RACK SYSTEMS: WDM LASER SOURCE OVERVIEW

Modular Platform Solutions

For multiple wavelength systems with simultaneous control capabilities, Thorlabs offers two modular platform solutions: the PRO8 system (with local control for stand-alone operation and remote IEEE-488 or RS-232 control) and the TXP5000 platform (with remote control only).

Two types of mainframes are available for the PRO8 system. The PRO800 accommodates two single modules, while the PRO8000 can operate up to eight modules. In addition to the DWDM laser modules (listed below), this platform offers a host of laser diode drivers, optical switches, and photodiode amplifiers.The PRO8 has been the mainstay for many laser diode manufacturing and test facilities. The TXP5000 system also includes two types of mainframes: the TXP5004 with USB control for up to four TXP modules and the 19" rack unit TXP5016 with Ethernet control for up to 16 modules. TXP5001AD is an easy-to-use USB adapter for single TXP cards. The TXP platform features high versatility and is the base for Thorlabs' complex Test & Measurement Systems.

PRO8000 Modular Laser System

- Our PRO8000 system provides an outstanding platform for eight-channel DWDM laser sources; it has a number of preconfigured offerings and a complete range of laser source modules from which to choose. Together these modules cover the full S-, C-, and L-Bands of the ITU Grid* (1491-1612nm).

- The PRO8000 DWDM laser modules offer precise tunability, long-term wavelength and power stability, and adjustable coherence control, making them ideal for both active and passive DWDM component testing as well as multiwavelength transmission experiments. These features are possible by combining the sophisticated laser diode control circuit designed by our experienced instrumentation group with high performance DFB lasers.

TXP5000 Modular Laser System

- The TXP5000 system is now available as a multichannel laser source platform with the addition of our LS5000 series of DWDM laser source modules. Populating a TXP5016 chassis with up to sixteen DWDM DFB laser source modules produces a versatile and easy-to-use multichannel laser source system when combined with the outstanding features of our TXP platform.

- The LS5000 DWDM laser modules for the TXP5000 Series systems offer precise tunability, as well as long-term wavelength and power stability. Adjustable coherence control makes them ideal for both active and passive DWDM component testing as well as multiwavelength transmission experiments.
- These WDM laser modules are ideally suited for all DWDM applications, ranging from test systems for fiber optic DWDM components and EDFA production to multi-laser optical sources for DWDM transmission experiments.

*Subject to DFB Laser Availability

Tunable Lasers
Femtosecond Laser
WDM Laser Sources
Benchtop Laser Sources
HeNe Lasers
ASE Sources
Terahertz
Electro-Optic Modulators

DWDM Laser Sources for TXP5000 – LS5000 Series

Complete ITU Coverage: We are committed to providing quick delivery of any of the 600 lasers (on a 25GHz grid) that comprise the DWDM S-, C-, and L-bands*. When ordering, please refer to the tables presented on page 565, which are organized based on 100GHz channel spacings. Pricing and ordering codes can also be found there. Our order codes are a combination of the band designator (S, C, or L), the 100GHz channel number (01 through 50), and an additional character (A, B, C, or D) that indicates the frequency offset from the base channel.

*Subject to Laser Diode Availability

Introduction – LS5000 DWDM Laser Modules

The LS5000 DWDM laser modules for the TXP5000 Series systems offer precise tunability as well as long-term wavelength and power stability. Adjustable coherence control makes them ideal for both active and passive DWDM component testing as well as multi-wavelength transmission experiments.

The WDM laser modules are ideally suited for all DWDM applications, ranging from test systems for fiber optic DWDM components and EDFA production to multi-laser optical sources for DWDM transmission experiments.

Stability, Accuracy, and Dependability

This DWDM laser platform is the ideal choice for demanding DWDM test and measurement applications with laser linewidths of less than 10MHz, center wavelength stability of better than 0.005nm per 24 hours, and wavelength accuracy of better than ±0.025nm.
We use only telecom-rated, butterfly-packaged DFB lasers with integrated TEC elements, optical isolators, and low back-reflection fiber pigtails. When combined with our sophisticated drive circuits, the result is an extremely stable, low-noise laser source that exhibits optical power stability that is better than 0.005dB per 60 minutes and a relative intensity noise RIN figure of 145dB/Hz is typical. All Thorlabs' instruments are backed by an extensive two-year warranty on materials and workmanship.

Extensive Inventories

The ITU-T DWDM grid now contains 600 wavelengths (25GHz channels) spanning the S-, C-, and L-Bands. Thorlabs stocks a comprehensive inventory of C- and L-band lasers with powers of 10mW and 20mW. Many of these lasers ship directly from stock. Due to a limited demand, S-band lasers are available upon request.

Thorlabs has earned a reputation for providing exceptional service. We are fully committed to providing the same level of service on this extensive product line.

For manufacturers of laser diodes, Thorlabs also offers the service of incorporating user-supplied lasers into our modules. Please contact technical support for details.

Features

- Center Wavelengths on 25GHz ITU-T Grid
- Wavelength Stability <0.005nm (24 Hours)
- Output Power Stability <0.01dB (24 Hours)
- Wavelengths in C-, S-, & L- Bands*
- Precise Wavelength Tuning Over ±0.85nm
- Direct Display of Wavelength During Tuning
- Precise Power Tuning Over up to 10dB
- Variable Coherence Control, Linewidths up to 1GHz
- Instrument Drivers for LabVIEW™ & LabWindows™/CVI Included

*Subject to Laser Diode Availability

TXP5000 Series Chassis Specifications

	TXP5016	TXP5004	TXP5001AD*
Maximum Power Consumption	400VA	150VA	75VA
Number of Slots	16 Slots	4 Slots	1 Slot
Operation	GUI on Remote PC		
Remote Interface	Ethernet 10Base-T	USB 2.0	USB 2.0
Remote Drivers	LabVIEW™, LabWindows/CVI™, and C++		
Chassis Ground	4mm Banana		4.8mm Fast-On
Line Voltage	100-240V AC ±10%		
Line Frequency	50-60Hz ± 5%		
Operating Temperature	0 to +40°C		
Storage Temperature	–40 to +70°C		
Dimensions	449 x 148 x 435mm	168 x 148 x 315mm	124 x 23 x 112mm
Weight (w/o Modules)	7kg (15.41lb)	3kg (6.61lb)	0.2kg (0.44lb)

*Please see order information at the bottom of the next page.

