

NEW

High Performance Tunable Laser TSL-570

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 control. A Wake-on-LAN (WoL) feature provides convenience for remote installations. Models are available to cover from 1240 to 1640 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

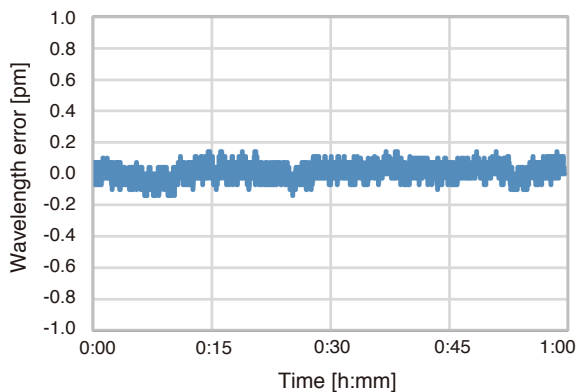
- ▶ Fast, up to 200 nm/s, wavelength sweeps
- ▶ Wide tuning range lineup: 1240 to 1640 nm
- ▶ Wavelength resolution: 0.1 pm
- ▶ High Signal-to-Noise Ratio: 90 dB/0.1 nm
- ▶ Fine tuning scan range: 10 GHz

Applications

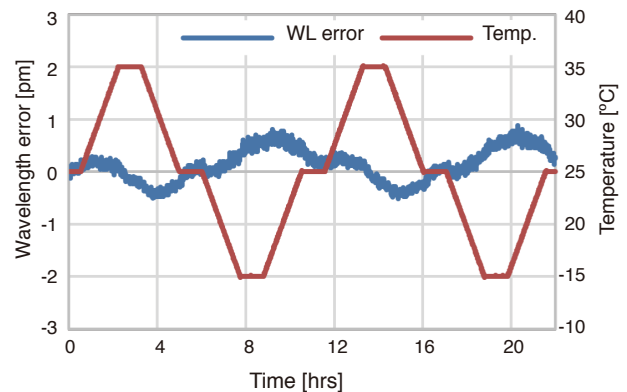
- ▶ Optical component characterization
- ▶ Fiber optic transmission testing
- ▶ Photonic material characterization
- ▶ Optical spectroscopy

Measurement Data

Wavelength Stability



Temperature Dependency of Wavelength Variation



■ Optical Specifications

Model Number: 260360, 355485 and 500630

| Category | Parameter | Unit | Performance | | |
|--|---|---|---|-----------------------|---------------------|
| | | | Type A | Type C | |
| Wavelength Characteristics | Wavelength Tuning Range | nm | 1260 - 1360 / 1355 - 1485 / 1500 - 1630 | | |
| | 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 | ±5 |
| | Wavelength Repeatability (typ.) | | pm | ±8 | ±1.5 |
| | Sweep Speed | nm/s | 1 to 200 | | |
| | Fine Tuning Scan Range | GHz | ≥10 | | |
| Optical Power Characteristics | Output Power | Peak (typ.) | dBm | | ≥13 |
| | | @1260 - 1360 / 1380 - 1485 / 1500 - 1630 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} | | dB | | ±0.2 |
| | Dynamic power repeatability (typ.) ^{*3} | Continuous sweep mode | dB | | ±0.01 |
| Dynamic relative power flatness (typ.) ^{*3} | @100 nm/s | dB | | ±0.02 | |
| Relative intensity noise (RIN) (typ.) ^{*4} | | dB/Hz | | -145 (1 MHz to 3 GHz) | |
| Spectrum | Linewidth (typ.) | Coherence Ctrl. Off | kHz | | 200 |
| | | 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 | ±5 | ±1.5 |
| | Wavelength Repeatability (typ.) | | pm | ±8 | ±1 | ±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 | 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 | Linewidth (typ.) | Coherence Ctrl. Off | kHz | | 200 | 100 |
| | | 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).

