

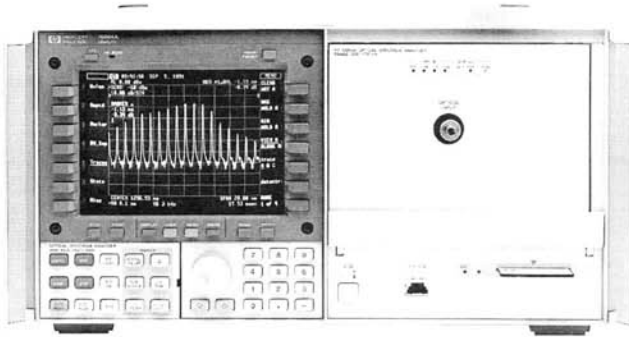
SPECTRUM, COMPONENT & SIGNAL ANALYZERS

Optical Spectrum Analyzers, 600 nm to 1700 nm

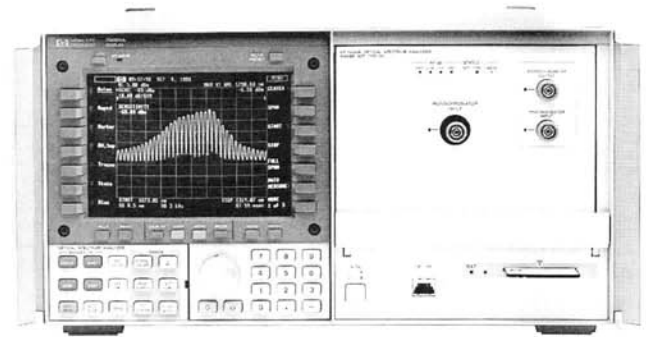
HP 71450B, 71451B, 71452B

- Spectral measurements from 600 to 1700 nm
- Unique double-pass monochromator
- Real-time sweep rates
- -90 dBm sensitivity and 60 dB dynamic range

- Excellent amplitude accuracy, low polarization dependency
- Wavelength and amplitude calibration across full measurement range
- Optional current-source and white light source
- Five modes of operation (HP 71451B)



HP 71450B



HP 71451B



HP 71450B, 71451B, and 71452B Optical Spectrum Analyzers

The HP 71450B, 71451B, and 71452B are grating-based optical spectrum analyzers that display the amplitude of light versus wavelength over the 600 to 1700 nm wavelength range. These instruments make fast spectral measurements of LEDs, Fabry-Perot lasers, DFB lasers, and Erbium-doped fiber amplifiers. Capable of sweeping 40 nm in 50 ms and the full frequency range in 500 ms, they can save hours of measurement time in the laboratory or on the production floor.

A unique double-pass monochromator provides the optical spectrum analyzers with the high dynamic range of double-monochromator instruments (-55 dBm at 0.5 nm from the peak) and the sensitivity of single-monochromator instruments (better than -90 dBm). They also offer high amplitude and wavelength accuracy as well as polarization insensitivity.

The optical spectrum analyzers are housed in a single, 9-in-high mainframe. They operate in temperatures from 0° to 55° C, and they meet rigorous environmental tests, including those for shock and vibration. The analyzers maintain full calibration for two years, even after normal transportation—across the room or across the country.

Measurement Versatility

Many features are found in the HP 71450B, 71451B, and 71452B. Modification of screen data allows immediate wavelength position or span adjustments. Fully variable spans with full control over sweep speeds, sensitivity, and resolution, and the choice of automatic or manual settings, make the analyzers easy to use. In addition, automatic features include an auto-measure function that locates the signal, zooms in, and centers the display; and an auto-align feature that automatically centers the light on the photodiode for optimum amplitude accuracy.

Three advanced functions measure and characterize LEDs and DFB and Fabry-Perot lasers. The LED measurement identifies the spectral FWHM value, mean-wavelength position, and peak-power density of the LED. The Fabry-Perot function measures the spectral FWHM, center wavelength, mode spacing, and total power of the laser. One-button measurements of DFB lasers include center wavelength, automatic side-mode suppression ratios, peak power, and stop-band characterization.

An optional current source can source or sink up to 200 mA of current to bias your laser or LED. The current source allows either continuous current or variable duty-ratio current pulses to minimize chip heating effects. The source can be set from the front panel or over HP-IB. It provides transient suppression and voltage clamping to protect your diode under test.

An optional white light source covering 900 to 1600 nm can be added to your OSA for swept wavelength stimulus response testing of optical components. The optical spectrum is filtered below 900 nm to prevent errors due to detection of light at half the wavelength of interest.