DWDM Laser Sources for TXP5000 – LS5000 Series (cont.)

Coherence Control

All the DWDM series laser modules provide an adjustable coherence length control. For high-precision power measurement, the narrow linewidth of a DFB laser can lead to coherent interference effects due to reflections from the multiple surfaces that are present in most optical systems.

TXP5016 CHASSIS WITH LS5000 MODULES

Specifications

Wavelength

- **Options:** 600 Wavelengths: S-, C-, and L-Bands
- **Tuning Range:** ±0.85nm
- **Accuracy:** ± 0.025nm, typ.< ± 0.01nm
- **Stability:** < 0.005nm over 24 Hours (Typ.)
- **Resolution:** 1pm
- **Laser Linewidth:** < 10MHz

Output Power

- **Options:** 10mW, 20mW
- **Accuracy (abs/rel):** 0.6dB/0.4dB
- **Stability:** < 0.002dB over 15s, < 0.005dB Over 1 Hour, < 0.01dB over 24 Hours
- **Attenuation:** >6dB, Typ. 10dB (Continuously Variable)
- **Resolution:** 0.01dB
- **Side Mode Suppression Ratio:** >40dB typ. (>36dB Min)
- **Relative Intensity Noise (RIN):** –145dB/Hz (Typ.)
- **Optical Isolation:** > 35dB

Coherence Control (Standard Feature, All Models)

- **Linewidth:** Up to 1GHz (Adjustable)
- **Shape:** Sine, Square, & Triangle
- **Frequency:** 0.02 to up to 20kHz
- **Modulation Depth:** 0.1 to 100%

Modulation

- **Analog LF Modulation Input:** DC-50kHz (Option via SMA Input)

General Data

- **Optical Output:** FC/APC Connector
- **Fiber:** PMF (Aligned Connector Available upon Request)
- **Operating temperature:** 0 to +35°C Non Condensing
- **Storing temperature:** -40 to +60°C
- **Warm-Up Time:** 15min for Rated Accuracy
- **Laser Module Width:** 1 Slot

All Data Valid at 23±5ºC and 45±15% Relative Humidity

Interference Effects

For high-precision power measurements, the narrow linewidth of a DFB laser can lead to interference effects caused by reflections from the multiple surfaces that are present in most optical systems. These multiple reflections, while extremely small, can accumulate due to the long coherence length. Brillouin scattering is another effect that can lead to significant errors when making optical power measurements in fiber-based systems.

The magnitude of these effects can be significantly reduced by increasing the linewidths of the source. Therefore, all the DWDM series laser sources provide a control to adjust the coherence length; a small signal modulation on the laser current is used to broaden the DFB laser linewidth from a few MHz up to more than 1GHz. The LS5000 modules provide continuous adjustment of the linewidth over this entire range. An internal broadband noise source or an internal freely running sine wave/square wave generator is used to modulate the laser current. The modulation frequency range of the function generator is 20Hz to 50kHz with up to 100% modulation depths. Using these features, an ideal non-discrete, Gaussian-shaped or a discrete spectral distribution is generated.

External Analog LF Modulation DC to 50kHz (Optional)

For applications where a precise LF modulation up to50kHz is required, the DWDM modules are available with an LF modulation option. With this option, the output power can be modulated via an optional SMA input. The laser remains fully protected due to a precise limit circuit located inside the module.

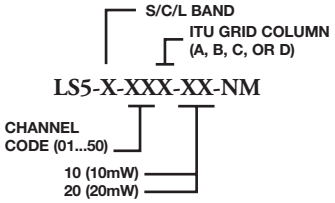
Precision Wavelength Tuning

The wavelength is displayed with a resolution of 0.001nm. By precisely controlling the temperature of the laser chip, the emitted wavelength can be tuned over a range of ±0.85nm (approximately ±100GHz). This range allows the central wavelength of the source to be shifted from one transmission channel to the adjacent channels in dense WDM systems with 100GHz channel spacing, and a tuning over up to 8 channels in systems with 25GHz channel spacing. This feature is useful for simulating crosstalk between channels and can also be used to measure the profile of narrow band DWDM filters.

For information about the ITU grid and available wavelengths, see pages 564-565.

Ordering Information

Example (LS5-C-09B-10nm): C-Band Source, Channel 9 in the 50GHz ITU "B" Grid (1522.95nm), 10mW.



ITEM	$	£	€	RMB	DESCRIPTION
LS5-X-XXX-10-NM	$ 2,200.00	£ 1,386.00	€ 2.046,00	¥ 21,010.00	WDM Laser Source 10mW, No Direct Modulation
LS5-X-XXX-20-NM	$ 2,500.00	£ 1,575.00	€ 2.325,00	¥ 23,875.00	WDM Laser Source 20mW, No Direct Modulation
TXP5004	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	TXP Test and Measurement, 4 Slot With USB Control
TXP5016	$ 3,480.00	£ 2,192.40	€ 3.236,40	¥ 33,234.00	TXP Test and Measurement, 16 Slot With Ethernet Control