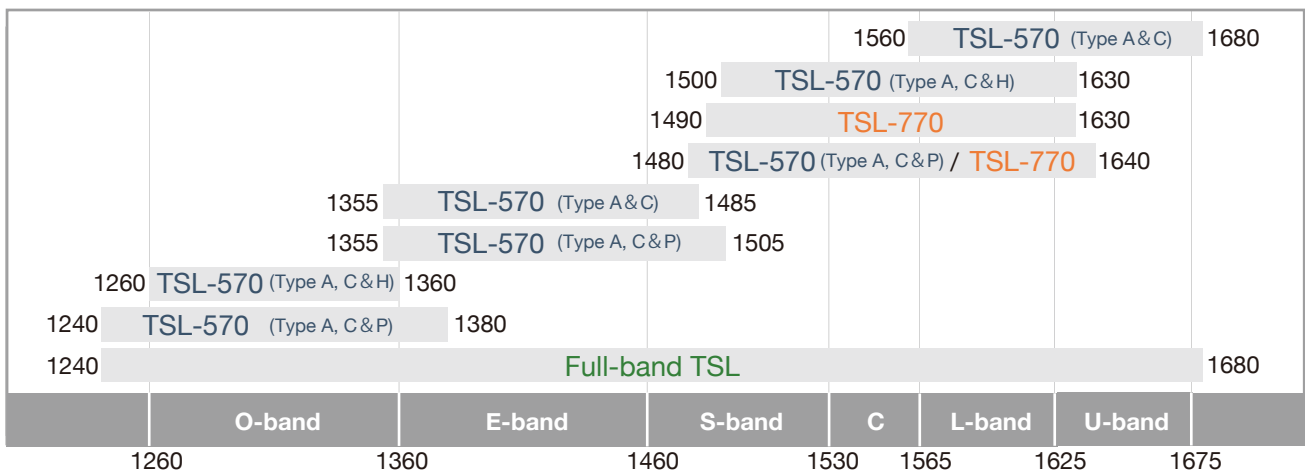


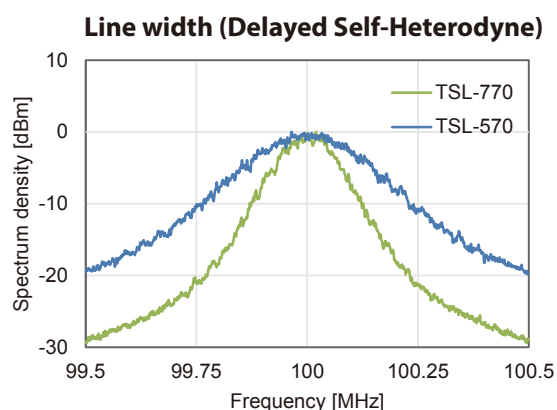
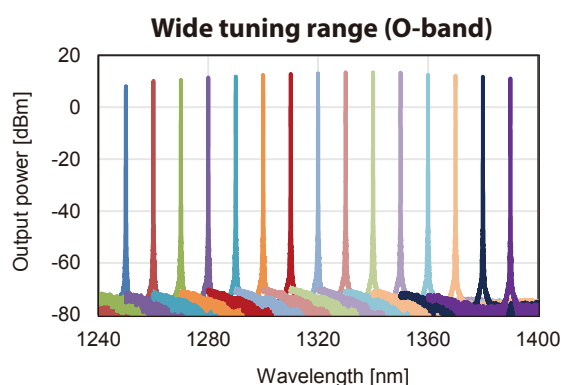
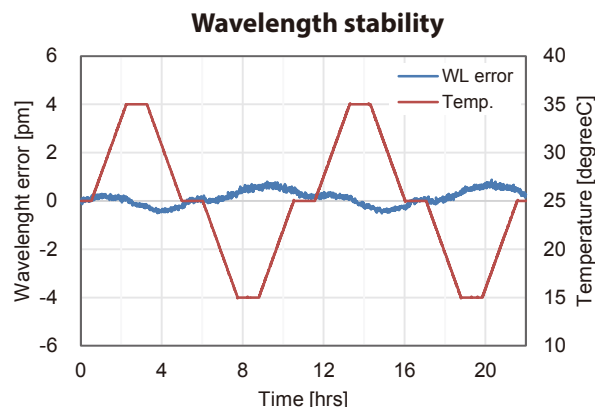
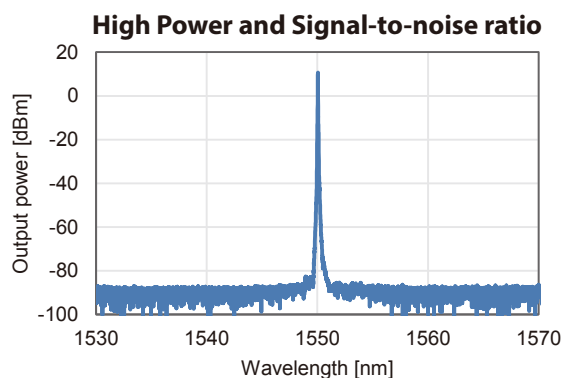
Littman-Metcalf configuration

