



High Performance Tunable Laser



Product Overview

The all-new TSL-570 capitalizes on Santec's 33 years' experience in tunable laser manufacture. 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 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



Temperature Dependency of Wavelength Variation



Optical Specifications

Model Number: 260360, 355485, 500630 and 560680

Cotogony	Parameter				Performance		
Category					Туре А	Туре С	
	Wavelength Tuning Range			nm	1260 - 1360 / 1355 - 1485 / 1500 - 1630 / 1560 -1		
Wavelength Characteristics	Wavelength Setting Resolution			pm	0.1		
	Wavelength Stability (typ.) [™]			pm	≤±5	<u>≤</u> ±1	
	Absolute Wavelength Accurac	acy *2		pm	±15	±3	
	Absolute Wavelength Accuracy (Operating temp.)		Step Mode	pm	±20	±5	
	Wavelength Repeatability (typ	(typ.)		pm	±5	±1	
	Absolute Wavelength Accurac	;y (typ.) ^{∗2}	Continuous sweep mode	pm	±15	±3.5	
	Wavelength Repeatability (typ).)	@100 nm/s	pm	±6	±1.5	
	Sweep Speed			nm/s	1 to 200		
	Fine Tuning Scan Range			GHz	≥10		
	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				±0.01		
Oplical Power	Power Repeatability *3			dB	±0.01		
Characteristics	Power Flatness vs. Wavelength * 3, 7		Step mode	dB	±0.2		
	Dynamic power repeatability (typ.) *3 Continuous sweep mode			dB	±0.01		
	Dynamic relative power flatness (typ.) ³ @100 nm/s			dB	±0.2		
	Relative intensity noise (RIN) (typ.) * 4			dB/Hz	-145 (1 MHz to 3 GHz)		
Spectrum	Coherence Ctrl. Off (I		Delayed self-heterodyne)	kHz	200		
	Linewidth (typ.) Coherence Ctrl. Off (nstantaneous *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

Cotogony	Category Parameter			Unit	Performance		
Category				Unit	Type A	Type C	Type P
	Wavelength Tuning Range *8			nm	1240 - 1380 / 1355 - 1505 / 1480 - 1640		
Wavelength Characteristics	Wavelength Setting Resolution			pm	0.1		
	Wavelength Stability (typ.) ^{*1}				$\leq \pm 5$	<u>≤</u> ±1	$\leq \pm 1$
	Absolute Wavelength Accura	racy ^{*2}		pm	±15	±3	±1 (typ.)
	Absolute Wavelength Accura	Step Mode	pm	±20	±5	±2	
	Wavelength Repeatability (ty	/p.)	.)			±1	±0.5
	Absolute Wavelength Accura	acy (typ.) *2	Continuous sweep mode	pm	±15	±3.5	±1.5
	Wavelength Repeatability (ty	/p.)	@100 nm/s		±6	±1.5	±0.8
	Sweep Speed				1 to 200		
	Fine Tuning Scan Range			GHz	≥10		
	Output Power *7		Peak (typ.)	dBm	≥13		
			@1260 - 1360 / 1380 - 1485 / 1500 - 1630 nm	dBm	≥10		
			Full Tuning Range	dBm	≥7		
	Power Stability ^{1, 13}				±0.01		
Optical Power Characteristics	Power Repeatability *3	Stop modo	dB	±0.01			
Onaracteristics	Power Flatness vs. Wavelength *3,*7		Step mode	dB	±0.2		
	Dynamic power repeatability (typ.) ^{*3}		Continuous sweep mode	dB	±0.01		
	Dynamic relative power flatness (typ.) ⁻³		@100 nm/s	dB	±0.2		
	Relative intensity noise (RIN) (typ.) ^{*4}				-145 (1 MHz to 3 GHz)		
Spectrum	Linewidth (typ.) Coherence Ctrl. Off (Delayed self-heterodyne)	kHz	2	00	100
			nstantaneous *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 \pm 0.5 °C. *2: At 25 \pm 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 \geq 100 nm/s and < 150 nm/s.

*9: Calculated from white noise of frequency noise characteristics

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

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		Specification				Notoo	
		Туре А	Тур	e C	Type P	Notes	
	pm	±12	±2	.5	±1.0	at 50 nm/s	
Wavelength Accuracy (typ.) (Absolute) *1		±15	±3.5		±1.5	at 100 nm/s	
		±17	±4	.5	±2.1	at 200 nm/s	
		±9	±2	.2 ±0.8		at 50 nm/s	
Wavelength Accuracy (typ.) (Relative)	pm	±12	±3	5.0	±1.3	at 100 nm/s	
	Í	±14	±4	.0	±1.9	at 200 nm/s	
		±5	±1	.2	±0.5	at 50 nm/s	
Wavelength Repeatability *2	pm	±6	±1	.5	±0.8	at 100 nm/s	
		±8	±2	2.0	±1.1	at 200 nm/s	
Tunable laser		TSL-570 T	Type A, T	ype C a	nd Type P		
Power meter module		MPM-211,	MPM-211, 212 M		MPM-215		
Scan Speed	nm/s	1 to 200					
Dynamic Range for Insertion Loss at one scan (typ.)	dB	40			60		
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	2 10@100 nm/s, 6.8@200 nm/) nm/s			
Wavelength Resolution	pm	0.1					
	dB	±0.02			±0.02	0 to 30 dB Device IL	
IL Accuracy (typ.)		±0.1			±0.02	30 to 40 dB Device IL	
		±0.1	±0.0		±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% o	f PDL)	±(0.02 + 3% of PDL)		0 to 20 dB Device IL	
	<u>u</u> D	±(0.15 + 3% o	f 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		o 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 \pm 5 °C, *2: Temperature within 25 \pm 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			
	Optical Output Connector		-	FC or SC, SPC or APC			
Interface	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



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.



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