High Performance Tunable Laser

TSL-580

New

Product Overview

The TSL-580, the 8th generation of santec's high-performance tunable laser, combines a wide wavelength tuning range with high output power and a superior signal-to-noise ratio. Building on the sweep-speed control, wavelength resolution, wavelength accuracy and wide fine-tuning range established by the previous generations, the TSL-580 introduces a redesigned laser cavity and updated control electronics.

The new cavity design increases available output power while improving sweep linearity, providing a more powerful and more predictable source for swept-wavelength measurements. At the same time, the redesigned control electronics support a narrower linewidth, enabling more stable frequency behavior and more precise wavelength control in demanding optical test applications.

The TSL-580 is designed to work as the light source in automated optical test setups. In combination with santec optical power meters and polarization controllers, it can support Insertion Loss (IL) and Polarization Dependent Loss (PDL) measurements. Thanks to its high-performance features, the TSL-580 is suitable for optical component testing, PIC characterization, spectroscopy, sensing, and quantum photonics.

Features

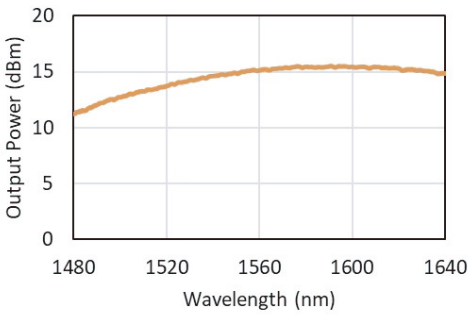
- Fast, up to 200 nm/s, wavelength sweeps
- Wide tuning range lineup: 1240-1640 nm
- Wavelength resolution: 0.1 pm
- High output power: >15 dBm @peak
- High signal-to-noise ratio: 90 dB/0.1nm
- Narrow linewidth: 20 kHz (typ.) (Type Q)
- Sweep linearity: <5 %

Applications

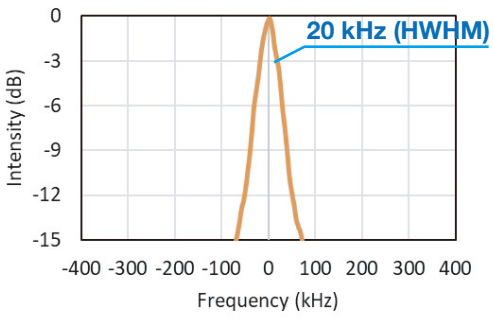
- Photonic characterization (SiPh, Quantum)
- Optical component characterization
- Fiber optic transmission testing
- Optical spectroscopy

Measurement Data

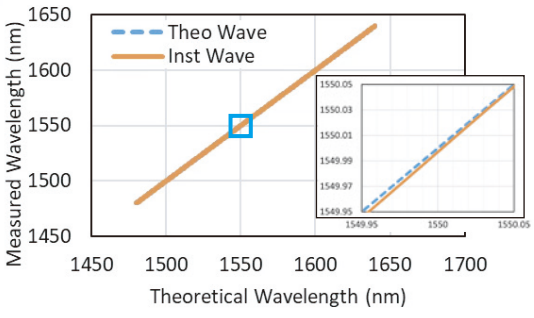
High output power



Narrow linewidth



<5% sweep linearity



Optical Specifications

Category	Parameter			Unit	Performance	
					Type P	Type Q
Wavelength Characteristics	Wavelength Tuning Range *8			nm	1240-1380 / 1355-1505 / 1480-1640	
	Wavelength Setting Resolution			pm	0.1	
	Wavelength Stability (typ.) *1			pm	≤ ±1	
	Absolute Wavelength Accuracy *2		Step Mode	pm	±1 (typ.)	
	Absolute Wavelength Accuracy (Operating temp.)			pm	±2	
	Wavelength Repeatability (typ.)			pm	±0.5	
	Absolute Wavelength Accuracy*2		Continuous sweep mode @100 nm/s	pm	±1.5	
	Wavelength Repeatability (typ.)			pm	±0.8	
	Sweep Speed			nm/s	1 to 200	
	Sweep Linearity (typ.)			%	5%	
	Fine Tuning Scan Range			GHz	≥10	
Optical Power Characteristics	Output Power *7	Peak (typ.)		dBm	≥15	
		@1260-1360 / 1380-1485 / 1500-1630 nm		dBm	≥12	
		Full range @1355-1505 / 1480-1640 nm		dBm	≥10	
		Full range @1240-1380 nm		dBm	≥ 9	
	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	100	20
		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/0.1nm)	

* 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 ºC. *2: At 25±1 ºC. *3: At “Auto” power mode and > 0 dBm. *4: At maximum output power.
*5: Ratio of signal power to total spontaneous emission power within ±15nm of the signal wavelength (typical value).
*6: Ratio of signal power to maximum spontaneous emission power in a 1nm band within a ±3nm 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: The calculation was based on white noise from frequency noise characteristics.

