

**Brand New
7th generation**

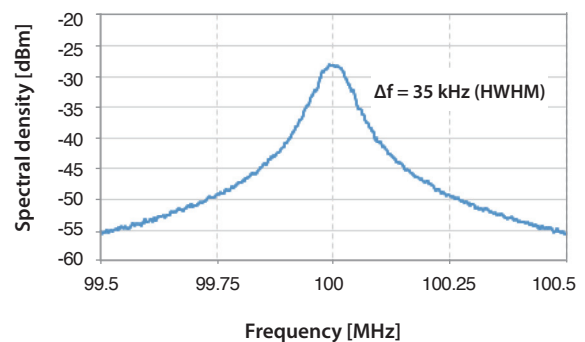
Flagship model High performance Tunable Laser **TSL-770**



Santec has brought all its experience and knowledge gained over the past 30 years to its all-new 7th generation tunable laser. The TSL-770 is a very high specification tunable laser with flexibility in operation to ensure suitability for a wide range of applications. A ground up redesign of the laser cavity together with ultra-low noise electronics combine to provide market leading scan speed, high optical power, wide tuning range, low noise and narrow linewidth in the same laser. The new proprietary cavity design enhances Q-factor and wavelength stability enabling accurate measurements in even the most cutting-edge research applications.

Measurement Data

Linewidth



Features

- ▶ Wide tuning range from 1480-1640 nm
- ▶ Mode-hop-free continuous tuning
- ▶ Fast, up to 200 nm/s, wavelength sweeps
- ▶ High output power +13 dBm
- ▶ High signal-to noise ratio 90 dB/0.1 nm
- ▶ High wavelength accuracy 0.3 pm (typ.)
- ▶ Narrow linewidth < 60 kHz

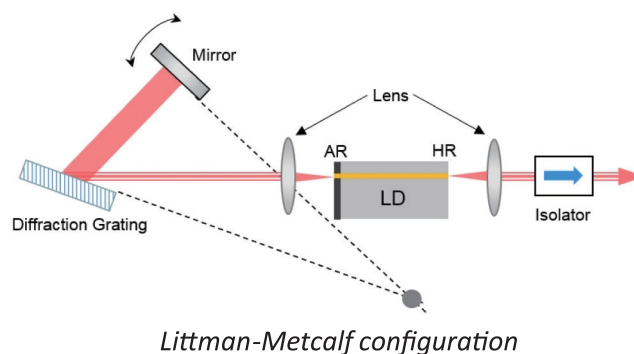
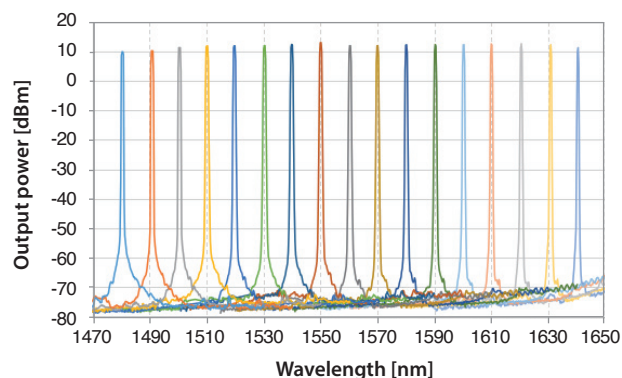
Applications

- ▶ Optical component & photonics material characterization
- ▶ Fiber optic transmission testing (Carrier LD, Local oscillator, etc.)
- ▶ Interferometry, Spectroscopy, Metrology (OFDR, Gas sensing, Terahertz generation, etc.)

Technologies & typical performance

Wide tuning range

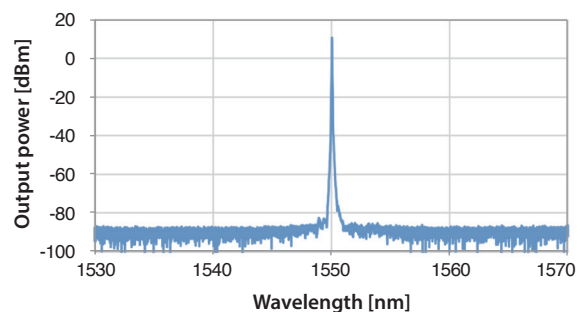
The TSL-770 adopts the Littman-Metcalf configuration to achieve a mode-hop-free tuning range of 160 nm. The drive mechanism is robust to ensure long term performance, and is isolated to eliminate acoustic and mechanical noise in the laser.



High S/N and high power

An innovative external cavity design has been implemented to lower the optical SSE noise, leading to a high signal-to-noise ratio of over 90 dB/0.1 nm while still maintaining a high output power of up to +13 dBm. It is ideal for next generation components testing driven by extremely high dynamic range filters and Wavelength Selective Switches (WSS).

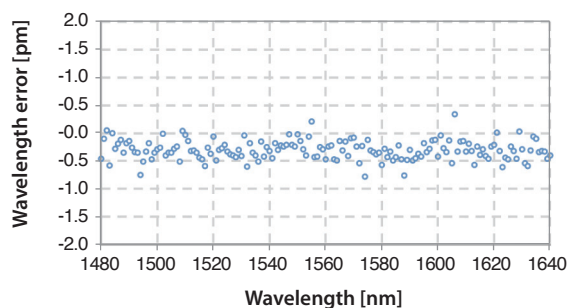
High power and high signal-to-noise ratio



Built-in high performance wavelength meter

The TSL-770 includes a built-in high performance wavelength meter with an absolute wavelength accuracy of ± 2 pm and stores (logs) wavelength data when in continuous sweep mode.

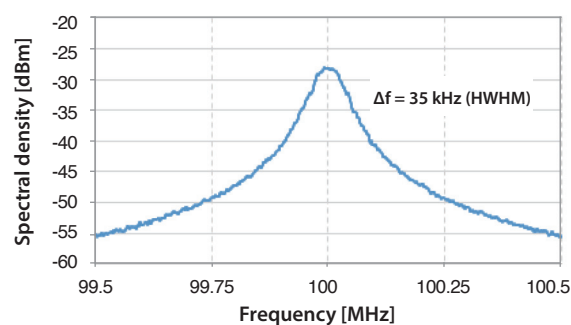
Wavelength accuracy



Narrow linewidth & low jitter

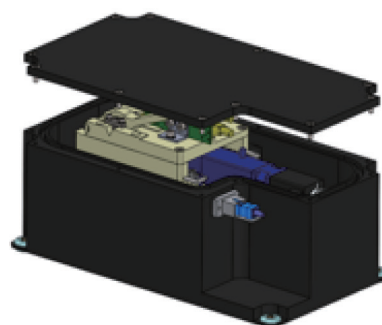
The Q-value of the laser cavity has been maximized by isolating the optical cavity from mechanical vibrations. This results in ultra-narrow laser linewidth and market leading wavelength stability.

