

Keysight 81960A Compact Tunable Laser Source Module

Getting Started
Guide

Notices

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Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

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Keysight 81960A
Compact Tunable Laser Source Module
Getting Started Guide

1 Getting Started

This chapter provides a general description of Keysight 81960A Tunable Laser Source Family.

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Safety Considerations

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

Before operation, review the instrument and manual, including the red safety page, for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

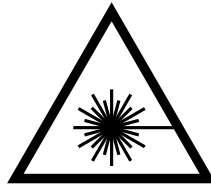
WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

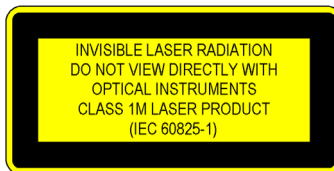
Safety Symbols



The apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.



Hazardous laser radiation.



Invisible laser radiation.

Initial Inspection

Inspect the shipping container for damage. If there is damage to the container or cushioning, keep them until you have checked the contents of the shipment for completeness and verified the instrument both mechanically and electrically.

If the contents are incomplete, mechanical damage or defect is apparent, notify the nearest Keysight Technologies Sales/Service Office.

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the outer enclosure (covers, panels, etc.).

WARNING

You *MUST* return instruments with malfunctioning laser modules to a Keysight Technologies Sales/Service Center for repair and calibration.

Line Power Requirements

The Keysight 81960A Compact Tunable Laser Source modules operate when installed in 8163A/B Lightwave Multimeters, 8164A/B Lightwave Measurement Systems, and 8166A/B Lightwave Multichannel Systems.

Operating Environment

The safety information in your mainframe's User's Guide summarizes the operating ranges for the Keysight 81960A Compact Tunable Laser Source modules. In order for these modules to meet specifications, the operating environment must be within the limits specified for your mainframe.

Storage and Shipment

A Keysight 81960A Compact Tunable Laser Source module can be stored or shipped at temperatures between - 40°C and + 70°C.

Protect the module from temperature extremes that may cause condensation within it.

Protecting Empty Module Slots

Fitting a Blind Panel or Filler Module helps to:

- prevent dust pollution and
- optimize cooling by guiding the air flow.

Fitting Blind Panels for Front-Loadable Module Slots

To fit the a blind panel (part number - 08163-40199), perform the following procedure:

- 1 Position the blind panel as shown in [Figure 1](#) on page -8. Position the end closest to the handle against the bottom edge of the slot.

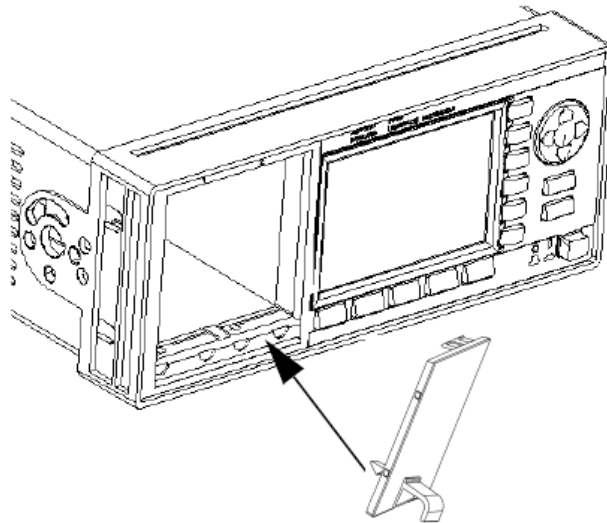


Figure 1 Fitting a Blind Panel

- 2 Push the top of the blind panel so that it clicks into position.

NOTE

To remove a blind panel, pull the handle.

Fitting a Filler Module for Back-Loadable Module Slots

The Keysight 81960A Filler Module must be used if you have not installed a back-loadable Tunable Laser module into the 8164A/B Lightwave Measurement System.

The Keysight 81960A Filler Module can be fitted and removed in the same way as any back-loadable module.

Initial Safety Information for Tunable Laser Modules

The laser sources specified by this user guide are classified according to IEC 60825-1.

The laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50 dated 2007-June-24:

Table 1 Standard Laser Source Modules Laser Safety Information

Keysight 81960A	
Laser type	ECL-Laser InGaAsP
Wavelength Range	1505 nm-1630 nm
Max. CW output power*	50 mW
Beam waist diameter	9 μ m
Numerical aperture	0.1
Laser Class according to IEC 60825-1 (2007)	1M
Max. permissible CW output power	163 mW
<p>* Max. CW output power is defined as the highest possible optical power that the laser source can produce at its output connector.</p> <p>** Max. permissible CW output power is the highest optical power that is permitted within the appropriate laser class</p>	

Laser Safety Labels

Laser class 1M label

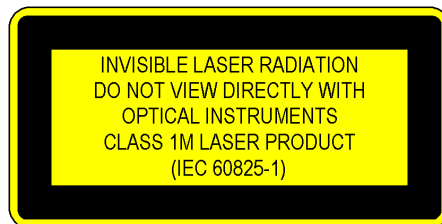


Figure 2 Class 1M Safety Label - 81960A

A sheet of laser safety labels is included with the laser module as required. In order to meet the requirements of IEC 60825-1 we recommend that you stick the laser safety labels, in your language, onto a suitable location on the outside of the instrument where they are clearly visible to anyone using the instrument.

WARNING

Please pay attention to the following laser safety warning:

- The laser output can be controlled by GUI, GPIB state command and the front panel button.
- Do not switch on the instrument when there is no termination to the optical output connector, to the optical fiber or to the attached device. The laser radiation can seriously damage your eyesight.
- The use of optical instruments with this product will increase eye hazard.
- Refer servicing only to qualified and authorized personnel.

CAUTION

The built in laser diode is active whenever the instrument is powered on, therefore disabling the output is not sufficient to establish eye safe conditions.

NOTE

The remote interlock function interrupts the laser current when the connector is open.

Introduction

What is a Tunable Laser Source?

A Tunable Laser Source (TLS) is a laser source for which the wavelength can be varied through a specified range. The Keysight 81960A is a TLS with continuous-sweep measurement capabilities, where wavelength and power are regulated while the laser changes wavelength at a constant rate. The Keysight Technologies range of TLS modules also allow you to set the output power, and to choose between continuous wave or modulated power.

With the 81960A, Keysight sets a new mark in tunable laser performance with faster sweep speeds and repetition rates combined with the dynamic accuracy specifications needed for DWDM component measurements, all packaged in a compact module. The new and unique capability of dynamically specified sweeps in both directions enhances the repetition rate even further for real-time use in adjustment and calibration procedures.

Installation

The Keysight 81960A Tunable Laser Source Family is a front-loadable module.

For a description of how to install your module, refer to “How to Fit and Remove Modules” in the Installation and Maintenance chapter of your mainframe’s User’s Guide.

Front Panels

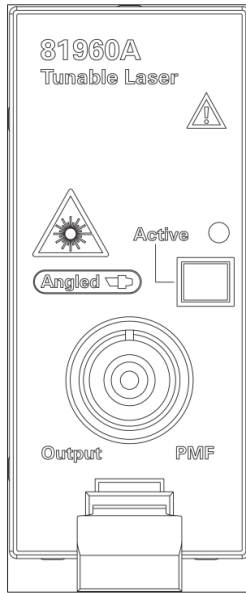


Figure 3 Keysight 81960A Compact Tunable Laser Module

Front Panel Controls and Indicators

Switch the laser output on or off using the button on its front panel, using the [State] parameter in the instrument's Graphical User Interface, or remotely using GPIB commands. When the 'Active' LED is lit the output is enabled. When the active LED is not lit the output is disabled.

CAUTION

The built-in laser diode is active whenever the instrument is powered on, therefore disabling the output is not sufficient to establish eye safe conditions.

Typical Use Models

The Keysight 81960A Tunable Laser Source Family provides high output power up to +14 dBm.

This module covers a total wavelength range of 125 nm in the C- and L-band.

This laser has been designed for making spectral measurements of passive fiber optic components, where results with high wavelength accuracy and dynamic range are needed. The laser is especially well supported by the swept-wavelength measurement engines in the N7700A software suite and can be programmed directly.

