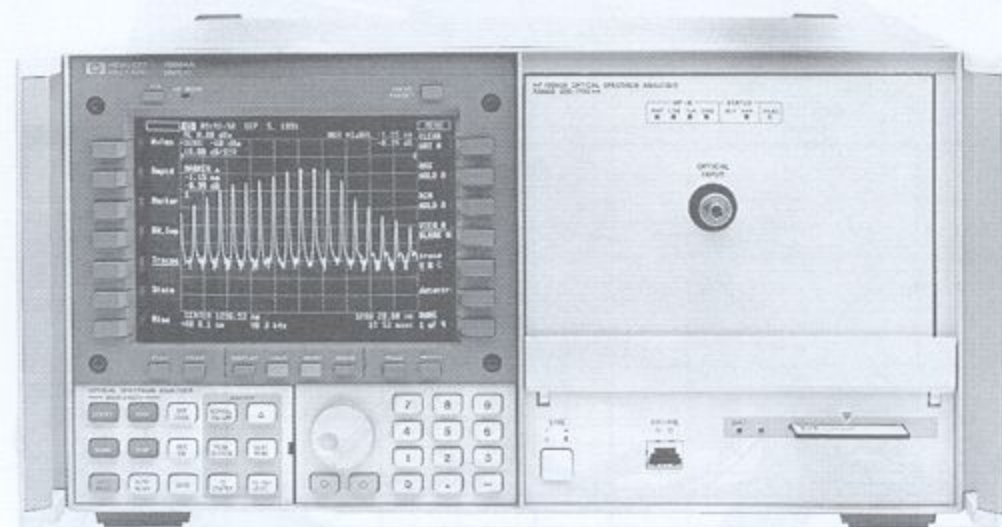


SPECTRUM, COMPONENT & SIGNAL ANALYZERS

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



HP 71450B



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.

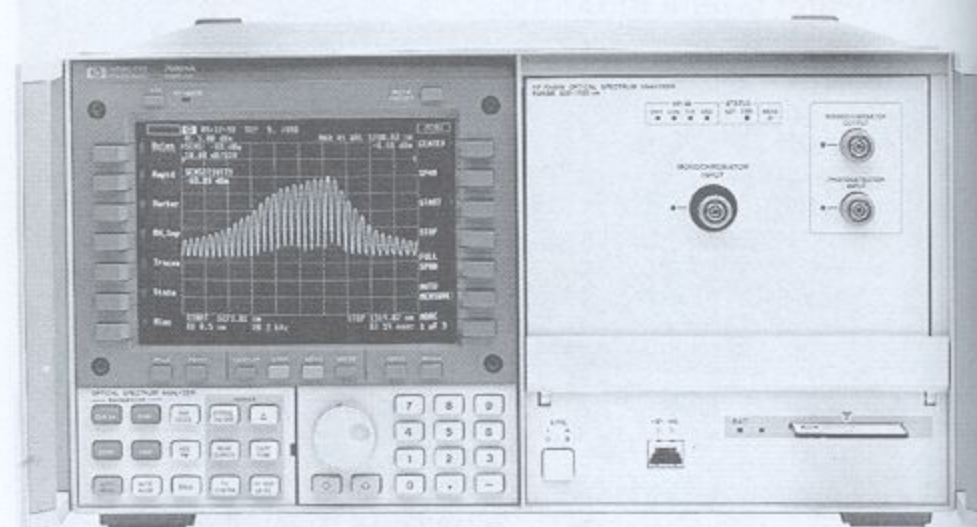
Measurement Versatility

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.

- 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 71451B



Specifications

Optical Input Channel

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, photodiode input, monochromator output, and transimpedance amplifier input. An internal transfer switch, automatic fiber alignment, and access to the photodiode and transimpedance amplifier allow the HP 71451B to be operated in five modes: OSA, preselector, stimulus-response, power meter, and photodiode.