Linewidth



Rapid sweep technology

Santec's advanced optomechanical design enables fast sweeps, up to 200 nm/s with high precision and repeatability. Acceleration and deceleration periods are minimized to further reduce the measurement time for repeated scans.



Specifications

Category	Parameter		Unit	Performance	
Wavelength Characteristics	Wavelength Tuning Range		nm	SCL-band: 1480-1640 (160 nm) CL-band: 1490-1630 (140 nm)	
	Wavelength Setting Resolution		pm	0.1	
	Wavelength Absolute Accuracy *1	Operating Temperature	pm	± 2	
		25 $\pm$ 1 °C (typ.)	pm	± 0.5	
	Wavelength Repeatability *1		pm	± 1 (± 0.3 (typ.))	
	Wavelength Stability (typ.) *2		pm	< ± 1	
Optical Power Characteristics	Sweep Speed		nm/sec	0.5 to 200	
	Output Power	Peak (typ.)	dBm	≥ 13	≥ 13
		>10dBm range	dBm	≥ 10 (1500-1630)	≥ 10 (1500-1630)
		Full Tuning Range	dBm	≥ 7	≥ 8
	Power Repeatability *1, *3		dB	± 0.01	
	Power Stability *2		dB	± 0.01	
	Power Flatness vs. Wavelength *1, *3		dB	± 0.2	
	Relative Intensity Noise (RIN) (typ.) *4		dB/Hz	-145 (1 MHz to 3 GHz)	
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off	kHz	60	
		Coherence Ctrl. On	MHz	40	
	SMSR (typ.)		dB	≥ 50	
	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)	
Interface	Optical Output Connector		-	FC or SC, SPC or APC	
	Optical Fiber		-	PMF *7	
	Communication		-	GP-IB (IEEE 488.2), USB, Ethernet	
Modulation	LF Modulation		kHz	DC to 400 (typ.)	
	RF Modulation (option)		MHz	2 to 100 (typ.)	
Environmental Conditions and others	Operating	Temperature	°C	15 to 35	
		Humidity	%	< 80 (non-condensing)	
	Power Supply		-	AC 100-240 V ± 10 %, 50/60 Hz	
	Dimensions (W) x (D) x (H) (Except for the protrusion)		mm	440 x 416 x 133	
	Weight		kg	16	

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

*1: At static condition or "Step" sweep mode.

*2: For period of 1 hour. Within ± 0.5 °C.

*3: At "Auto" power mode.

*4: At maximum output power.

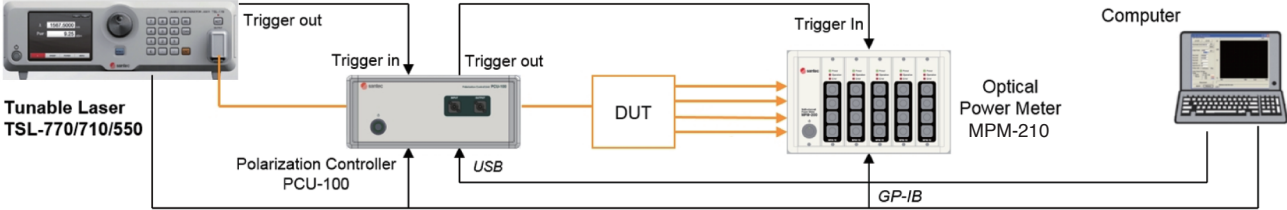
*5: Ratio of signal power to total spontaneous emission power within ± 15 nm of the signal wavelength (typical value).

*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).

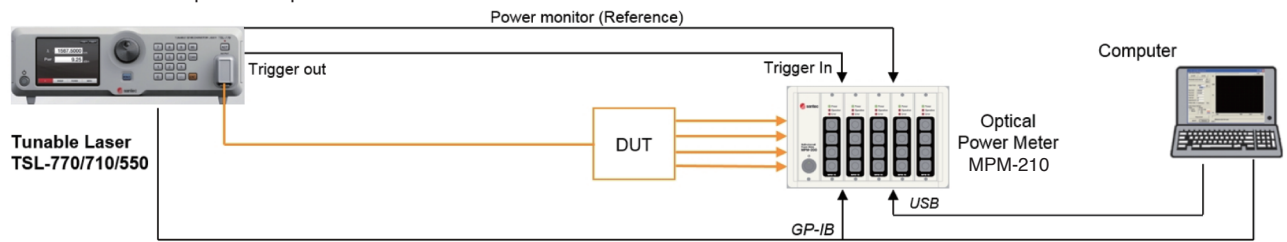
*7: Polarization axis in alignment with connector key. Polarization extinction ratio is 17 dB (typical value).

■ Typical Swept Test system configuration

IL/PDL measurement setup with the polarization controller PCU-100 and the power meter MPM-210



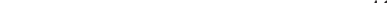
IL measurement setup with the power meter MPM-210



The TSL-770 has an internal power monitor that can be used to compensate output power fluctuation in real time. This eliminates the need to take an optical power reference and reduces the number of power meters required in a measurement system.

The laser integrates with Santec's power meter, MPM-210, and polarization controller unit, PCU-100, to create a turn-key WDL or PDL measurement solution. Santec provides software to control the system, as well as dynamic link libraries (DLLs) to enable system integration and control with a variety of programming languages.

■ Model selection

Model Number	Wavelength Range
480640	1480  1640
490630	1490  1630

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 (2007).

This product complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50 dated June 24, 2007.