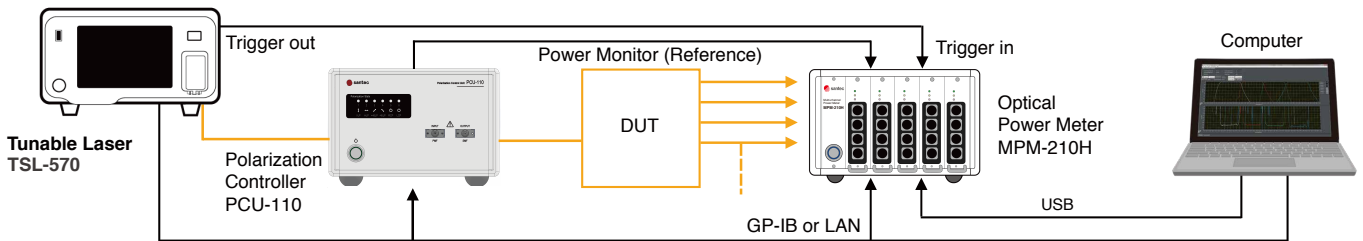
*7: The specification range is up to 1630 nm.

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

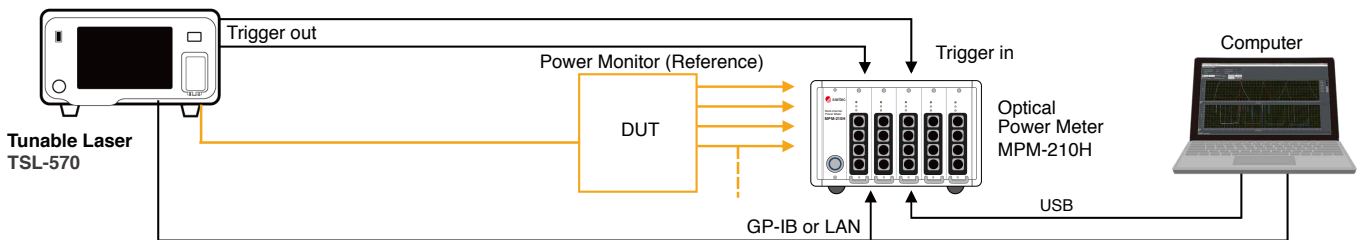
Full wavelength tuning range reduced by 3 nm on both ends for sweep speeds ≥ 150 nm/s.

Typical configuration

IL / PDL measurement setup with the polarization controller PCU-110 and the power meter MPM-210H



IL measurement setup with the power meter MPM-210H



Specification

| 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 | 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, 1.5@200 nm/s | | | |
| Measurement Time for IL / PDL (typ.) *3 | sec | 12@100 nm/s, 6@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 |
| PDL 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 | ±0.02 | | | |
| PDL Resolution | dB | 0.01 | | | |
| Communication | - | USB (USB 2.0 High Speed) | | | MPM-210H |
| | | GP-IB (IEEE488.2), Ethernet | | | PCU-110 / MPM-210H |
| 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 |

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

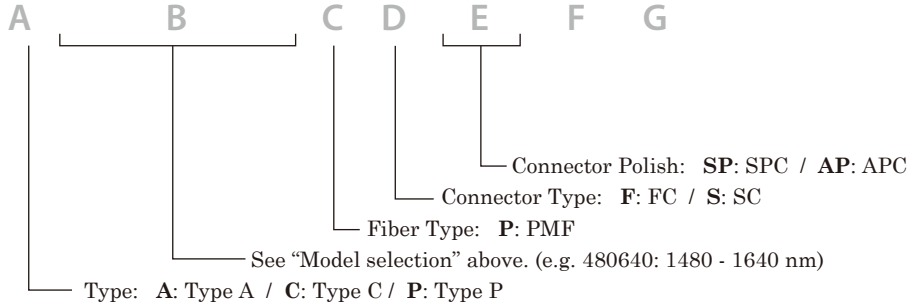
Laser safety information



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**---**00**-



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