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

Settability (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
Flatness ¹ :	±2 dB ³	±2 dB	±1 dB

Polarization

Dependence¹: ±2.5 dB² ±1.5 dB² ±0.5 dB³

71452B: ±0.05 dB from 1542 to 1562 nm³
±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 dBm

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

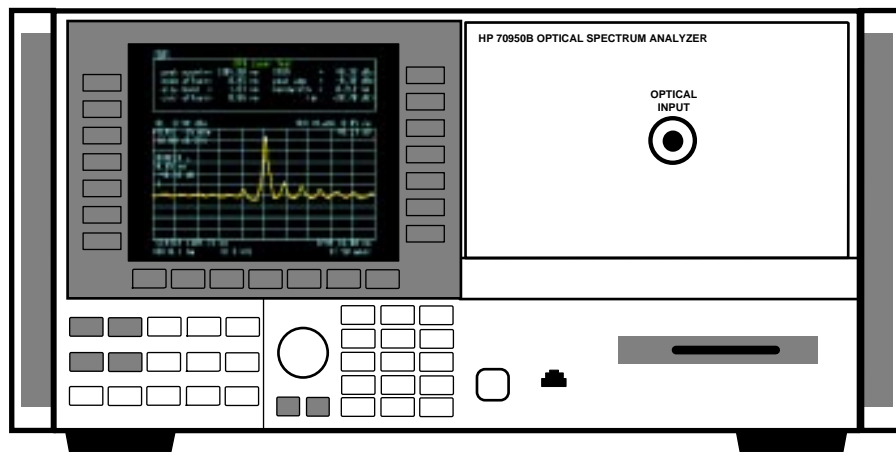
⁴Signal value ≥6 times the RMS noise value

⁵To within 15 dB of the sensitivity noise limit

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

Technical Specifications

**Spectral Measurements
from 600 to 1700 nm**



The HP 71450B, 71451B, and 71452B are diffraction-grating-based optical spectrum analyzers that provide spectral measurements of optical power versus wavelength and advanced functions for measuring and characterizing optical components, amplifiers, LEDs, DFB lasers, and Fabry-Perot lasers.

This technical specifications sheet describes the measurement accuracy and operating conditions of the HP family of optical spectrum analyzer systems. The HP 71450B includes an HP 70950B module, the HP 71451B includes an HP 70951B module and the HP 71452B includes an HP 70952B module.

The **specifications** apply to all functions autocoupled over the temperature range 0 to 55° C and relative humidity <95% (unless otherwise noted). All specifications apply after the instrument's temperature has been stabilized after 1 hour continuous operation and the auto-align routine has been run. Unless otherwise noted, specifications apply without USER CAL.

Characteristics and Specifications

The distinction between specifications, *characteristics (shown in italicized text)*, typical performance, and nominal values is described as follows:

- **Specifications** describe warranted performance.
- **Characteristics** provide useful, but nonwarranted information about the functions and performance of the instrument.
- **Typical Performance**, where listed, is not warranted, but indicates performance which most units will exhibit.
- **Nominal Value** is an expected, but not warranted, value of the parameter.