The swept polarization dependent loss (PDL) kit available on the HP 71451B, when coupled with the white light source, provides the capability to make swept PDL measurements on both optical-to-optical and optical-to-electrical components from 1250 to 1600 nm.

The optical spectrum analyzers save data in several ways. Displayed information can be transferred directly to a printer or plotter, and trace and instrument setups can be saved internally in the standard 1 MB memory, stored on a memory card, sent over HP-IB to an external disk drive, or captured on a PC with the OSA capture program.

Part of the Modular Measurement System (MMS), the HP 71450B, 71451B, and 71452B, consists of a color mainframe/display and a new HP 70950B, 70951B, or 70952B optical spectrum analyzer module. Either optical module can be added to existing MMS systems.

Erbium-Doped Fiber Amplifier Testing

The HP 71452B is optimized for EDFA testing. The polarization sensitivity is improved to ± 0.05 dB from 1542 to 1562 nm, the scale fidelity has been reduced to 0.05 dB, and the wavelength accuracy has been improved to ± 0.2 nm. Also included are three EDFA measurement personalities: ASE Interpolation, Time Domain Extinction (TDE), and Noise Gain Profile (NGP). The ASE Interpolation and TDE personalities provide a quick and easy way to measure large signal gain, noise, and a variety of parameters at a single wavelength. With the addition of the appropriate member of the HP 8168 family of tunable laser sources, multiple wavelengths can be measured. The NGP personality provides a fast way to measure the small signal gain and noise figure of an amplifier with a saturating signal. The three personalities are available for the HP 71450B and HP 71451B by ordering Options 051, 052, and 053.

Five Modes of Operation with the HP 71451B

The HP 71451B extends the standard optical spectrum analysis capability by adding four measurement ports: monochromator input, photodetector input, monochromator output, and transimpedance amplifier input. An internal transfer switch, automatic fiber alignment, and access to the photodetector and transimpedance amplifier allow the HP 71451B to be operated in five modes: OSA, preselector, stimulus-response, power meter, and photodetector.

Specifications

Wavelength

Range: 600 to 1700 nm

Span Range (contin. variable): 0.2 nm to full range

Absolute Accuracy¹: ±1 nm

Absolute Accuracy¹ (after user cal): ±0.3 nm; ±0.2 nm (71452B)

Differential Accuracy^{1,2}: ±0.1 nm, for separations ≤20 nm

Reproducibility ≤1 minute: ±0.005 nm

Tuning Repeatability: ±0.005 nm

Stability (zero span): ±0.005 nm

Resolution¹

FWHM: 0.08 and 0.1 to 10 nm in a 1,2,5 sequence

Resolution Accuracy (≥0.5 nm, 1250 to 1600 nm): ±20%

Corrected Bandwidth Accuracy (≥0.5 nm, 1250 to 1600 nm): ±3%

Amplitude (for resolutions ≥0.2 nm)

Calibration Accuracy¹ at -30 dB, 1300 nm: ±0.5 dB

Scale Fidelity, Sensitivity in Auto: ±0.1 dB ±0.05 dB

(Opt 101)³

Sensitivity in Manual: ±0.2 dB ±0.07 dB

(Opt 101)³

Display Resolution: 0.01 dB, log; 0.23% of measurement + 0.01% of reference level, linear

	600 to 1700 nm	750 to 1600 nm	1250 to 1600 nm
Flatness¹:	±2 dB ³	±2 dB	±1 dB
Polarization Dependence¹:	±2.5 dB ²	±1.5 dB ²	±0.5 dB ³
71452B:	±0.05 dB from 1542 to 1562 nm ³		
	±0.125 dB from 1300 to 1320 nm		

Sensitivity⁴

600 to 750 nm: -65 dBm

750 to 1100 nm: -75 dBm

1100 to 1600 nm: -90 dBm

1600 to 1750 nm³: -80 dBm³

Dynamic Range^{1,3} (excluding multiple-order grating responses)

600 to 1700 nm: -50 dB ≥ ±1 nm

1250 to 1600 nm: -55 dB ≥ ±0.5 nm; -60 dB ≥ ±1 nm

Input Power

1 dB Compression Level, within Selected Resolution: ≥ 10 dBm

Maximum Displayed Level: ≥ 15 dBm

Maximum Safe Input Level: +20 dBm per 5 nm, +30 dBm total

Input Return Loss¹

With PC or HMS-10/HP Connector: > 35 dB

Sweep Time (with functions auto-coupled)²

Maximum Sweep Rate 40 nm/50 ms

Sweep Time Cycle 50 nm span, auto zero off <180 ms

50 nm span <340 ms

100 nm span <400 ms

full span <1 s

Pulse Mode

Turn on >2 ms pulse ±0.2 dB

Turn off >10 ms pulse and 30 dB extinction ±0.2 dB

Additional Specifications for the HP 71451B

Monochromator Insertion Loss

850 nm: <17 dB (1st order)

