

Keysight 81950A Compact Tunable Laser Source

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

A WARNING 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 personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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Keysight 81950A
Compact Tunable Laser Source Modules
Getting Started Guide

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Getting Started

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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.

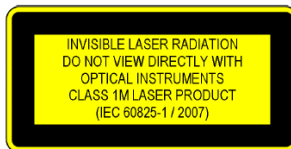
Safety Symbols



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.

The Performance Tests give procedures for checking the operation of the instrument. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, 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 81950A Compact Tunable Laser Source modules operate when installed in Keysight 8163A/B Lightwave Multimeters, Keysight 8164A/B Lightwave Measurement Systems, and Keysight 8166A/B Lightwave Multichannel Systems.

Operating Environment

The safety information in your mainframe's User's Guide summarizes the operating ranges for the Keysight 81950A 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.

Input/Output Signals

CAUTION

There is one BNC input connector on the front panel of a Keysight 81950A Compact Tunable Laser Source module.

To prevent the BNC interface from damage, do not exceed the voltage limit of $\pm 5V$ when applying external voltage.

Storage and Shipment

A Keysight 81950A Compact Tunable Laser Source module can be stored or shipped at temperatures between -40°C and $+70^{\circ}\text{C}$.

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

Initial Safety Information for Tunable Laser Modules

The laser sources specified by this document are classified according to IEC 60825-1 (2007).

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

Table 1 Safety Information for TLS Modules

	Keysight 81950A Option 210	Keysight 81950A Option 101
Laser type	ECL-Laser InGaAsP	ECL-Laser InGaAsP
Wavelength Range	1527 nm-1566 nm	1505 nm-1630 nm
Max. CW output power*	50 mW	50 mW
Beam waist diameter	9 µm	9 µm
Numerical aperture	0.1	0.1
Laser Class according to IEC 60825-1 (2001)-International	1M	1M
Max. permissible CW output power	163 mW	163 mW
<i>* Max. CW output power is defined as the highest possible optical power that the laser source can produce at its output connector.</i>		
<i>** Max. permissible CW output power is the highest optical power that is permitted within the appropriate laser class.</i>		

Laser Safety Labels

Laser class 1M label

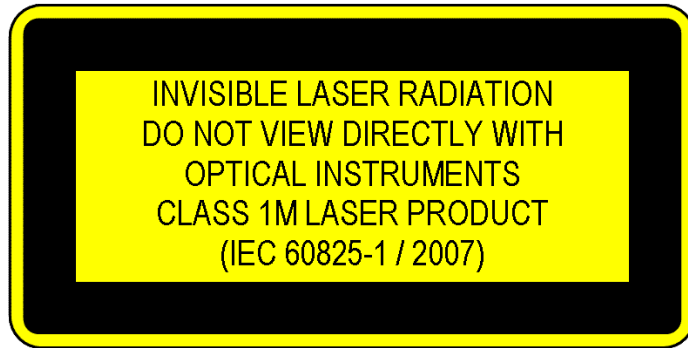


Figure 1 Class 1M Safety Label - 81950A/81960A

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

The laser output can be controlled by GUI, GPIB state command and the front panel button.

NOTE

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

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 Technologies range of compact TLS modules also allow you to set the output power, and to choose between continuous wave or modulated power. These are flexible stimulus modules suitable for applications such as the testing of optical amplifiers, DWDM components, and complete DWDM systems.

