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If you wish to buy or sell a 81680A or any model of HP, Agilent, Keysight TLS (Tunable Laser Source) and other brands, visit our catalog here to see our current stock with actual photos.

# The Simbol Test Systems expertise

With more than 20 years of expertise in repair of OSA, **Tunable Lasers**, Wavemeters and more, the quality of our services is renowned amongst the service centers community and highly appreciated by our partners and customers. We developed custom software allowing us to perform automatic calibration tests to cover the entire band of your TLS. Don't settle for a two-page summary assessment to trust that your **TLS** is operating through its full range at full power; our report contains the complete table of all results, confirming it has **really** been tested. A report from other labs with less data points reflects a not completely calibrated unit. So be careful of other sellers saying their equipment is "tested good", "powered on, self-tested", "pulled from a working environment". When you choose AssetRelay, you can be confident that we actually test everything we sell so you know it will work when it gets to your workplace.

## Agilent/HP 81680A Tunable Laser Source (TLS) Repair and Calibration Services

The 81680A TLS goes through a premium calibration to ensure it meets or exceeds manufacturer's published specifications. The equipment is shipped with a comprehensive 12 page calibration certificate including a report with complete data (9 pages) and a calibration sticker. A report from other labs with less data points reflects a not completely calibrated unit.

Simbol Test Systems is the only North America independent lab with the capability of realigning Agilent/HP TLS optical sections including the attenuator. If your unit does not pass calibration, we offer a fixed price repair fee and will get your TLS back to perfect working condition.

### List of specifications calibrated

- Relative and Absolute Wavelength Accuracy
- Mode Hop Free Tuning
- Wavelength Repeatability
- Maximum Power Output 1 Low SSE
- Power Linearity Output 1 Low SSE
- Maximum Power Output 2 High Power
- Power Linearity Output 2 High Power
- Power Flatness Over Wavelength
- Power Stability
- Power Linearity Output 2 by Attenuator
- Signal-to-Source Spontaneous Emission Output 2 High Power
- Signal-to-Total-Source Spontaneous Emission Output 2 High Power
- Signal-to-Source Spontaneous Emission Output 1 Low SSE
- Signal-to-Total-Source Spontaneous Emission Output 1 Low SSE

Traceability: Instrumentation used during this calibration is traceable to N.I.S.T (National Institute of Standards and Technology) or C.N.R.C. (Canadian National Research Council).

# Agilent 81480/ 680/ 640A Tunable Lasers
# Agilent 81682/ 642A Tunable Lasers
# Agilent 81689A Compact Tunable Laser
## Technical Specifications

**This is an edited version of the Agilent specifications focusing on the 81680A**

The 81480A, 81640A, 81680A, 81642A and 81682A Tunable Laser modules with their built-in wavelength control loop push today's performance limits. As they are mode-hop free tunable with continuous output power, they qualify for the test of the most critical DWDM components.

Agilent Technologies

## Tunable lasers for all gain bands

The Agilent 81680A and 81682A modules operate in the 1550 nm band whereas the Agilent 81640A covers the wavelength range from 1510 nm to 1640 nm and the Agilent 81480A covers the wavelength range from 1370nm to 1480nm.

## Optimum tuning precision for the test of critical dense-WDM devices

The Agilent 81480A 81640A, 81642A 81680A and 81682A Tunable Laser modules with their built-in wavelength control loop push today's performance limits. As they are all mode-hop free tunable with continuous output power, they qualify for the test of the most critical DWDM components. All three modules fit into the bottom slot of the 8164A mainframe.

## Test of optical amplifiers and passive components

The 81682A and 81642A Tunable Laser module provides the high stimulus power needed to test today's optical amplifiers. An optional, built-in optical attenuator allows an output power dynamic range of more than 60 dB. Its excellent wavelength precision makes it a multi-purpose instrument for all kinds of component test.