■ Ordering Code

TSL-770-P-

A

B

D

F

F

- Power Monitor: 0 : None / 1: Power Monitor(Standard)

Modulation: **00**: LF / **RF**: LF+RFConnector Polish: **SP:** SPC / **AP:** APCConnector Type: **F:** FC / **S:** SC

Fiber Type: **P**: PMF

See “Model selection” above. (e.g. 490630: 1490-1630 nm)

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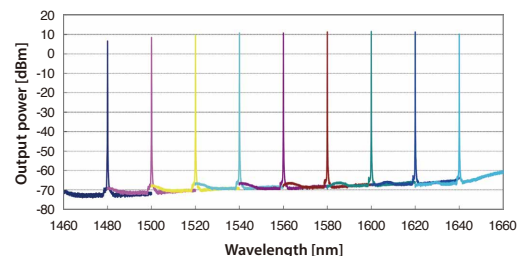
High Performance Tunable Laser TSL-710

The TSL-710 is Santec's flagship, highest performance tunable laser. Combining high output power with high signal-to-noise ratio makes the TSL-710 an invaluable tool for optical testing. An innovative external cavity design has been implemented to lower the optical ASE noise, leading to a high signal-to-noise ratio of over 90dB/0.1nm, while still maintaining a high output power of over +10dBm. The TSL-710 is also equipped with features such as fine-tuning and coherence control. GPIB interface with the industry standard SCPI command set allow full remote control and measurement automation.

The TSL-710 is an outstanding tool for testing next generation components for Dense Wavelength Division Multiplexing (DWDM) such as multi-input, high extinction ratio devices such as Wavelength Selective Switch (WSS). The TSL-710 has excellent wavelength characteristics with high wavelength accuracy of $\pm 2\text{pm}$, high wavelength resolution of 0.1pm, and narrow linewidth of <100kHz. These features make it suitable for cutting edge research in nanophotonics. The TSL-710 covers a wide tuning range of 160nm and is designed to improve production inspection throughput by doubling the scan repetition rate over conventional lasers. The laser linewidth is less than 100kHz, making it suitable to be used as a local oscillator in coherent transmission, as well as a tool for interferometry and sensing applications. In addition, the TSL-710 is available for WDL and PDL measurement with support of our dedicated software engineers.



Measurement Data



Features

- ▶ Wide Wavelength Range from 1480 to 1640 nm (SCL-Band)
- ▶ High Wavelength Accuracy: $\pm 2\text{ pm}$
- ▶ Wavelength Resolution: 0.1 pm
- ▶ High Output Power: 10 dBm
- ▶ High Signal-to-Noise Ratio: 90 dB/0.1 nm
- ▶ Narrow Linewidth: 100 kHz

Applications

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

SANTEC TUNABLE LASERS

■ Specifications

Category	Parameter		Unit	Performance
				High power & Low Noise
Wavelength Characteristics	Wavelength Tuning Range		nm	1480-1640 (160nm)
	Wavelength Setting Resolution		pm	0.1
	Absolute Accuracy ^{*1}	Operating Temperature	pm	±2
		25±1°C (typ.)	pm	±1
	Repeatability ^{*1}		pm	±1
	Stability (typ.) ^{*2}		pm	±1
	Sweep Speed		nm/sec	0.5 to 100
Optical Power Characteristics	Output Power	Peak (typ.)	dBm	≥ 13
		1500-1630nm	dBm	≥ 10
		Full Tuning Range	dBm	≥ 7
	Power Repeatability ^{*1, *3}		dB	±0.01
	Power Stability ^{*2, *3}		dB	±0.01
	Power Flatness vs. Wavelength ^{*1, *3}		dB	±0.2
	Relative Intensity Noise (RIN) (typ.)		dB/Hz	-145 ^{*6}
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off	kHz	100
		Coherence Ctrl. On	MHz	40
	SMSR (typ.)		dB	≥ 45
	Signal to Total Source Spontaneous Emission Ratio ^{*4}		dB	≥ 70
	Signal to Source Spontaneous Emission Ratio ^{*5}		dB/nm	≥ 80 (≥ 90 dB/0.1nm)
Interface	Optical Output Connector		-	FC or SC, SPC or APC
	Optical Fiber		-	SMF or PMF ^{*7}
	Communication		-	GP-IB (IEEE 488.2), USB, RS-232C
	Power Monitor		V	0 to 3
Modulation	LF Modulation		kHz	DC to 400 (Input level -2 to 0V, Modulation depth >50%/V (typ.))
	RF Modulation (option)		MHz	2 to 100 (Input level 5Vp-p, Modulation depth >10% (typ.))
Environmental Conditions and others	Operating	Temperature	°C	15 to 35
		Humidity	%	< 80 (non-condensing)
	Power Supply		-	AC 100-240V±10%, 50/60Hz
	Power Consumption		VA	100
	Dimensions (W) x (D) x (H)		mm	210x440x110
	Weight		kg	6.5

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

*1: At static condition or "Step" sweep mode. *2: For period of 1 hour. Within $\pm 0.5^{\circ}\text{C}$. *3: At "Auto" power mode.

*4: Ratio of signal power to total spontaneous emission power within $\pm 15\text{nm}$ of the signal wavelength (typical value).

*5: Ratio of signal power to maximum spontaneous emission power in a 1nm band within a $\pm 3\text{nm}$ band around the signal wavelength (typical value).

*6: Measured Freq. 1MHz to 3GHz

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

■ Laser safety information



This product is classified class 1M laser product according to IEC 60825-1 (2007).

This product complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50 dated June 24, 2007.

■ Ordering Code

TSL-710- □□□□□□ - □ - □ - □□ - □□ - □

A B C D E F

Power Monitor: **1:** Power Monitor
Modulation: **00:** LF / **RF:** LF+RF
Connector Polish: **SP:** SPC / **AP:** APC
Connector Type: **F:** FC / **S:** SC
Fiber Type: **S:** SMF / **P:** PMF
Wavelength: 480640 (1480-1640nm)

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High Performance Tunable Laser TSL-550

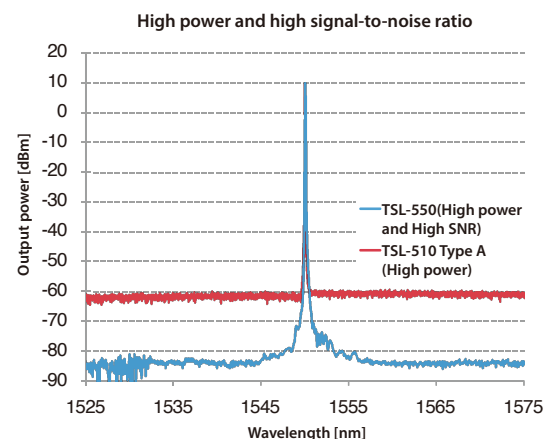
The TSL-550 is a high performance tunable laser with a wide tuning range and an output combining high power and high signal-to-noise ratio. The mod-hop-free tuning TSL-550 is equipped with features such as fine tuning and coherence control making it a must have tool for precision optical testing. Santec has used an innovative cavity design to lower the optical ASE noise, resulting in an extraordinarily high signal-to-noise ratio of over 90dB/0.1nm, while also maintaining a high output power of over +10dBm. GPIB and USB interfaces with the industry standard SCPI command set provide a convenient automated measurement solution.