Installation

The Keysight 81950A 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

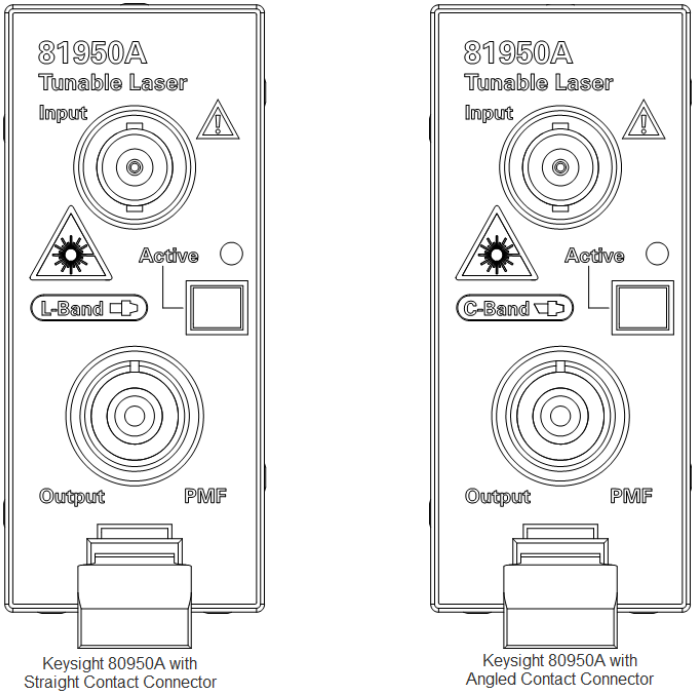


Figure 2 Keysight 81950A Compact Tunable Laser Module

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.

Typical Use Models

The Keysight 81950A Tunable Laser Source Family provides high output power.

This module covers a total wavelength range of 40 nm, either:

- In the C-band with the 81950A Option 210, or
- In the L-band with the 81950A Option 101.

Their compact single-slot format makes them a flexible and cost-effective stimulus for single channel and multichannel DWDM applications.

Device Characterization at high power levels

The high optical output power of the Keysight 81950A Tunable Laser Source Family improves the testing of all types of optical amplifiers and other active components as well as broadband passive optical components. It helps overcome losses in test setups or in the device under test itself. Thus, engineers can test optical amplifiers such as EDFAs, Raman amplifiers, SOAs and EDWAs to their limits. This tunable laser provides the high power levels required to help speed the development of innovative devices by enabling the test and measurement of nonlinear effects.

Low line width source for complex modulation formats

The low line width of the Keysight 81950A Compact TLS module makes this module an ideal light source for transmission systems with (D)QPSK and higher order modulation formats and as local oscillator for coherent receivers. The fine tuning capability allows to precisely set the intermediate frequency in the coherent receiver.

SBS suppression feature enables high launch power

The SBS Suppression feature avoids the reflection of light induced by Stimulated Brillouin Scattering (SBS). It enables the launch of the high optical output power into long fibers without intensity modulation to avoid impairment in time-domain measurements.

Specifications:

For further details on specifications, refer to Users Guide (Part No. 81950-90B01).

Optical Output

Polarization Maintaining Fiber

A Polarization maintaining fiber (PMF) output is standard for Keysight 81950A Tunable Laser Source Family.

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.

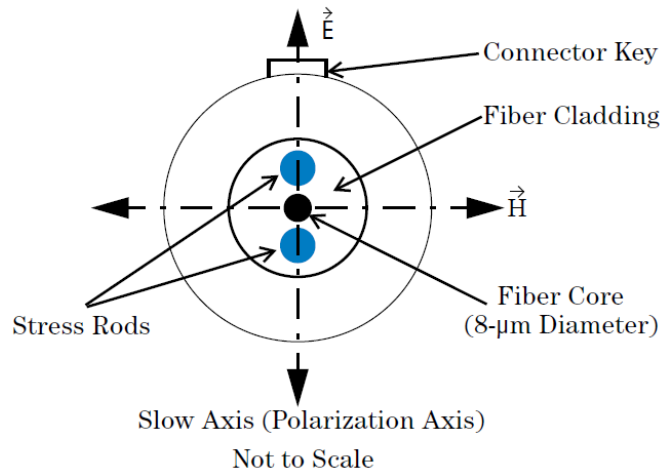


Figure 3 PMF Output Connector

For further details on connector interfaces and accessories, refer to the User's Guide (Part No. 81950-90B01).

Angled and Straight Contact Connectors

To ensure most accurate measurements, the Keysight 81950A 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 4 Angled and Straight Contact Connector Symbols

Figure 4 on page -15 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 Users Guide (Part No. 81950-90B01).

Signal Input and Output

CAUTION

There is one BNC input connector on the front panel of a Keysight 81950A Compact Tunable Laser Source module.

To prevent the BNC interface from damage, do not exceed the voltage limit of $\pm 5V$ when applying external voltage.