## Polarization Maintaining Fiber for the test of integrated optical devices

The 81480A, 81640A, 81642A, 81680A and 81682A modules are ideally constructed to characterize integrated optical devices. Their Panda PMF output ports provide a well defined state of polarization to ensure constant measurement conditions on waveguide devices. A PMF cable easily connects an external optical modulator.

## Low spontaneous emission for maximum measurement range

The 81480A, 81640A and 81680A tunable laser modules are equipped with two optical outputs. One output port delivers a signal with ultra-low source spontaneous emission (SSE). It enables accurate crosstalk measurement of dense-WDM system components with many channels at narrow spacing.

Just a power meter module is sufficient to characterize steep notch filters such as Fiber Bragg Gratings.

The second output port provides increased optical power and allows adjustment by more than 60 dB through a built-in optical attenuator.

## Compact module for multi-channel test

A variable amount of the compact, yet fully remote controlled Agilent 81689A Tunable Laser modules, in combination with the 81682A and 81642A high power Tunable Laser, is the ideal solution to characterize optical amplifiers for use in dense-WDM applications. Furthermore the 81689A allows a realistic multi-channel test bed for dense-WDM transmission systems to be set up.

Its continuous, mode-hop free tuning makes it quick and easy to set even the most complex configurations to the target wavelengths and power levels, just by dialing or using the vernier keys. The 81689A is available with both, standard single-mode fiber and Panda- type PMF. Each 8164A mainframe can host up to four units of the 81689A in its upper slots.

The 8164A, 81480A, 81640A, 81642A, 81680A, 81682A and 81689A are produced to ISO 9001 international quality system standard as part of Agilent's commitment to continually increasing customer satisfaction through improved quality control.

Specifications describe the instrument's warranted performance. They are verified at the end of a 2 m long patchcord and are valid after warm-up and for the stated output power and wavelength ranges.

Each specification is assured by thoroughly analyzing all measurement uncertainties. Supplementary performance characteristics describe the instrument’s non-warranted typical performance.

Every instrument is delivered with a commercial certificate of calibration and a detailed test report.

For further details on specifications, see the Definition of Terms in Appendix C of the Tunable Laser User's Guide.

## 81680A Tunable Laser for the test of critical dense-WDM components

| | **Agilent 81680A** | |
|---|---|---|
| Wavelength range | 1460 nm to 1580 nm | |
| Wavelength resolution | 0.1 pm, 12.5 MHz at 1550 nm | |
| Mode-hop free tuning range | full wavelength range | |
| Absolute wavelength accuracy [1] [2] | ±0.01 nm | |
| Relative wavelength accuracy [1] [2] | ±5 pm, typ. ±2 pm | |
| Wavelength repeatability [2] | ±1 pm, typ. ±0.5 pm | |
| Wavelength stability<br>(typ., 24 h at const. temp.) [2] | ≤ ±1 pm | |
| Tuning speed (typ. for a 1/10/100 nm step) | 400 ms/ 600 ms/ 2.8 s | |
| Linewidth (typ.), coherence control off<br>Effective linewidth (typ.), coherence ctrl. on | 100 kHz<br>> 50 MHz (1480 –1580 nm, at maximum flat output power) | |
| | Output 1 (low SSE) | Output 2 (high power) |
| Output power [3]<br>(continuous power during tuning) | ≥ –4 dBm peak typ.<br>≥ –6 dBm (1520 –1570 nm)<br>≥ –10 dBm (1480 –1580 nm)<br>≥ –13 dBm (1460 – 1580 nm) | ≥ 6 dBm peak typ.<br>≥ 5 dBm (1520 – 1570 nm)<br>≥ 1 dBm (1480 – 1580 nm)<br>≥ –3 dBm (1460 –1580 nm) |
| Minimum output power [3] | –13 dBm | –3 dBm<br>(–60 dBm in attenuation mode) |
| Power stability [3] [9] | ±0.01 dB, 1 hour<br>typ. ±0.03 dB, 24 hours | |
| Power repeatability (typ.) [3] | ±0.01 dB | |
| Power linearity [3] | ±0.1 dB | ±0.3 dB |
| Power flatness versus wavelength [3] | ±0.2 dB, typ. ±0.1 dB | ±0.3 dB, typ. ±0.15 dB |
| Side-mode suppression ratio (typ.) [4] [8] | ≥ 40 dBc (1480 – 1580 nm) | |
| Signal to source spontaneous emission ratio [5] [8] | ≥ 63 dB/ nm [7]<br>(1520 – 1570 nm)<br>≥ 58 dB/ nm [7]<br>(typ., 1480– 1580 nm)<br>≥ 53 dB/ nm [7]<br>(typ., 1460 – 1580 nm) | ≥45 dB/ nm<br>(1520 – 1570 nm)<br>≥ 40 dB/ nm<br>(1480 –1580 nm)<br>≥ 35 dB/ nm<br>(1460 – 1580 nm) |
| Signal to total source spontaneous emission ratio [6] [8] | ≥ 60 dB<br>(1520 – 1570 nm) [7]<br>≥ 50 dB<br>(typ., 1460 – 1580 nm) [7] | ≥ 30 dB<br>(typ., 1520 – 1570 nm ) |
| Relative intensity noise (RIN, typ.) [8] | –145 dB/Hz (1480 – 1580 nm) | |

