Bench Top Tunable Lasers
TSL-210/220

santec

Santec's TSL models are designed as fully-controllable, single-channel benchtop tunable lasers, with superior performance and reasonable cost. Both the TSL-210 and TSL-220 units offer excellent stability in conjunction with high output power and wide wavelength tuning ranges, selectable from various windows between 1260 and 1650 nm (TSL-210). These lasers share many standard features that include Automatic Power Control (APC), fine-tuning wavelength control, fully variable coherence control, and a GPIB-RS232C interface with drivers for LabView™ and Visual Basic™.

The TSL-220 also features an integrated wavelength monitor, which enables the laser to achieve absolute wavelength accuracy of ±5 pm. In addition, a built-in tracking filter is incorporated to cut ASE noise and provide a high signal-to-noise ratio (SNR). A built-in attenuator adjusts optical power to ensure that a high side-mode- suppression ratio (SSR) is maintained even at low output levels.

The TSL-210 and TSL-220 tunable lasers are ideal for use in a wide variety of telecom applications including research, development, and production environments.

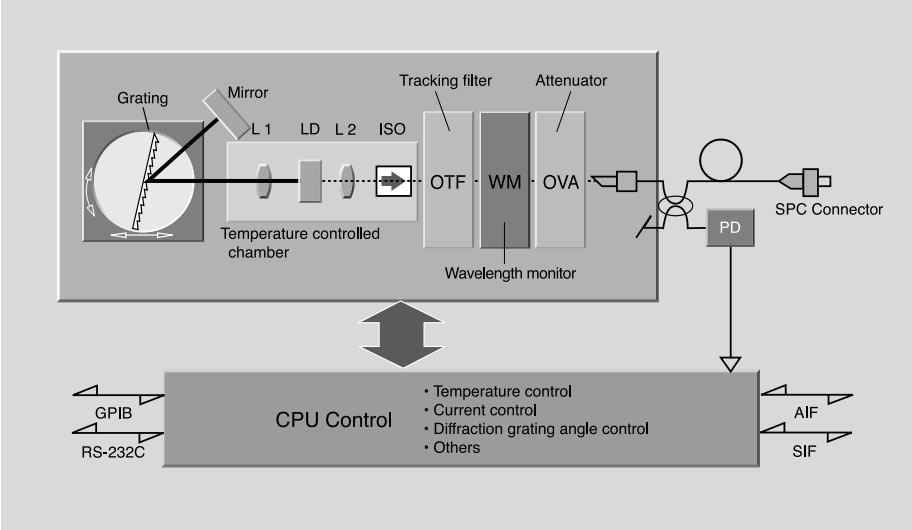


Figure 1: Principle of Operation

Model Comparison

	TSL-210	TSL-220
Peak Power	10mW (typ)	4mW
Tuning Range	>80nm	80nm
Accuracy	<±0.1nm	<±0.005nm
Wavelength Monitor	not available	included
Attenuator	optional	included
Tracking Filter	optional	included

CP-10 Control Pad for TSL-210/220

The TSL lasers feature a simple, easy to use front panel interface. The CP-10 offers additional control, providing full support of all functions in a compact handheld unit. Up to 128 combinations of wavelength and power can be stored in the CP-10 memory, and wavelength sweeps can be easily and conveniently performed.

TSL-220

High accuracy, high signal-to-noise

Features

- High wavelength accuracy <±5pm
- Standard built-in WM, OTF and OVA
- Compact size, & easy operation
- Low cost & short lead time
- Made in Japan Top quality