The TSL-550 has two separate versions: Type A includes a wavelength meter with $\pm 20\text{pm}$ wavelength accuracy and Type C, the high accuracy version, with an absolute wavelength accuracy of $\pm 5\text{pm}$.

The TSL-550 is ideal for next generation components testing driven by innovations in Dense Wavelength Division Multiplexing (DWDM), passives and Wavelength Selective Switches (WSS) that require characterization of multi-input, high extinction ratio devices. The TSL-550 is designed to improve production inspection throughput by doubling the scan repetition rate over conventional lasers. In addition, the TSL-550 is available for WDL and PDL measurement with the support of our power meter, MPM-210 and dedicated software.



Measurement Data



Features

- ▶ Wide tuning range: from 1260 to 1680 nm
- ▶ High output power: +10 dBm
- ▶ High signal-to-noise ratio: 90 dB/0.1 nm
- ▶ High wavelength accuracy:
 - Type A: $\pm 20\text{ pm}$
 - Type C: $\pm 5\text{ pm}$

Applications

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

SANTEC TUNABLE LASERS

Optical Specifications

Wavelength range: 1260-1360nm and 1500-1630nm

Category	Parameter		Unit	Performance	
				TypeA	TypeC
Wavelength Characteristics	Wavelength Tuning Range		nm	1260-1360 / 1500-1630	
	Wavelength Setting Resolution		pm	0.1	
	Absolute Accuracy *1	Operating Temperature	pm	±20	±5
		25±1 °C (typ.)	pm	±15	±2.5
	Repeatability *1		pm	±10	±2
	Stability (typ.) *2		pm	≤ ±5	≤ ±1
Optical power Characteristics	Sweep Speed		nm/sec	1 to 100	
	Output Power	Peak (typ.)	dBm	≥ 13	
		Full Tuning Range	dBm	≥ 10	
	Power Repeatability *1, *3		dB	±0.01	
	Power Stability *2, *3		dB	±0.01	
	Power Flatness vs. Wavelength *1, *3		dB	±0.2	
	Relative Intensity Noise (RIN) (typ.) *6		dB/Hz	-145 (1MHz to 3GHz)	
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off	kHz	400	200
		Coherence Ctrl. On	MHz	40	
	SMSR (typ.)		dB	≥ 45	
	Signal to Total Source Spontaneous Emission Ratio *4		dB	≥ 70	
	Signal to Source Spontaneous Emission Ratio *5		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: At static condition or "Step" sweep mode. *2: For period of 1 hour. Within ± 0.5 °C. *3: At "Auto" power mode.

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

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

*6: At maximum output power.

Wavelength range: 1355-1485nm and 1480-1630nm

Category	Parameter		Unit	Performance	
				TypeA	TypeC
Wavelength Characteristics	Wavelength Tuning Range		nm	1355-1485 / 1480-1630	
	Wavelength Setting Resolution		pm	0.1	
	Absolute Accuracy *1	Operating Temperature	pm	±20	±5
		25±1 °C (typ.)	pm	±15	±2.5
	Repeatability *1		pm	±10	±2
	Stability (typ.) *2		pm	≤ ±5	≤ ±1
Optical power Characteristics	Sweep Speed		nm/sec	1 to 100	
	Output Power	Peak (typ.)	dBm	≥ 13	
		≥ 10dBm Range	dBm	≥ 10 (1380-1485nm) @1355-1485nm model ≥ 10 (1500-1630nm) @1480-1630nm model	
		Full Tuning Range	dBm	≥ 7	
	Power Repeatability *1, *3		dB	±0.01	
	Power Stability *2, *3		dB	±0.01	
	Power Flatness vs. Wavelength *1, *3		dB	±0.2	
Spectrum	Relative Intensity Noise (RIN) (typ.) *6		dB/Hz	-145 (1MHz to 3GHz)	
	Linewidth (typ.)	Coherence Ctrl. Off	kHz	400	200
		Coherence Ctrl. On	MHz	40	
	SMSR (typ.)		dB	≥ 45	
	Signal to Total Source Spontaneous Emission Ratio *4		dB	≥ 70	
Spectrum	Signal to Source Spontaneous Emission Ratio *5		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: At static condition or "Step" sweep mode. *2: For period of 1 hour. Within ± 0.5 °C. *3: At "Auto" power mode.

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

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

*6: At maximum output power.

Optical Specifications

Wavelength range: 1560-1680nm

Category	Parameter		Unit	Performance	
				TypeA	TypeC
Wavelength Characteristics	Wavelength Tuning Range		nm	1560-1680	
	Wavelength Setting Resolution		pm	0.1	
	Absolute Accuracy *1	Operating Temperature	pm	±20	±5
		25±1 °C (typ.)	pm	±15	±2.5
	Repeatability *1		pm	±10	±2
	Stability (typ.) *2		pm	≤ ±5	≤ ±1
Optical power Characteristics	Sweep Speed		nm/sec	1 to 100	
	Output Power *7	Peak (typ.)	dBm	≥ 13	
		Full Tuning Range	dBm	≥ 10	
	Power Repeatability *1, *3		dB	±0.01	
	Power Stability *2, *3		dB	±0.01	
	Power Flatness vs. Wavelength *1, *3, *7		dB	±0.2	
	Relative Intensity Noise (RIN) (typ.) *6		dB/Hz	-145 (1MHz to 3GHz)	
Spectrum	Linewidth (typ.)	Coherence Ctrl. Off	kHz	400	200
		Coherence Ctrl. On	MHz	40	
	SMSR (typ.)		dB	≥ 45	
	Signal to Total Source Spontaneous Emission Ratio *4		dB	≥ 35	
	Signal to Source Spontaneous Emission Ratio *5		dB/nm	≥ 45 (≥ 55 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: At static condition or "Step" sweep mode. *2: For period of 1 hour. Within ± 0.5 °C. *3: At "Auto" power mode.