[1] Valid for one month and within a ±5 K temperature range after automatic wavelength zeroing.

Wavelength Zeroing is an internal function that performs an automatic self-adjustment.

[2] At CW operation. Measured with wavelength meter based on wavelength in vacuum.

[3] Applies to the selected output.

[4] Measured by heterodyning method.

[5] Measured with optical spectrum analyzer at 1 nm resolution bandwidth.

[6] Measured with optical spectrum analyzer.

[7] Measured with Fiber Bragg Grating to suppress the signal.

[8] Output power as specified per wavelength range and output port.

[9] Warm up time 1 hour

## Supplementary performance characteristics

### Modulation

**Internal digital modulation** [1]
50% duty cycle, 200 Hz to 300 kHz.

**Modulation output:**
TTL reference signal.

**External digital modulation** [1]
> 45% duty cycle, fall time
< 300 ns, 200 Hz to 1 MHz.

**Modulation input:**
TTL signal.

**External analog modulation**
≥ ±15% modulation depth,
5 kHz to 20 MHz (for Agilent 81689A: 5 kHz to 1 MHz).

**Modulation input:**
5 Vp-p

**External wavelength locking**
(Agilent 81480/
81680A/640A/682A/642A)
> ±70 pm at 10 Hz
> ±7 pm at 100 Hz.

**Modulation input:**
± 5 V

**Coherence control**
(81480A/81640A/81642A/ 80A/ 82A)
For measurements on components with 2 m long patchcords and connectors with 14 dB return loss, the effective linewidth results in a typical power stability of < ±0.025 dB over 1 minute by drastically reducing interference effects in the test setup.

### Continuous sweep mode

(81480A/81640A/81462A/ 80A/ 82A)
Tuning velocity adjustable to
40 nm/sec, 5 nm/sec and 0.5 nm/sec.
Mode-hop free span
*Agilent 81480A*:
1420-1470 nm at flat output power
≥ 0 dBm
*Agilent 81680A/82A:*
1520-1570 nm at flat output power
≥ 3dBm
*Agilent 81640A:*
Any 50 nm within 1520-1620 nm at flat output power ≥ 0 dBm
*Agilent 81642A:*
Any 50 nm within 1520-1620 nm at flat output power ≥ 2 dBm
Ambient temperature within +20 °C and +35 °C.

