



High Performance Tunable Laser

TSL-570



Product Overview

The TSL-570 is a high performance tunable laser with a wide tuning range and an output combining high power and high signal-to-noise ratio. It uses a new optical cavity design with precise speed control up to 200 nm/s and sub-picometer resolution and accuracy.

Tunable lasers are used extensively in photonics: for optical component characterization, photonic integrated circuit testing, quantum photonics, spectroscopy and sensors. Santec's TSL-570 is a high specification, full feature instrument suitable for all applications. It has a simple to use touch panel display as well as Ethernet, GPIB and USB interfaces for remote control. A Wake-on-LAN (WoL) feature provides convenience for remote installations. Models are available to cover from 1240 to 1680 nm with output powers up to 20 mW.

Santec's new sealed laser cavity is mode-hop-free and provides a stable output at every wavelength. It has 0.1 pm resolution, sub-pm accuracy and a market leading, 90 dB/0.1 nm, ultra-low level of spontaneous source emission. The TSL-570 integrates seamlessly with Santec's optical power meters, optical switches and polarization controllers creating benchmark, turn-key solutions for wavelength dependent loss (WDL) and polarization dependent loss (PDL) measurements.

Features

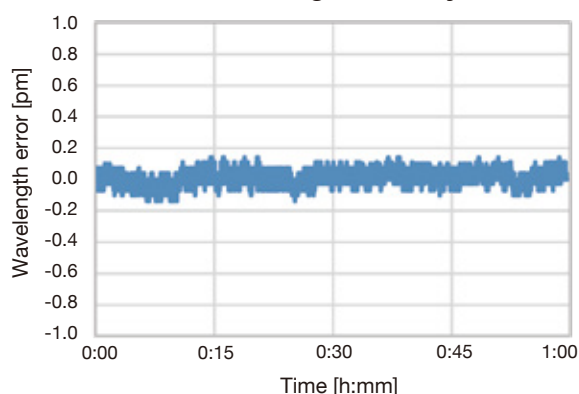
- Fast, up to 200 nm/s, wavelength sweeps
- Wide tuning range lineup : 1240 to 1680 nm
- Wavelength resolution : 0.1 pm
- High signal-to-noise ratio : 90 dB/0.1 nm
- Fine tuning scan range : 10 GHz

Applications

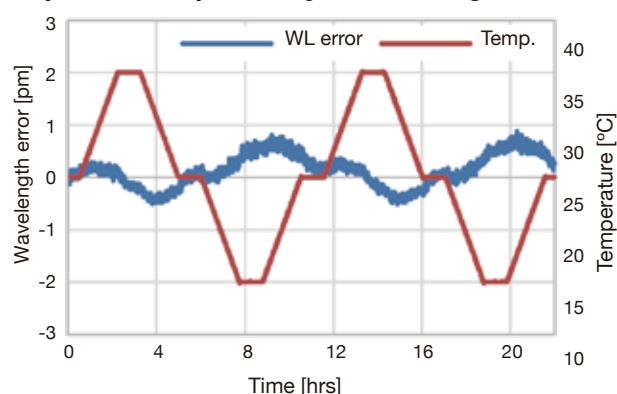
- Optical component characterization
- Fiber optic transmission testing
- Photonic material characterization
- Optical spectroscopy