1300 nm: <7 dB

1550 nm: <10 dB

Maximum Input Power: +20 dBm per 5 nm, +30 dBm total

Monochromator Output (into 62.5 μm fiber)

Polarization Dependence¹, for Resolutions ≥0.2 nm

1250 to 1600 nm: ±0.5 dB³

600 to 1700 nm: ±2.5 dB

Resolution Selections (FWHM): 0.08 nm and 0.1 to 10 nm in a 1,2,5 sequence

Resolution Accuracy for ≥0.5 nm, 1250 to 1600 nm: ±20%

Photodetector Input (in power meter mode)

Accuracy at -30 dBm¹ (ref to 1300 nm): ±0.25 dB

Maximum Safe Power Level: +20 dBm

1 dB Compression Level: ≥7 dBm

Scale Fidelity on Screen⁵ for ≤2 dBm Inputs: ±0.25 dB with fixed reference level

Display Resolution: 0.01 dB

600 to 1700 nm 1250 to 1600 nm

Power Range: +15 to -80 dBm +15 to -90 dBm

Flatness¹ (for
≤ 3 dBm inputs): ±2.0 dB³ ±0.4 dB

Transimpedance Input

Current Range: 0 to -10 mA

Maximum Current: ±10 mA

Maximum Voltage: ±10 V

Specifications: Optional Current Source

Current Output

Range: 0 to ±200 mA (source or sink)

Resolution: 50 μA steps

Pulse Mode

Pulse Range: 1 μs to 6.5 ms

Pulse Resolution: 100 ns

Duty Cycle Range: pulse width/1 s to 100%

General Specifications

Inputs/Outputs

Optical Output (HP 71451B): 62.5 μm fiber

Optical Input: 50 μm fiber, standard; 9 μm fiber, HP 71452B

Optical Connectors: FC/PC standard; other interface adapters available

Rear Panel Connectors: SMB (electrical)

Size: 425.4 mm W × 222 mm H × 526 mm D (16.75 in W × 8.74 in H × 20.7 in D)

Weight

HP 71450B, 71451B, 71452B: 28 kg (61.6 lb)

HP 70950B, 70951B, 70952B: 8 kg (17.6 lb)

Environmental

Temperature: 0° to +55° C (operational), -30° to +71° C (storage)

Shock and Vibration: Tested to MIL-T-28800D class 5, par. 3.7.4, 3.7.5.2&3

EMI: Conducted and radiated interference complies with CISPR Pub 11, FTZ 526/527/79, MIL-STD 461B part 7 CE03 (AF) and RE02

Power Requirements

Voltage: 100, 120, 220, 240 VAC (+5, -10%)

Maximum Power: 260 W max (350 VA max)

Frequency: 47 to 66 and 356 to 444 Hz

Ordering Information

	Price
HP 71450B Optical Spectrum Analyzer	\$36,700
Opt 001 Built-in Programmable Current Source	+\$1,225
Opt 002 Built-in White Light Source	\$3,570
Opt 010 Delete FC/PC Connector Interface	-\$130
Opt 051 EDFA ASE Interpolation	+\$1,530
Opt 052 EDFA Time Domain Extinction	\$1,530
Opt 053 EDFA Noise Gain Profile	\$1,530
HP 71451B Optical Spectrum Analyzer	\$45,700
Opt 001 Built-in Programmable Current Source	+\$1,225
Opt 002 Built-in White Light Source	\$3,570
Opt 003 Swept PDL Kit	\$15,000
Opt 010 Delete FC/PC Connector Interface	-\$390
Opt 051 EDFA ASE Interpolation	+\$1,530
Opt 052 EDFA Time Domain Extinction	\$1,530
Opt 053 EDFA Noise Gain Profile	\$1,530
HP 71452B Optical Spectrum Analyzer Module	\$43,300
Opt 001 Built-in Programmable Current Source	+\$1,225
Opt 002 Built-in White Light Source	\$3,570
Opt 010 Delete FC/PC Connector Interface	-\$130

¹With applied input fiber 9/125 μm

²Characteristic

³Temperature range 20° to 30° C

⁴Signal value ≥6 times the RMS noise value

⁵To within 15 dB of the sensitivity noise limit