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

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

*6: At maximum output power. *7: Warrant range is 1560 to 1650nm

General specifications

Interface	Optical Output Connector		-	FC or SC, SPC or APC
	Optical Fiber		-	SMF or PMF *1
	Communication		-	GP-IB (IEEE 488.2), USB, RS-232C
	Power Monitor		V	0 to 3
Modulation	LF Modulation		kHz	DC to 400 (Input level -2 to 0V, Modulation depth >50%/V (typ.))
	RF Modulation (option)		MHz	2 to 100 (Input level 5Vp-p, Modulation depth >10% (typ.))
Environmental Conditions and others	Operating	Temperature	°C	15 to 35
		Humidity	%	< 80 (non-condensing)
	Power Supply		-	AC 100-240V±10%, 50/60Hz
	Power Consumption		VA	100
	Dimensions (W) x (D) x (H)		mm	210x440x110
	Weight		kg	6.5

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

SANTEC TUNABLE LASERS

Model selection

Model Number	Wavelength Range
260360	1260  1360
355485	1355  1485
480630	1480  1630
500630	1500  1630
560680	1560  1680

Other wavelength range model is available on request. Please contact Santec Sales.

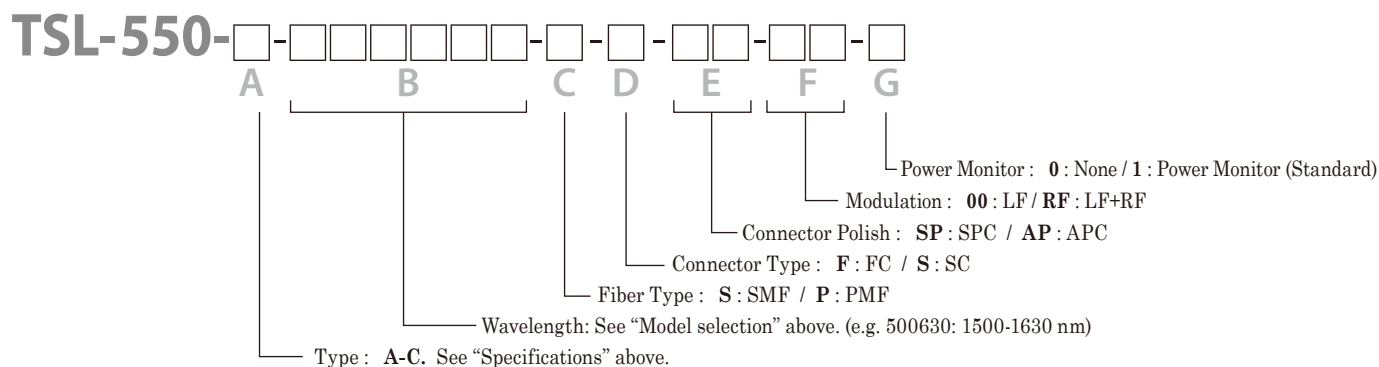
Laser safety information



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Ordering Code



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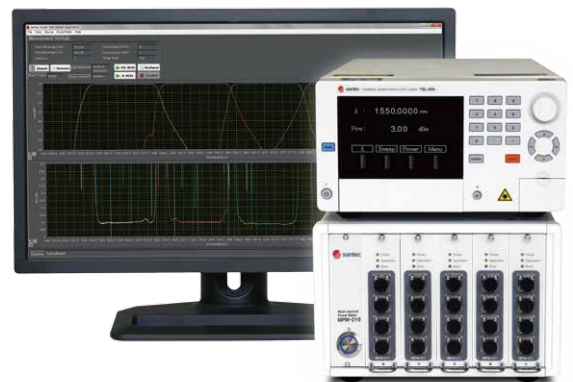
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NEW

High Speed Swept Test System Swept Test System

The Santec Swept Test System has been developed to streamline photonic testing, providing a complete solution where high-speed analysis, high resolution and accuracy are key. Combining one of Santec's tunable lasers (TSL-710, TSL-550 or TSL-510) with a Santec optical power meter (MPM-210), a polarization control unit (PCU-100) and custom software, the complete Swept Test System optimizes WDL and PDL measurement for use in both R&D and production environments. Using real-time referencing, while simultaneously acquiring output power from the tunable laser and the transmitted optical power through the DUT, the system provides high accuracy in WDL and PDL analysis using the Muller Matrix Method.

A simplified system is available by combining a Santec Swept Processing Unit (SPU-100) and any basic power meter or photodetector; the resulting Swept Test System variant can be used for WDL measurements. Over-sampling and rescaling algorithms are used to maximize testing throughput while maintaining measurement integrity. The system is particularly suited to transmission spectra characterization such as those required for DWDM components and High Q photonic devices. Rapid sweep and accurate measurement saves time and ensures the integrity and validity of your device characterization.



Features

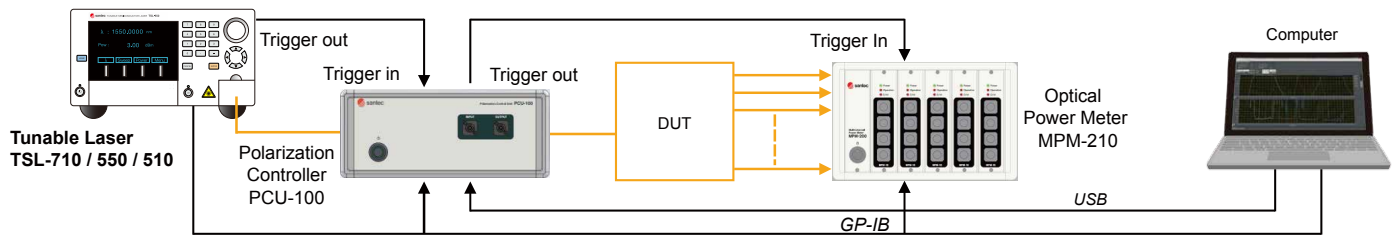
- ▶ Real-time power referencing
 - 1 Accurate WDL / PDL characteristics measurement
 - High power repeatability $< \pm 0.02$ dB
 - High PDL repeatability ± 0.01 dB
 - 2 Automatic normalization of laser source power
- ▶ Rescaling algorithm utilizing the Swept Processing Unit (data acquisition unit)
 - 1 High wavelength resolution and accuracy
 - 2 Reduced measurement time
- ▶ Multi-channel measurement is available.
- ▶ Supporting LabVIEW control software
 - 1 Convenient set up of measurement parameters
 - 2 Data analysis