Measurement Data

Wavelength Stability



Temperature Dependency of Wavelength Variation



Optical Specifications

Model Number: 260360, 355485, 500630 and 560680

Category	Parameter		Unit	Performance	
				Type A	Type C
Wavelength Characteristics	Wavelength Tuning Range		nm	1260 - 1360 / 1355 - 1485 / 1500 - 1630 / 1560 - 1680	
	Wavelength Setting Resolution		pm	0.1	
	Wavelength Stability (typ.) ^{*1}		pm	≤±5	≤±1
	Absolute Wavelength Accuracy ^{*2}	Step Mode	pm	±15	±3
	Absolute Wavelength Accuracy (Operating temp.)		pm	±20	±5
	Wavelength Repeatability (typ.)		pm	±5	±1
	Absolute Wavelength Accuracy (typ.) ^{*2}	Continuous sweep mode @100 nm/s	pm	±15	±3.5
	Wavelength Repeatability (typ.)		pm	±6	±1.5
	Sweep Speed		nm/s	1 to 200	
Fine Tuning Scan Range		GHz	≥10		
Optical Power Characteristics	Output Power ^{*7}	Peak (typ.)	dBm	≥13	
		@1260 - 1360 / 1380 - 1485 / 1500 - 1630 / 1560 - 1680 nm	dBm	≥10	
		@ 1355 - 1485 nm	dBm	≥ 7	
	Power Stability ^{*1, *3}		dB	±0.01	
	Power Repeatability ^{*3}	Step mode	dB	±0.01	
	Power Flatness vs. Wavelength ^{*3, 7}		dB	±0.2	
	Dynamic power repeatability (typ.) ^{*3}		dB	±0.01	
	Dynamic relative power flatness (typ.) ^{*3}	Continuous sweep mode @100 nm/s	dB	±0.2	
	Relative intensity noise (RIN) (typ.) ^{* 4}		dB/Hz	-145 (1 MHz to 3 GHz)	
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off (Delayed self-heterodyne)	kHz	200	
		Coherence Ctrl. Off (Instantaneous ^{*9})	kHz	<10	
		Coherence Ctrl. On	MHz	40	
	SMSR (typ.)		dB	≥ 45	
	Signal to Total Source Spontaneous Emission Ratio ^{*5}		dB	≥ 70	
	Signal to Source Spontaneous Emission Ratio ^{*6}		dB/nm	≥ 80 (≥90 dB/0.1 nm)	

Model Number: 240380, 355505 and 480640

Category	Parameter		Unit	Performance		
				Type A	Type C	Type P
Wavelength Characteristics	Wavelength Tuning Range *8		nm	1240 - 1380 / 1355 - 1505 / 1480 - 1640		
	Wavelength Setting Resolution		pm	0.1		
	Wavelength Stability (typ.) *1		pm	≤ ±5	≤ ±1	≤ ±1
	Absolute Wavelength Accuracy *2	Step Mode	pm	±15	±3	±1 (typ.)
	Absolute Wavelength Accuracy (Operating temp.)		pm	±20	±5	±2
	Wavelength Repeatability (typ.)		pm	±5	±1	±0.5
	Absolute Wavelength Accuracy (typ.) *2	Continuous sweep mode @100 nm/s	pm	±15	±3.5	±1.5
	Wavelength Repeatability (typ.)		pm	±6	±1.5	±0.8
	Sweep Speed		nm/s	1 to 200		
Fine Tuning Scan Range		GHz	≥10			
Optical Power Characteristics	Output Power *7	Peak (typ.)	dBm	≥13		
		@1260 - 1360 / 1380 - 1485 / 1500 - 1630 nm	dBm	≥10		
		Full Tuning Range	dBm	≥7		
	Power Stability *1, *3		dB	±0.01		
	Power Repeatability *3	Step mode	dB	±0.01		
	Power Flatness vs. Wavelength *3, *7		dB	±0.2		
	Dynamic power repeatability (typ.) *3		Continuous sweep mode @100 nm/s	dB	±0.01	
	Dynamic relative power flatness (typ.) *3	dB		±0.2		
	Relative intensity noise (RIN) (typ.) *4		dB/Hz	-145 (1 MHz to 3 GHz)		
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off (Delayed self-heterodyne)	kHz	200		100
		Coherence Ctrl. Off (Instantaneous *9)	kHz	<10		
		Coherence Ctrl. On	MHz	40		
	SMSR (typ.)		dB	≥45		
	Signal to Total Source Spontaneous Emission Ratio *5		dB	≥70		
	Signal to Source Spontaneous Emission Ratio *6		dB/nm	≥80 (≥90 dB/0.1 nm)		

* All specifications are quoted after 1 hour warm-up period. Specifications apply for wavelengths not equal to any water absorption line.