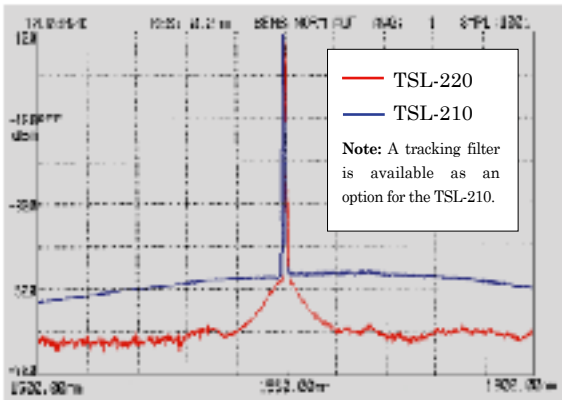


Figure 3: Built in Tracking Filter Characteristics

TSL-210

High power, wide tuning range

Features

- 80-100nm range @1260-1650nm
- High power over 10mW
- High accuracy and stability for wavelength & power
- Compact size, & easy operation
- Low cost & short lead time
- Made in Japan Top quality

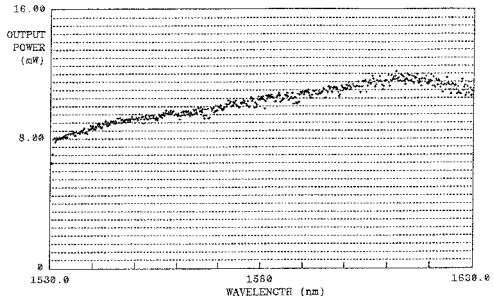
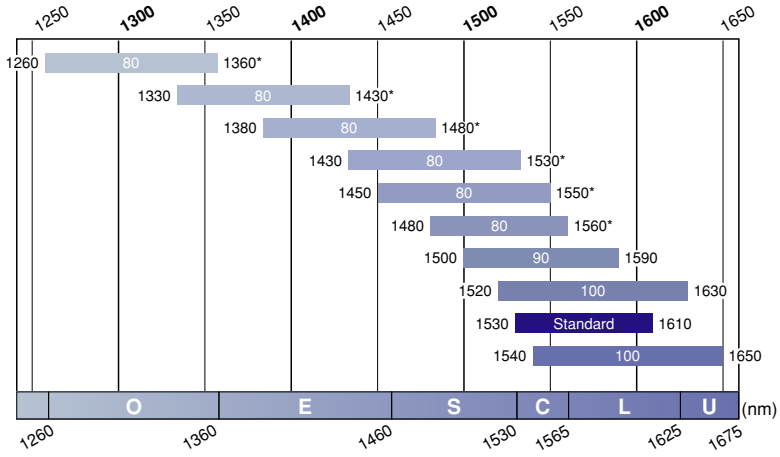


Figure 2: Wavelength vs. Power Characteristics

Wavelength Selection

The TSL-210 offers unparalleled wavelength selection options; any 80-100 nm bandwidth within the range of 1260-1650 nm can be provided. Please refer to the examples in the graph below.



Wavelength	Available Range	High Power Option Type
*1260 - 1360	80nm	A
*1330 - 1430	80nm	A
*1380 - 1480	80nm	A
*1430 - 1530	80nm	A
*1450 - 1550	80nm	A
*1480 - 1560	80nm	B
1500 - 1590	90nm	A
1520 - 1630	100nm	B
1530 - 1610	80nm	B
1540 - 1650	100nm	B

* The Wavelength below 1500nm has the absorption points of the water.

Output Power

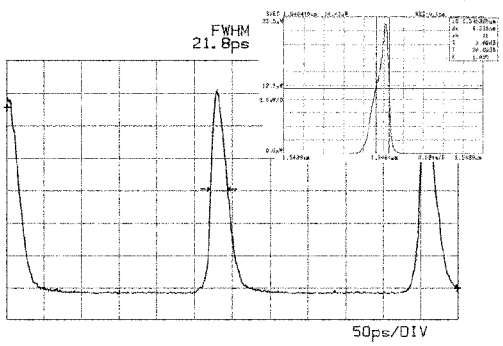
ST	Standard : All Type	
	Standard	ST + Filter(HIx80%)
Peak	8mW	6.4mW
40nm	6mW	4.8mW
80nm	4mW	3.2mW
All(90-100nm)	3mW	2.4mW

HI	High Power Option : Type A		High Power Option : Type B	
	HighPower	HI + Filter(HIx80%)	HighPower	HI + Filter(HIx80%)
Peak	10mW	8mW	10mW	8mW
40nm	7mW	5.6mW	7mW	5.6mW
80nm	5mW	4mW	6mW	4.8mW
All(90-100nm)	3mW	2.4mW	4mW	3.2mW

TSL-210 Pulse

The TSL-210 Pulse produces ultrashort optical pulses using an active modelocking method. Pulses shorter than 30ps, with a repetition rate of 2.5GHz, can be generated over the entire tuning range of >80nm.