Applications

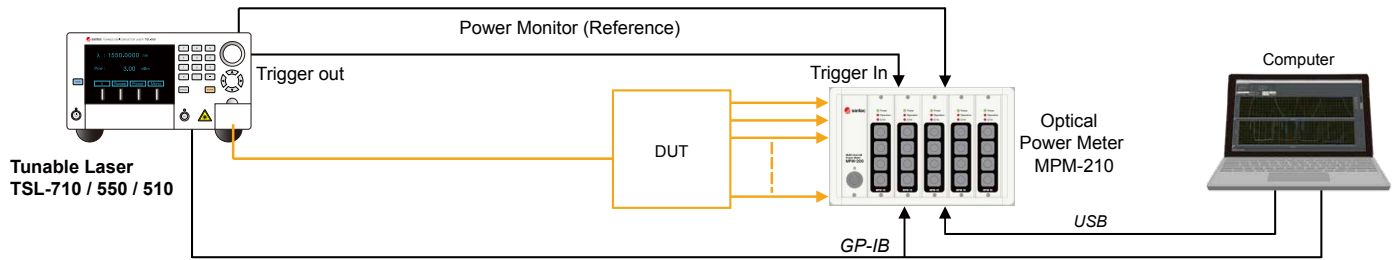
- ▶ Optical components and modules characterization
 - Tunable Filters, Interleavers, Fiber Bragg Gratings (FBGs), Couplers, Splitters, Isolators, Switches
 - WSS, Wavelength Blockers
 - DWDM components
- ▶ Photonic material characterization
- ▶ Optical spectroscopy

Typical configuration

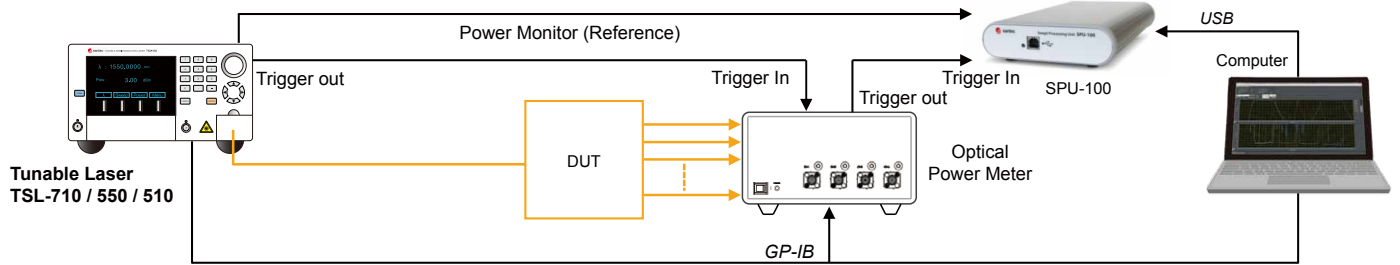
IL / PDL measurement setup with the polarization controller PCU-100 and the power meter MPM-210



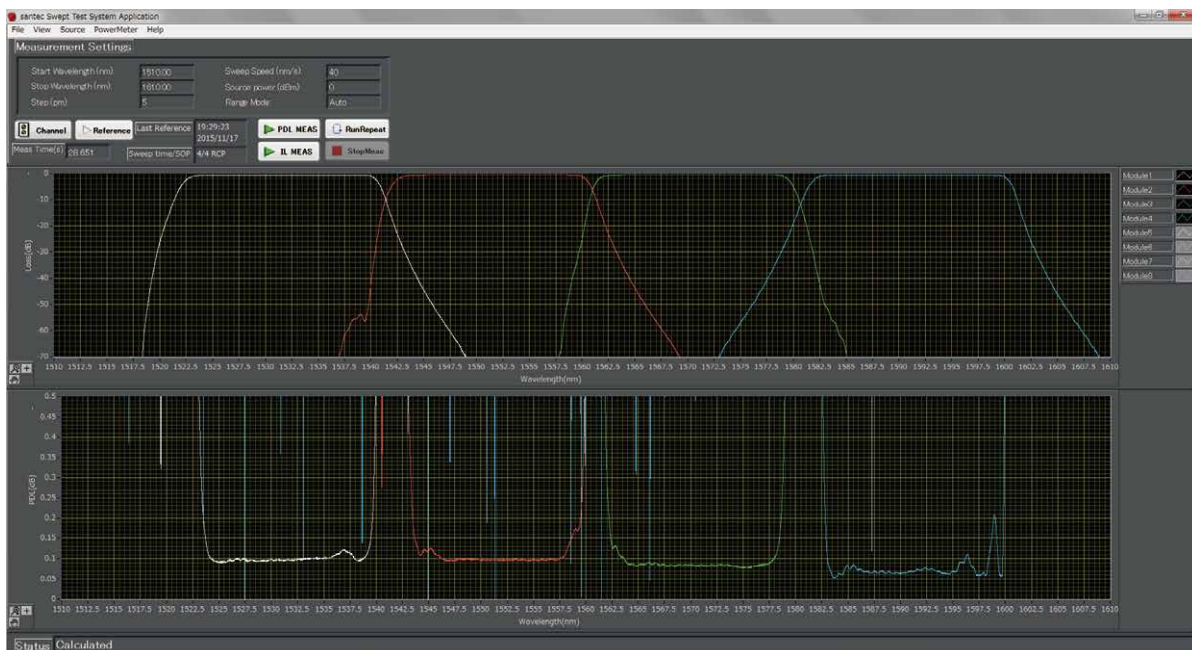
IL measurement setup with the power meter MPM-210



IL measurement setup with any other power meter



Graphical user interface



Specifications

Parameter	Unit	Specifications			Notes
		TSL-550		TSL-710	
		Type A	Type C	-	
Wavelength Accuracy*1(typ.) (Absolute)	pm	±16	±4.6	±2.4	At 10nm/s
		±19	±7.2	±5.0	At 40nm/s
Wavelength Accuracy (typ.) (Relative)	pm	±9	±3.1	±1.6	At 10nm/s
		±12	±5.7	±4.2	At 40nm/s
Wavelength Repeatability*2	pm	±6	±1.9	±1.0	At 10nm/s
		±7	±3.5	±2.6	At 40nm/s
Scan Speed	nm/s	1 to 100		0.5 to 100	
Dynamic Range for Insertion Loss (typ.)	dB	70			
Dynamic Range for PDL (typ.)	dB	0 to 5			
Measurement Time for IL (typ.)	sec	4			At 40nm/s*4,*5
Measurement Time for IL / PDL (typ.)	sec	14			At 40nm/s*4,*5
Wavelength Resolution	pm	1	0.1		
IL Accuracy (typ.)	dB	±0.02			0 to 20dB Device IL
		±0.03			20 to 40dB Device IL
IL Repeatability*2,*3 (typ.)	dB	±0.02(±0.01 (typ.))			
IL Resolution	dB	0.001			
PDL Accuracy (typ.)	dB	±(0.02 + 3% of PDL)			0 to 20dB Device IL
		±(0.15 + 3% of PDL) (typ.)			20 to 40dB Device IL
PDL Repeatability*2,*3 (typ.)	dB	±0.01			
PDL Resolution	dB	0.01			
Communication	-	USB (USB 2.0 High Speed)			MPM-210 / PCU-100 / SPU-100
		GP-IB (IEEE488.2)			TSL-550 / TSL-710 / MPM-210 / PCU-100
Operating Temperature	°C	15 to 35			
Operating Humidity	%	< 80			non-condensing

* All specifications are quoted after 1 hour warm-up period.