The key application for this laser is high repetition-rate scanning for real time updates, benefiting from the higher sweep speeds and acceleration, bidirectional sweeping and improved uploading of the logged wavelength monitor data. These features are best harnessed with the N7700A-102 fast spectral loss engine, which synchronizes the laser with the N7744A or N7745A power meters to produce power and loss spectra in a convenient GUI display. The wavelength resolution and 50-60 dB dynamic range achieved surpass comparable measurements with an OSA, with repetition rates better than 2 Hz for add-drop filter adjustment and calibration.

The high performance in continuous sweeps also matches this laser well to the single-sweep PDL and IL N7700A measurement engine. The dynamic wavelength accuracy will satisfy the test needs for many DWDM components at an optimized performance/price balance. The source to spontaneous noise ratio, SSE, while not as high as the 81600B series, is also sufficient to qualify the isolation of many filter devices. The higher sweep speeds save time measuring broadband devices not needing such high wavelength resolution.

These same advantages apply to use with the N7788B component analyzer for measuring PMD and DGD in addition to PDL and IL. The relative wavelength accuracy during the sweeps is especially important for accurate DGD measurements using the JME method, since the result depends on the derivatives with respect to wavelength. The high speed is great for measuring isolators, PMF and other broadband components.

The powerful lambdascan functions of the 816x Plug&Play driver for customized programs, and the N7700A IL engine which provides a GUI interface to these functions also support power and IL measurements together with any of the Keysight power meters. And the performance of swept-wavelength measurements in the N4150A PFL, including fast repetitive sweeps, are also supported with this newest member of the Keysight swept tunable lasers.

Optical Output

Polarization Maintaining Fiber

A Polarization maintaining fiber (PMF) output is standard for Keysight 81960A Tunable Laser Source Families.

PMF is aligned to maintain the state of polarization. A well defined state of polarization helps ensure constant measurement conditions.

The fiber is of Panda type, with TE mode in the slow axis in line with the connector key.

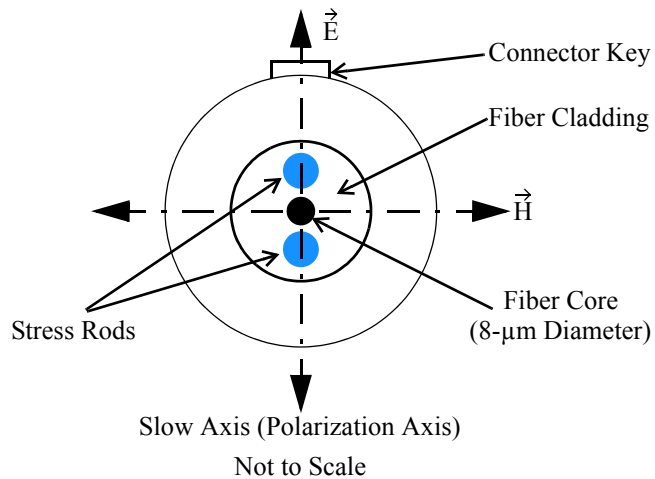


Figure 4 PMF Output Connector

For further details on connector interfaces and accessories, refer to the 81960A User's Guide.

Angled and Straight Contact Connectors

To ensure most accurate measurements, the Keysight 81960A Fast sweeping Compact TLS module is equipped with angled contact connectors.

Angled contact connectors help you to control return loss, since reflected light tends to reflect into the cladding, reducing the amount of light that reflects back to the source.

CAUTION

With the angled contact connectors on your instrument, you can only use cables with angled connectors.



Figure 5 Angled and Straight Contact Connector Symbols

Figure 5 on page -17 shows the symbols that tell you whether the contact connector of your Tunable Laser module is angled or straight. The angled contact connector symbol is colored green.

You should connect straight contact fiber end connectors with neutral sleeves to straight contact connectors and connect angled contact fiber end connectors with green sleeves to angled contact connectors.

NOTE

Angled non-contact fiber end connectors with orange sleeves cannot be directly connected to the instrument.

For further details on connector interfaces and accessories, refer to the 81960A User's Guide.