Specifications for the HP Family of Optical Spectrum Analyzers

	HP 71450B	HP 71451B	HP 71452B
Wavelength			
Range	600 to 1700 nm		
Span range (continuously variable)	0.2 nm-full range and zero span		
Absolute accuracy ¹	±1 nm		
Absolute accuracy ¹ (after user cal)	±0.3 nm	±0.3 nm	±0.2 nm
Absolute accuracy ^{1,2} (after user calibration within 40 nm of Cal signal)			±0.05 nm
Multimode fiber (62.5 μm) coupling uncertainty ²	≤0.3 nm		not applicable
Span linearity ^{1,2}	±0.05 nm, for spans <40 nm		
Span linearity ^{1,2} (1530 nm to 1570 nm)			±0.02 nm
Reproducibility (1 minute)	±0.005 nm		
Reproducibility ^{1,2} (1 minute)			±0.001 nm
Tuning repeatability	±0.005 nm		
Settability	±0.005 nm		
Readout resolution ²	span/trace length		
Resolution Bandwidth¹			
FWHM	<0.08 and 0.1 to 10 nm in a 1,2,5 sequence		
FWHM of <0.08 nm setting ²			0.065 nm ±15%
Resolution accuracy ≥0.5, 1250 to 1600 nm	±20%		
0.1 to 10 nm, 600 to 1700 nm ²	±30%		
Corrected bandwidth accuracy for noise markers:			
≥0.5 nm, 1250 to 1600 nm	±3%		
0.2 nm ² , 1250 to 1600 nm			±5% (characteristic)
0.2 nm, 1250 to 1600 nm			Option 122 specifies ±5%
Amplitude			
Calibration accuracy ^{1,6} at -30 dBm, 1300 nm	±0.5 dB		
Scale fidelity ⁵ autorange off (sample detector)	±0.1 dB		±0.05 dB
autorange on (sample detector)	±0.2 dB		±0.07 dB
Display resolution log	0.01 dB		
linear	0.23% of measurement +0.01% of reference level		
Display scale	0.01 to 20 dB/div log in 0.01 dB steps, and linear		
Flatness			
1290 to 1330 nm ¹	±0.25 dB	±0.25 dB	±0.25 dB
1530 to 1570 nm ¹	±0.25 dB	±0.25 dB	±0.2 dB
1250 to 1600 nm ¹	±1 dB	±1 dB	±1 dB
750 to 1600 nm ^{2,8}	±1.5 dB	±1.5 dB	±1.5 dB
600 to 1700 nm ^{2,8}	±2 dB	±2 dB	±2 dB
Polarization dependence ^{1,6}			
1250 to 1600 nm	±0.5 dB		
1300 to 1320 nm	±0.5 dB	±0.125 dB	
1542 to 1562 nm	±0.5 dB	±0.05 dB	
750 to 1600 nm ²	±1.5 dB		
600 to 1700 nm ²	±2.5 dB		
Sensitivity⁴			
600 to 750 nm (second order only)	-60 dBm		
750 to 900 nm (second order)	-75 dBm		
750 to 900 nm (first order)	-65 dBm		
900 to 1200 nm	-75 dBm		
1200 to 1600 nm	-90 dBm		
1600 to 1700 nm ³	-80 dBm		

Specifications for the HP Family of Optical Spectrum Analyzers

(continued)

	HP 71450B	HP 71451B	HP 71452B
Dynamic Range¹			
Excluding multiple order grating responses In 0.1 nm resolution 600 to 1700 nm		-50 dB $\geq \pm 1$ nm	
In 0.1 nm resolution 1250 to 1600 nm		-55 dB $\geq \pm 0.5$ nm -60 dB $\geq \pm 1$ nm	
<i>Chop mode on²</i>		-70 dB at ± 0.5 nm, ± 1 nm, ± 5 nm	
HP 71452B Option 122			
Excluding multiple order grating responses 1250 to 1600 nm			
In 0.2 nm resolution			-58 dB $\geq \pm 0.5$ nm
In 0.2 nm resolution			-65 dB $\geq \pm 1$ nm
In 0.1 nm resolution ²			-60 dB $\geq \pm 0.4$ nm
In 0.1 nm resolution ²			-65 dB $\geq \pm 0.8$ nm
Input Power			
0.05 dB compression level, within selected resolution		≥ 10 dBm	
<i>Maximum displayed level²</i>		≥ 15 dBm	
Maximum safe input level		+20 dBm per 5 nm, +30 dBm total	
Input Return Loss			
With PC or HMS-10/HP connector 9 μ m		>35 dB >50 dB (internal reflections)	
<i>Maximum limited by input fiber size</i>			
50 μ m ²		>28 dB	not applicable
62.5 μ m ²		>26 dB	not applicable
Sweep Time^{2,9}			
<i>Maximum sweep rate</i>		40 nm/50 ms	
<i>Maximum sweep rate in zero span</i>		50 μ s/trace point	
<i>Sweep cycle time</i>			
50 nm span, auto zero off		<180 ms	
50 nm span, auto zoom		<340 ms	
500 nm span, auto zero on		<650 ms	
-80 dBm sensitivity, 30 nm span, auto zero on		<2 s	
-90 dBm sensitivity, 30 nm span, auto zero on		<35 s	
full span, auto zoom		<1 s	
Pulse Mode			
Turn On >2 μ s pulse width		± 0.2 dB ²	
Turn Off >10 μ s pulse width and 27 dB extinction		± 0.2 dB ²	± 0.2 dB
Signal-to-Noise⁷ CW			
		± 0.63	± 0.18
Pulse Mode		± 0.68	± 0.29