General Specifications

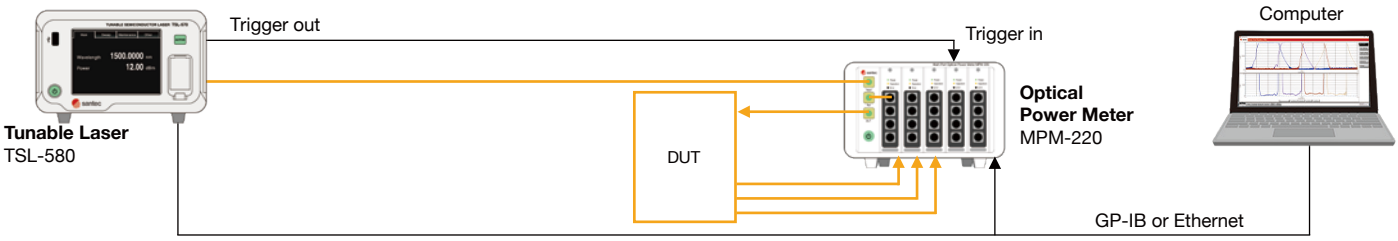
Category	Parameter		Unit	Performance	
				Type P	Type Q
Interface	Optical Output Connector		-	FC or SC, SPC or APC	
	Optical Fiber		-	PMF *1	
	Communication		-	GP-IB (IEEE 488.2), USB, Ethernet	
	Power Monitor		V	0 to 3	
Modulation	Intensity Modulation		kHz	DC to 400 (Input level -2 to 0 V, Modulation depth > 50 %/V (typ.))	
Environmental Conditions and others	Operating	Temperature	ºC	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	9

*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.

Typical Configuration

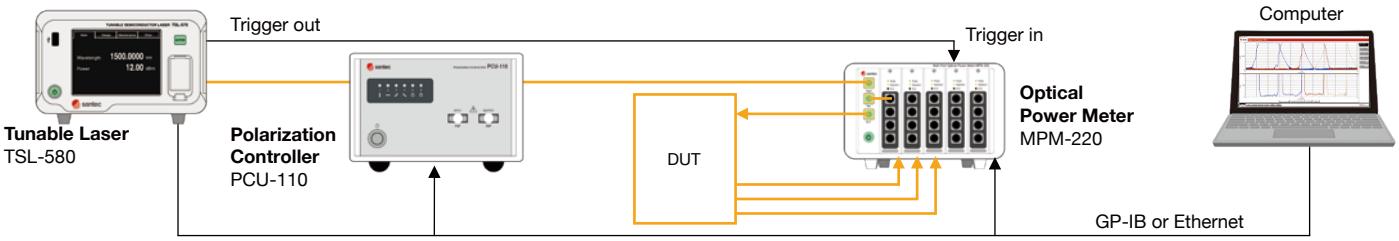
IL measurement setup with the power meter MPM-220

High Specification setup



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

High Specification setup



Specifications (Swept Test System with TSL-580)

Parameter	Unit	Specification		Notes
Tunable laser		**TSL-580 Type P and Type Q**		
Wavelength Accuracy (typ.) (Absolute) *1	pm	±1.0		at 50 nm/s
		±1.5		at 100 nm/s
		±2.1		at 200 nm/s
Wavelength Accuracy (typ.) (Relative)	pm	±0.8		at 50 nm/s
		±1.3		at 100 nm/s
		±1.9		at 200 nm/s
Wavelength Repeatability *2	pm	±0.5		at 50 nm/s
		±0.8		at 100 nm/s
		±1.1		at 200 nm/s
Power meter module		**MPM-211, 212, 217**	**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	ºC	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 ºC, *2: Temperature within 25±1 ºC

*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.

Model Selection

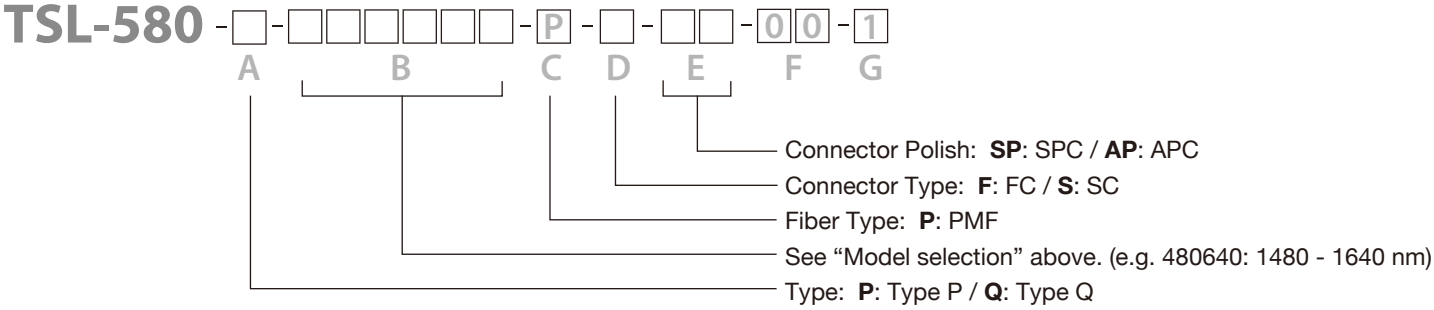
Model Number	Wavelength Range
240380	1240 – 1380
355505	1355 – 1505
480640	1480 – 1640

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



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