All specifications applies with santec optical power meter MPM-210.

*1 Temperature within 25°C±5°C

*2 Temperature within 25°C±1°C

*3 Does not include influence of connector.

*4 The measurement condition is within wavelength resolution 5pm, wavelength range 40nm for 1 channel.

*5 Measurement dynamic range per scan is up to 40dB.

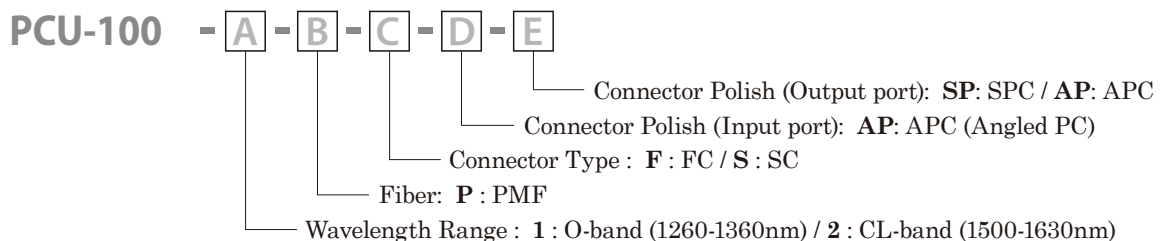
Ordering code

Optical Power Meter

Main frame **MPM-210**
Module **MPM-211/212/213**

Please refer to MPM-210 catalogue

Polarization Control Unit



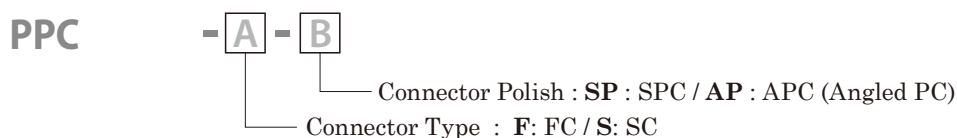
PMF Patch cord (Tunable Laser (TSL)<--->PCU-100)

Please select the ordering code for PMF patch cord if purchasing the PCU-100.

Connector selection (Type / Polish): One port is same option as the PCU-100 code. ("B" and "C")

Please select the same option as the TSL ordering code for the other port.

Fiber length 1.0m, Fiber jacket φ2.0mm



Swept Processing Unit

SPU-100

Contact information



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Full-band High Performance Tunable Laser System

Full-band TSL

The Full-band TSL is a full-band, high performance tunable laser system that covers the ultra-wide tuning range of 1260 to 1680nm (O-band to U-band). The system combines up to four Santec tunable lasers (TSL-550 and TSL-710) with an optical switch module (OSU-100) and control software. The complete Full-band TSL has excellent cost performance, high wavelength accuracy and fast sweeping for use in both R&D and production environments. The Full-band TSL can be easily controlled via GPIB and USB on PC using the custom GUI.

The Full-band TSL can be configured with Santec's Swept Test system hardware to provide WDL measurements over the entire tuning range from 1260 to 1680nm.



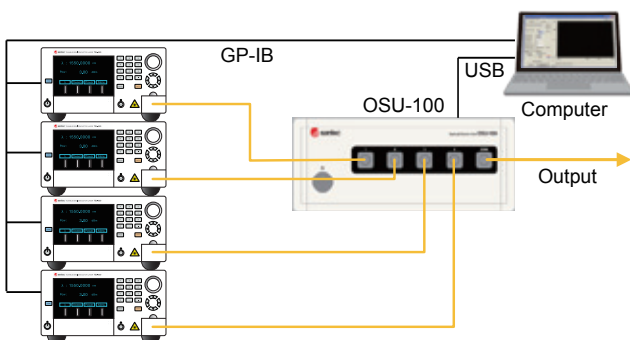
Features

- ▶ Wide wavelength range 1260-1680nm
- ▶ Mode-hop-free wavelength sweeps
- ▶ 100nm/s sweep speed
- ▶ Easy and automatic operation by exclusive