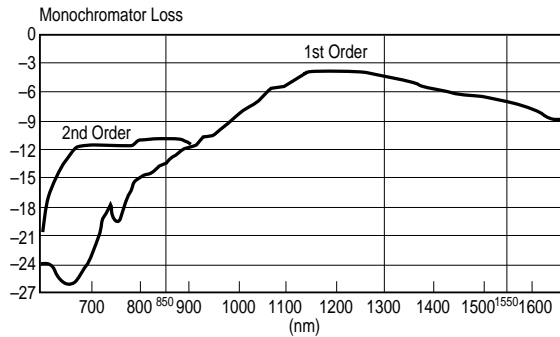
Additional Specifications for the HP 71451B (HP 70951B)

Monochromator Insertion Loss: (into 62.5 μm fiber)

(See characteristic plot)*

850 nm	<19 dB
1300 nm	< 7 dB
1550 nm	<10 dB
Maximum input port	+20 dBm per 5 nm; +30 dBm total

Characteristic Monochromator Loss



* Second order is selected when the stop wavelength is at or below 900 nm and resolution is <10 nm.

Monochromator Output (into 62.5 μm fiber)

Polarization dependence, for resolutions ≥ 0.2 nm		
	1250 to 1600 nm	± 0.5 dB ³
	700 to 1600 nm ²	± 1.5 dB
	600 to 1700 nm ²	± 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 dBm ¹ (ref to 1300 nm)		
	20°C to 30°C	± 0.35 dB
	0°C to 55°C	± 0.5 dB
Maximum safe power level		+20 dBm
1 dB compression level		$\geq +7$ dBm
Scale fidelity for ≤ 2 dBm inputs ⁵		
for any measurement with fixed reference level		± 0.1 dB
for multiple measurements with different reference levels		± 0.2 dB
Display resolution		
log		0.01 dB
linear		0.23% of measurement +0.01% of reference level

Power range (up to 50 dB in any reference level setting)	1250 to 1600 nm	600 to 1700 nm
Maximum displayed level ²	10 dBm	10 dBm
Sensitivity	-95 dBm	-85 dBm
Flatness (for ≥ 2 dBm input) ¹	± 0.4 dB	± 2 dB

Transimpedance Input

Current range	0 to -10 mA
Maximum current	± 10 mA
Maximum voltage	± 10 V

Optional Current Source (Option 001)

Current Output

Range	0 to ± 200 mA (source or sink)
Resolution	50 μ A steps
Accuracy	$\pm 2\%$ ± 50 μ A
Clamp voltage (nominal)	± 2.7 V
Noise density at 1 kHz ²	< 4 nA/ $\sqrt{\text{Hz}}$
Stability within 30 minutes ²	< 100 ppm ± 500 nA
Temperature drift ²	$< (100 \text{ ppm } \pm 500 \text{ nA}) / ^\circ\text{C}$

Pulse Mode

Pulse range	10 μ s to 6.5 ms
Pulse resolution	100 ns
Duty cycle range	pulse width/1 s to 100%

Optional Built-In White Light Source (Option 002)