*1: For period of 1 hour. Within ± 0.5 °C. *2: At 25±1 °C. *3: At "Auto" power mode and > 0 dBm. *4: At maximum output power.

*5: Ratio of signal power to total spontaneous emission power within ±15 nm of the signal wavelength (typical value).

*6: Ratio of signal power to maximum spontaneous emission power in a 1 nm band within a ±3 nm band around the signal wavelength (typical value).

*7: The specification range is up to 1630 nm.

*8: Full wavelength tuning range reduced by 2 nm on both ends for sweep speeds ≥ 100 nm/s and < 150 nm/s.

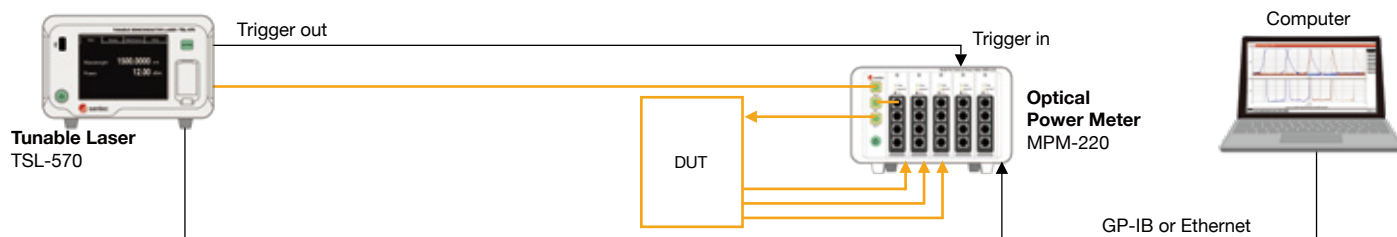
Full wavelength tuning range reduced by 3 nm on both ends for sweep speeds ≥ 150 nm/s.

*9: Calculated from white noise of frequency noise characteristics

Typical Configuration

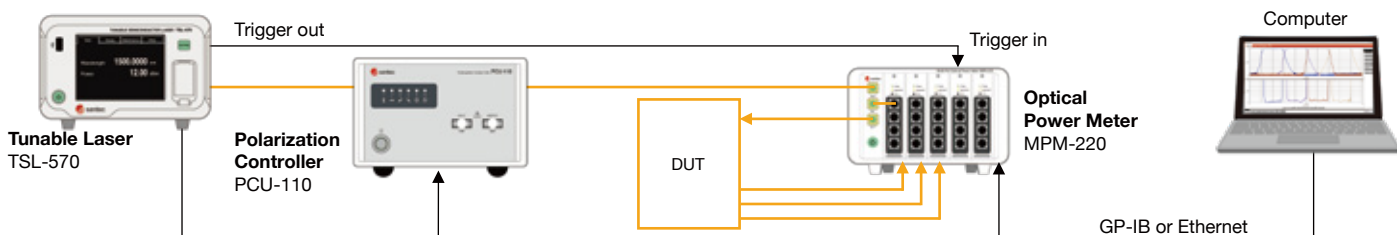
IL measurement setup with the power meter MPM-220

High Specification setup



IL / PDL measurement setup with the polarization controller PCU-110 and the power meter MPM-220

High Specification setup



Specification (Swept Test System with TSL-570)