### General

**Output isolation (typ.):**
50 dB (for 81689A: 38 dB).

**Return loss (typ.):**
60 dB (options 022, 072;
for 81689A: 55dB);
40 dB (options 021, 071;
for 81689A: 40dB).

**Polarization maintaining fiber**
(Options 071, 072)
**Fiber type:**
Panda.
**Orientation:**
TE mode in slow axis, in line with connector key.

**Extinction ratio:** 16 dB typ.

**Laser class:**
Class IIIb according to FDA 21 CFR 1040.10, Class 3A according to IEC 825 - 1; 1993.

**Recommended re-calibration period:**
2 years.

**Warm-up time:**
< 20 min
(for 81689A: < 40 min),
immediate operation after boot-up.

### Environmental

**Storage temperature:**
–40 °C to + 70 °C
(for 81689A:–20 °C to +70 °C).

**Operating temperature:**
10 °C to 35 °C
(for 81689A: 15 °C to 35 °C).

**Humidity:**
< 80 % R.H. at 10 °C to 35 °C
(for 81689A: < 80 % R.H. at 15 °C to 35 °C).

Specifications are valid in non-condensing conditions.

[1] 81640A/ 80A/ 82A:
displayed wavelength represents average wavelength while digital modulation is active.

## 8164A Lightwave Measurement System

**Display:**
Active color LCD, 600 x 400 pixels visible. VGA connector for external monitor.
**GPIB Interface:**
GPIB interface function code: SH1, AH1, T6, L4, SR1, RL1, PP0, DC2, DT0, C0.
**RS-232C Interface:**
Max. baud rate: 115,200 bps
**Parallel Printer Interface:**
Centronics
**PCCard slot:**
One type I, II and III compliant with PC Card Standard
PCMCIA 2.1/JEIDA 4.1
**External keyboard:**
PS/2 connector
**Data Storage:**
Internal Hard Disk Drive, 2000 MB
ATA PC and SRAM PC cards according to PCMCIA type I, II and III.
**Power:** 100 to 240 Vrms, ±10 %, 280 VA max.
**Dimensions:** 145 mm H, 426 mm W, 545 mm D
(5.8" x 16.9" x 21.6")
**Weight:** net, 20 kg (45 lb.), shipping, 23 kg (51 lb.), including modules.

**Built-in Application:**
Software 2.0 enables the measurement of loss vs. wavelength of up to 8 channels with trace display and data storage. This software version supports full performance of the laser in stepped mode.

## Listed options

**Option 003:** built-in optical attenuator, 60 dB attenuation
(81682A; included with 81640A and 81680A).

**Option 021:** standard single mode fiber, straight contact output connector (81689A).

**Option 022:** standard single mode fiber, angled contact output connector (81689A).

**Option 071:** polarization maintaining fiber, straight contact output connector (81640A, 81680A, 81682A, 81689A).

**Option 072:** polarization maintaining fiber, angled contact output connector (81640A, 81680A, 81682A, 81689A).

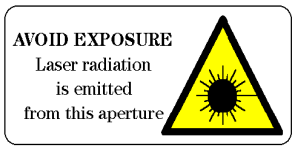
**Option 1CM:** rack mount kit without front handles for the 8164A mainframe.

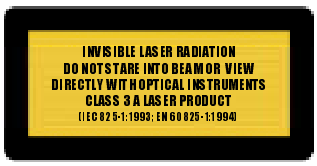
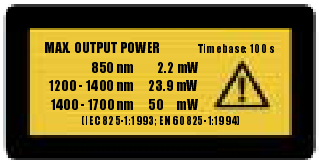
**Option 1CN:** front handles for the 8164A mainframe.

**Agilent 81645A Filler Module:**
The 81645A filler module is required to operate the 8164A mainframe if it is used without an 81640A/80A/82A tunable laser module.

### Laser Safety Information

In the USA, all tunable lasers specified by this data sheet are classified as Class IIIIb according to 21 CFR 1040.10.




Internationally, the same tunable lasers are classified as Class 3A according to IEC 60825-1.