Light Source Output

Wavelength	900 to 1700 nm
Minimum output power spectral density (9/125 μ m fiber)	
	900 to 1600 nm -67 dBm/nm (0.2 nW/nm)
	900 to 1600 nm (typical) -64 dBm/nm (0.4 nW/nm)
	1600 to 1700 nm -70 dBm/nm (0.1 nW/nm)
Minimum output power spectral density ²	
	50/125 μ m fiber -50 dBm/nm (10 nW/nm)
	62.5/125 μ m fiber -46 dBm/nm (25 nW/nm)
Output stability ²	± 0.02 dB over 10 minutes
Lamp lifetime ²	Mean time between failures (MTBF) > 5000 hours

Stimulus Response System Specifications

Passive Optical-To-Optical Devices		1250 to 1600 nm 9/125 μ m fiber	900 to 1700 nm 62.5/125 or 50/125 μ m fiber
Measurement range	10 nm RBW	0 to 33 dB (36 dB typical)	0 to 30 dB
Dynamic range ²	10 nm RBW 10 nm RBW 0.5 to 10 nm RBW	36 dB	0 to 40 dB (1000 to 1600 nm) 24 dB (900 to 1000 nm) 36 dB (1000 to 1600 nm) 9 dB (1600 to 1700 nm)
Measurement accuracy		± 0.1 dB	± 0.2 dB
Optical-To-Electrical Devices			
(With HP 71451B or HP 70951B OSA)			
Minimum responsivity ² , Rshunt $> 1\text{M}\Omega$	0.01 A/W	0.01 A/W	
Accuracy ²		± 0.9 dB	± 0.9 dB

Optional Swept Polarization Dependent Loss Kit (Option 003)

Swept PDL System Specifications		1250 to 1600 nm
(with HP 71451B or HP 70951B OSA containing Option 002 built-in white light source)		
Accuracy	0/0 devices (external photodetector)	+0.1/–0.05 dB
	0/0 devices (internal photodetector) ²	+0.2/–0.1 dB
	O/E devices ²	+0.075/–0.025 dB
Polarizer extinction ratio	Measurement range ²	0 to 30 dB

General Specifications

Inputs/Outputs		
Optical input (HP 70950B or HP 70951B)	Multimode fiber, standard	
Optical input (HP 70952B)	9 μm fiber	
Optical output (HP 70951B)	62.5 μm fiber	
Optical connectors	FC/PC standard; other interface adapters available	
Rear panel connectors	SMB (electrical)	
Dimensions		
HP 71450B, 71451B or 71452B	222 mm high x 425.4 mm wide x 526 mm long (8.75 in x 16.75 in x 20.7 in)	
HP 70950B, 70951A or 70952B	Standard 4/8-width module	
Weight		
HP 71450B, 71451B or 71452B	28 kg (61.6 lb)	
HP 70950B, 70951A or 70952B	8 kg (17.6 lb)	
Environmental	Operational	Storage
Temperature	0°C to +55°C	–40°C to +71°C
Humidity	<95% R.H.	Noncondensing
Shock and vibration	Tested to MIL-T-28800D class 5 par. 3.7.4, 3.7.5.2 and 3	
EMI	Conducted and radiated interference is in compliance with CISPR Pub 11, FTZ526/527/79, and MIL-STD 461B part 7 CE03(AF) and RE02	
Power Requirements		
HP 71450B, 71451B or 71452B		
Voltage and frequency	87 to 132 VAC, 47 Hz to 66 Hz and 356 Hz to 444 Hz 174 to 264 VAC, 47 Hz to 66 Hz	
Maximum power	260 watts max (350 VA max)	

Definition of Terms

Wavelength

- *Absolute Accuracy (after user cal)* refers to the wavelength accuracy after the user has performed the internal wavelength calibration using a source of known wavelength.
- *Multimode Fiber Coupling Uncertainty* refers to additional wavelength error which can occur from the loss of control of the image size and angle that the light is launched into the OSA. Multiple angles are a result of the multimoding in the larger fiber.
- *Differential Accuracy* indicates the maximum error in measuring the wavelength difference between two signals that are within the specified separation.
- *Reproducibility* refers to the amount of wavelength drift which can occur over the specified time while the OSA is tuned to a specific wavelength.
- *Tuning Repeatability* refers to the wavelength accuracy of returning to a wavelength after having tuned to a different wavelength.