Parameter	Unit	Specification			Notes
		Type A	Type C	Type P	
Wavelength Accuracy (typ.) (Absolute) * ¹	pm	±12	±2.5	±1.0	at 50 nm/s
		±15	±3.5	±1.5	at 100 nm/s
		±17	±4.5	±2.1	at 200 nm/s
Wavelength Accuracy (typ.) (Relative)	pm	±9	±2.2	±0.8	at 50 nm/s
		±12	±3.0	±1.3	at 100 nm/s
		±14	±4.0	±1.9	at 200 nm/s
Wavelength Repeatability * ²	pm	±5	±1.2	±0.5	at 50 nm/s
		±6	±1.5	±0.8	at 100 nm/s
		±8	±2.0	±1.1	at 200 nm/s
Tunable laser		TSL-570 Type A, Type C and Type P			
Power meter module		MPM-211, 212		MPM-215	
Scan Speed	nm/s	1 to 200			
Dynamic Range for Insertion Loss at one scan (typ.)	dB	40		70	
Dynamic Range for Insertion Loss at two scan (typ.)	dB	75		-	
Dynamic Range for PDL (typ.)	dB	0 to 5			
Measurement Time for IL (typ.) * ³	sec	3@100 nm/s, 1.8@200 nm/s			
Measurement Time for IL / PDL (typ.) * ³	sec	10@100 nm/s, 6.8@200 nm/s			
Wavelength Resolution	pm	0.1			
IL Accuracy (typ.)	dB	±0.02		±0.02	0 to 30 dB Device IL
		±0.1		±0.02	30 to 40 dB Device IL
		±0.1		±0.05	40 to 60 dB Device IL
IL Repeatability (typ.) * ² , * ⁴	dB	±0.02			
IL Resolution	dB	0.001			
PDL Accuracy (typ.)	dB	±(0.02 + 3% of PDL)	±(0.02 + 3% of PDL)		0 to 20 dB Device IL
		±(0.15 + 3% of PDL)			20 to 40 dB Device IL
PDL Repeatability (typ.) * ² , * ⁴	dB	±0.03			
PDL Resolution	dB	0.01			
Communication	-	USB (USB 2.0 High Speed)			MPM-220
		GP-IB (IEEE488.2), Ethernet			PCU-110 / MPM-220
Operating Temperature	°C	15 to 35			
Operating Humidity	%	< 80			non-condensing

* All specifications are quoted after 1 hour warm-up period and executing a zero calibration.

*1: Temperature within 25±5 °C, *2: Temperature within 25±1 °C

*3: The measurement condition is within wavelength resolution 5 pm, wavelength range 100 nm, one scan for 1 channel.

*4: Does not include influence of connector.

General specifications

Category	Parameter		Unit	Performance
Interface	Optical Output Connector		-	FC or SC, SPC or APC
	Optical Fiber		-	PMF *1
	Communication		-	GP-IB (IEEE 488.2), USB, Ethernet
	Power Monitor		V	0 to 3
Modulation	Intensity Modulation		kHz	DC to 400 (Input level -2 to 0 V, Modulation depth > 50 %/V (typ.))
Environmental Conditions and others	Operating	Temperature	°C	15 to 35
		Humidity	%	< 80 (non-condensing)
	Power Supply		-	AC100 to 120 / 200 to 240 V ±10 %, 50/60 Hz
	Power Consumption		VA	100
	Dimensions (W) x (D) x (H) *2		mm	220 x 385 x 130
	Weight		kg	7

*1: In case of PMF, polarization axis in alignment with connector key. Polarization extinction ratio is 17 dB (typical value).

*2: Except for the protrusion.

Model selection

Model Number	Wavelength Range
260360	1260 - 1360
240380	1240 - 1380
355485	1355 - 1485
355505	1355 - 1505
500630	1500 - 1630
480640	1480 - 1640
560680	1560 - 1680

Other wavelength range model is available on request. Please contact santec sales.

Laser safety information



This product is classified class 1M laser product according to IEC 60825-1 (2014). This product complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 56 dated May 8, 2019.

Ordering Code

TSL-570 - -

P

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0

0

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1

A

B

C

D

E

F

G

Connector Polish: **SP**: SPC / **AP**: APC
Connector Type: **F**: FC / **S**: SC
Fiber Type: **P**: PMF
See "Model selection" above. (e.g. 480640: 1480 - 1640 nm)
Type: **A**: Type A / **C**: Type C / **P**: Type P