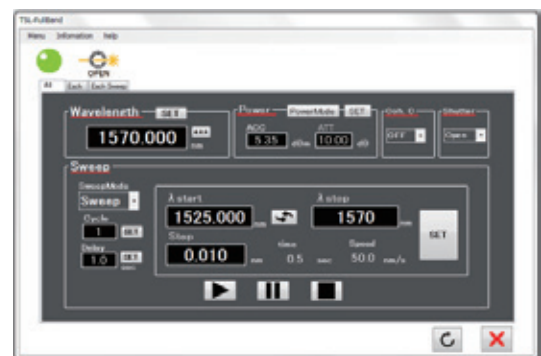
Applications

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

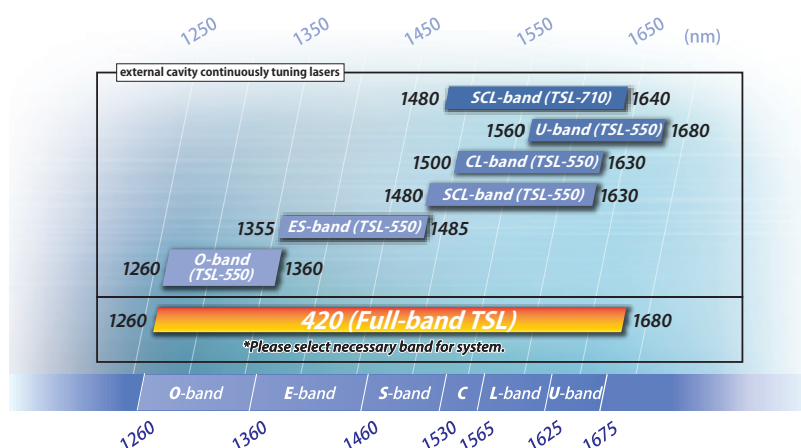
Typical configuration



Control software



Wavelength range



Specifications

Category	Parameter	Unit	Performance
Tunable Laser	All Specifications	-	Please refer to the TSL-550 or TSL-710 catalog for full specifications
Optical Switch OSU-100	Wavelength Tuning Range	nm	1260-1680
	Maximum Tuning Range	nm	420
	Insertion Loss ^{*1}	dB	<3 (typ. 1.5)
	Insertion Loss Stability ^{*2} (typ.)	dB	±0.01
	Repeatability (typ.)	dB	±0.01
	Crosstalk (typ.)	dB	-55
	Maximum Input Power (Optical)	mW	300
	Return Loss (typ.)	dB	>50
	Lifetime (typ.)	cycle	> 100,000,000
	Switching Time (typ.)	ms	5
	Optical Fiber	-	PMF ^{*3}
	Optical Output Connector	-	FC / APC or SC / APC
	Communication	-	USB (USB 2.0 High Speed)
	Operating Temperature	°C	15 to 35
	Operating Humidity	%	< 80 (non-condensing)
	Power Supply	-	AC 100-240V±10%, 50 / 60Hz
	Dimensions (W x H x D)	mm	210 x 88 x 350
	Weight	kg	3.1

*All specifications are quoted after 1 hour warm-up period.

*1: From 1260-1630nm

*2: For period of 1 hour. Within ± 0.5°C.

*3: Polarization extinction ratio 17 dB (typical). Polarization axis in alignment with connector key.

Ordering Code

Tunable Laser

Ordering code can be found on the following brochures:

1. TSL 550
2. TSL 710
3. TSL 770

Optical Switch

OSU-100 - - -

A

B

C

Connector Polish : AP : APC (Angled PC)

Connector Type : F : FC / S : SC

Fiber : P : PMF

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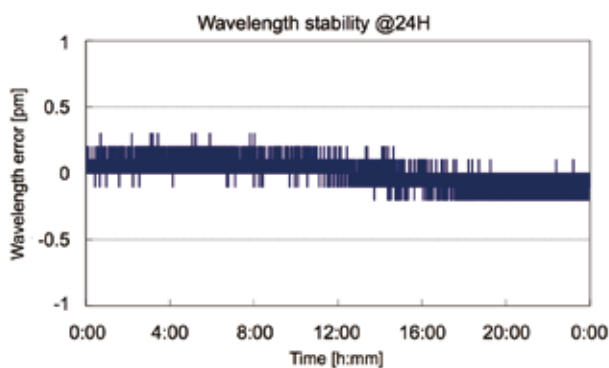
Wavelength Selectable Laser WSL-100

The WSL-100 is a compact and cost effective tunable laser source. Designed for use in fiber optic transmission testing, the WSL-100 can also be used for DWDM component evaluation and Coherent communications testing. C-band or L-band lasers are available, each covering a 38nm tuning range. The WSL-100 features Gridless tuning, allowing any wavelength to be accessed. An integrated wavelength locker ensures high wavelength accuracy and stability. This laser can be controlled either through the front panel or by using a GPIB interface, allowing full remote control and measurement automation.

Features

- ▶ C-band or L-band tuning with high resolution
- ▶ Settable to any wavelength
- ▶ Fine tuning available with 1MHz resolution
- ▶ Narrow linewidth <100kHz
- ▶ High output power >+15dBm
- ▶ Integrated wavelength locker
- ▶ One or two ports per unit

Measurement data



Applications

- ▶ Fiber optic transmission testing
- ▶ DWDM component testing
- ▶ Coherent communications / Local oscillator
- ▶ Optical amplifier testing

Graphical user interface



Specifications

Parameter	Unit	Gridless tuning	
Wavelength		C-band	L-band
Wavelength Range	nm	1527.60 to 1565.50	1570.01 to 1608.76
Frequency Range	THz	191.50 to 196.25	186.35 to 190.95
Channel Spacing	GHz	25 (Any frequency is available.)	
Frequency Accuracy to ITU grid	GHz	<±2.5 / ±1.0 (typ.)	
	pm	<±20 / ±8 (typ.)	
Frequency Repeatability to ITU grid *1	GHz	±0.25 (typ.)	
	pm	±2 (typ.)	
Frequency Stability to ITU grid @ 1hour *1	GHz	±0.25 (typ.)	
	pm	±2 (typ.)	
Fine tune resolution	MHz	1 (typ.)	
Fine tune range	GHz	±6	
Output power tuning range	dBm	7 to 15.5	7 to 13.5
Power Variation *2	dB	±0.2 (typ.)	
Power Stability @ 1hour *1, *2	dB	±0.01 (typ.)	
Spectrum linewidth	kHz	<100	
Side mode suppression ratio (SMSR)	dB	>40 / 55 (typ.)	
Relative intensity noise *3	dB/Hz	-145 (typ.)	
Polarization extinction ratio	dB	>20	
Optical output connector	-	FC/APC or SC/APC	
Interface	-	GP-IB, USB	
Operating	Temperature	°C	
	Humidity	%	
Power supply	Voltage	V	
	Frequency	Hz	
Dimensions (Width x Depth x Height)	mm	210x300x80	
Weight	kg	2.8	

*:All specifications are quoted after 1 hour warm-up period.

*1:At constant temperature ± 0.5 K.

*2:Measured by fiber with angled polished connector.

*3:10MHz to 3GHz

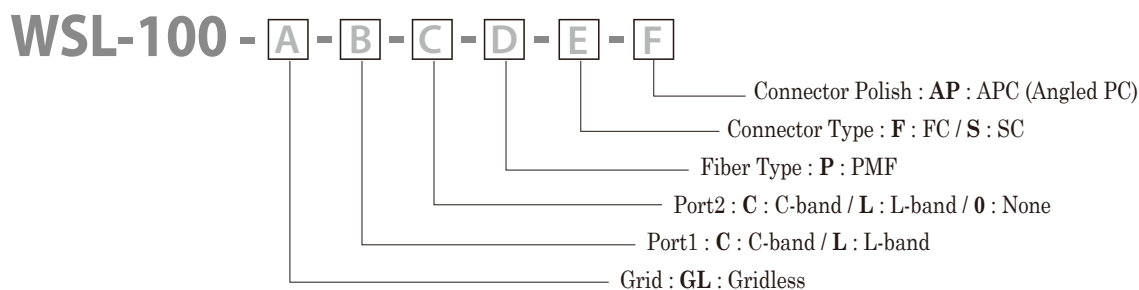
Laser safety information



This product is classified class 1M laser product according to IEC 60825-1 (2007).

This product complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50 dated June 24, 2007.

Ordering Code



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