Specifications	
Center wavelength	1570nm
Tuning range	80nm
Optical power	3dBm at peak
Repetition rate	2.5±0.1GHz
Pulse width	<30psec
Average power	0.2mW



■ Specifications

Category	Parameter	Unit	TSL-210	TSL-220	Notes
Wavelength Characteristics	Tuning Range	nm	-	1530 to 1610	Refer to "TSL-210 Wavelength Selection(210)
	(Maximum tuning width)		-	80	Refer to "TSL-210 Wavelength Selection(210)
	Resolution	nm	0.01	0.001	0.001nm with fine tuning (210)
	Accuracy	nm	<±0.1	<±0.005	
	Repeatability	nm	<±0.05	<±0.005	N=50 /Measured at center wavelength
	Stability	nm	<±0.01		After a warm-up 1h/1hour /Measured at center wavelength
	Fine Tuning Range	GHz	10		≒0.08nm
	Tuning Speed	ms/nm	170		Feedback time <500ms (220)
Power	Output Power	mW	-	>4 (Peak)	Refer to "TSL-210 Output Power" (210)
	Accuracy	%	<5		
	Repeatability	dB	<±0.01		N=50 /Measured at center wavelength /at 6dBm
	Stability	dB	<±0.01		After a warm-up 1h/1hour /Measured at center wavelength
	APC Flatness	dB	<±0.2		Measured at 6dBm APC:Automatic Power Control
	(Built in Attenuator Option)	dB	0 to 20		Resolution 0.04dB (Typ.)
	(Built in Tracking Filter Option)	dB	20% down		3dB Bandwidth 3nm (Typ.), Resolution 0.24nm (Typ.)
Environmental Conditions	Operating Temp. Range	ºC	20 ~ 30		
	Operating Humidity Range	%	<80		non condensing
	Storage Temp. Range	ºC	10 ~ 40		
	Storage Humidity Range	%	<80		non condensing
	Recommendation Calibration Period	Year	1		
Spectrum	Spectrum Line Width (Coh. OFF)	MHz	<1		Measured at center wavelength
	Spectrum Line Width (Coh. ON)		1 to 500		Variable /Measured at center wavelength
	SSR	dB	>45		Measured at center wavelength
	RIN	dB	>145		Measurement Freq. <1GHz
Interface	Optical Connector	-	FC or SC		
	Optical Fiber	-	SMF or PMF		
	Connector Polish	-	SPC or APC		
	GP-IB & RS-232C	-	Yes		IEEE-488
Modulation	LF modulation	KHz	0 to 10		
	(RF Modulation option)	MHz	1 to 100		at 3dB Down
Power Supply	Voltage	V	AC100-240		
	Power Consumption	VA	35-55		
Dimensions	Width x Height x Depth	mm	210x110x370		
	Weight	kg	6		

■ Ordering Code

TSL-210/220 - □□□□□□ - **B** - **C** - □□ - □□ - **F** - **G** - **H** - **I**

A: Wavelength: **530610**: 1530~1610nm **6digit**: Range within 1260~1650nm(210)

B: Fiber: **S**: SMF **P**: PMF

C: Connector: **F**: FC **S**: SC

D: Connector Polish: **SP**: SPC **AP**: APC

E: Modulation: **00**: LF **RF**: LF+RF

F: Power: **0**: ≧8mW(210), 4mW(220) H: ≧10mW(210)□

G: Attenuator: **0**: None(Standard for TSL-220)
□ **A**: Attenuator(for TSL-210)□

H: Optical Tracking Filter
0: None(Standard for TSL-220)
F: OTF(for TSL-210)

I: Control Pad
0: None **C**: Control pad

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