Typical Specifications Comparison Chart

	Ultimate Performance TSL-770	Cost Effective TSL-570 Type A	Standard TSL-570 Type C	High Accuracy TSL-570 Type P	High Power TSL-570 Type H
Application	<ul style="list-style-type: none"> Interferometry Spectroscopy Metrogy OFDR Gas sensing Terahertz generation 	<ul style="list-style-type: none"> Component testing CWDM 	<ul style="list-style-type: none"> Component testing DWDM 	<ul style="list-style-type: none"> Fiber optic transmission testing Photonic material characterization Optical spectroscopy 	<ul style="list-style-type: none"> Silicon Photonics
Tuning Range (nm)	1490 - 1630, 1480 - 1640	1240 - 1680 (Please refer following WL range selection)			1260 - 1360, 1500 - 1630
Output Power (dBm)	> 13	> 13			> 20
Sweep Speed (nm/s)	0.5 - 200	1 - 200			
Wavelength Accuracy (pm)	+/-1 (typ.0.3)	± 20	± 5	± 2	
Line width (kHz)	60	200		100	

Wavelength Range Selection





Other option lineup

Full band Tunable Laser System

The Full band TSL is a full band, high performance tunable laser system that covers the ultra wide tuning range of 1240 to 1680nm (O band to U band). The system combines up to four Santec's tunable lasers (TSL 570) with an optical switch module (OSU 110) and control software. The Full band TSL can be easily controlled via GPIB and USB on PC using the custom GUI.



Full-band TSL

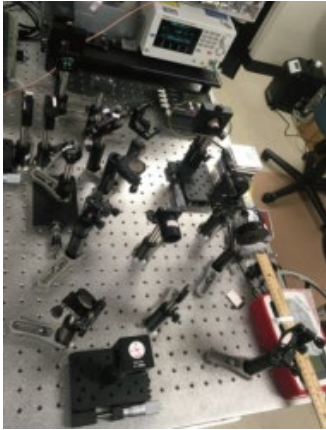
The Wavelength Selectable Laser

C-band or L-band lasers are available, each covering a 38 nm tuning range. The WSL-110 features gridless tuning, allowing any wavelength to be accessed.



WSL-110

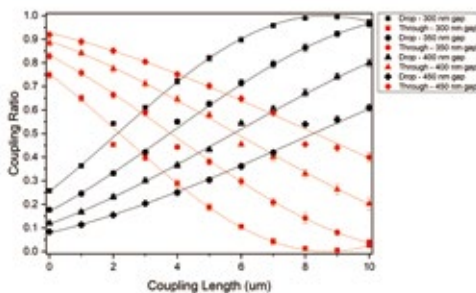
Customer Feedback



The tunable santec laser TSL-550 is integrated into an optical setup to aid us with sensitive reflection and transmission measurements that require fine wavelength increments (approximately 0.01 nm steps).

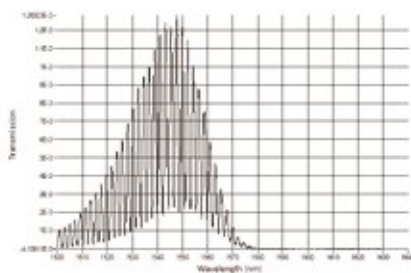
The user-friendly display panel provides an easy interface to control the wavelength increments, power and other sweep parameters. Additionally, the santec laser also offers a broadband operation, covering the wavelength range from 1560-1680 nm, helping us to acquire the spectral signatures of our photonic materials in a broad spectrum.

**Prof. Jennifer Dionne's lab,
Stanford University, USA**

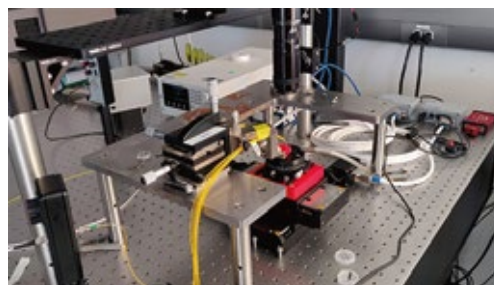


We wanted to determine the coupling ration of silicon photonic devices' directional couplers with different coupling gaps and lengths. The test setup was simply sweeping the TSL-550 across its scanning range and measuring transmitted power with a photodetector. Measured devices were integrated MZIs with an initial 3dB Y-splitter and the directional coupler as the output splitter. Measured interference fringes gave us an accurate method for characterizing the coupling strength without input/output coupling effects.

Coupling Ratio vs Coupling Length



Measured interference fringes



**Prof. Nathan Youngblood
University of Pittsburgh, USA**