Resolution

- *FWHM* refers to the Full-Width-Half-Maximum resolutions that are available. This indicates the width at half power level of the signal after passing through the resolution slits.

Amplitude

- *Scale Fidelity* refers to the potential errors in amplitude readout at amplitudes other than at the calibration point. This specification is sometimes called linearity.
- *Flatness* defines a floating band which describes the error in signal amplitude over the indicated wavelength range. (This error may be removed at a given wavelength by performing the user amplitude calibration.)
- *Polarization Dependence* refers to the amplitude change that can be seen by varying the polarization of the light entering the OSA. This is not to be confused with amplitude variations caused by the varying distribution of energy between the different modes in fiber that are multimode at the wavelength of interest.

Sensitivity

- *Sensitivity* is defined as the signal level that is equal to six times the RMS value of the noise. Displayed sensitivity values are nominal. Slightly lower values may have to be entered to achieve specified sensitivity.

Dynamic Range

- *Dynamic Range* is a measure of the ability to see low-level signals that are located very close (in wavelength) to a stronger signal. In electrical spectrum analyzers, this characteristic is generally called shape factor.

Sweep Time

- *Maximum Sweep Rate* refers to the maximum rate that the instrument is able to acquire data and display it. This rate may be limited by multiple internal processes.
- *Sweep Cycle Time* refers to the time required to make a complete sweep and prepare for the next sweep. It can be measured as the time from the start of one sweep to the start of the next sweep.

Photodetector Input

- *Scale Fidelity: For any measurement with fixed Reference Level* refers to the maximum error in a single power measurement. It also refers to the maximum error in the difference between two power measurements where the reference level was not changed between the measurements.
- *Scale Fidelity: For Multiple Measurements with Different Reference Levels* refers to the maximum error between two measurements when the reference level must be changed between the measurements.

¹ With applied input fiber 9/125 μm

² Characteristic

³ Temperature range 20°C to 30°C

⁴ Signal value >6 times the RMS noise value

⁵ To within 20 dB of the sensitivity noise limit

⁶ For resolutions ≥ 0.2 nm

⁷ Calculated from specified values; 1.15 x RSS of polarization sensitivity, scale fidelity, RBW accuracy, (and step response accuracy in pulse mode).

⁸ With applied input fiber that is standard single mode at wavelength of interest

⁹ Sweep cycle time includes forward sweep time plus overhead between sweeps.

Ordering Information

Available Options	HP 71450B HP 70950B	HP 71451B HP 70951B	HP 71452B HP 70952B
Option 001 Built-in programmable current source	yes	yes	yes
Option 002 Built-in white light source	yes	yes	yes
Option 003 Swept PDL kit	not available	yes	not available
Option 010 Delete FC/PC interface	yes	yes	yes
Option 051 EDFA interpolation test personality	yes	yes	included
Option 052 EDFA time domain test personality	yes	yes	included
Option 053 EDFA noise gain profile measurement personality	yes	yes	included
Option 122 Improved dynamic range and noise marker accuracy	No	No	Yes

Additional Interface Connectors:

HP 81000AI Diamond HMS-10
 HP 81000GI D4
 HP 81000KI SC
 HP 81000SI DIN 47256
 HP 81000VI ST
 HP 81000WI Biconic
 HP 81000FB FC/PC Bare fiber adapter

For more information about Hewlett-Packard test and measurement products, applications, services, and for a current sales office listing, visit our web site, <http://www.hp.com/go/tmdir>. You can also contact one of the following centers and ask for a test and measurement sales representative.

United States:

Hewlett-Packard Company
 Test and Measurement Call Center
 P.O. Box 4026
 Englewood, CO 80155-4026
 1 800 452 4844

Canada:

Hewlett-Packard Canada Ltd.
 5150 Spectrum Way
 Mississauga, Ontario
 L4W 5G1
 (905) 206 4725

Europe:

Hewlett-Packard
 European Marketing Centre
 P.O. Box 999
 1180 AZ Amstelveen
 The Netherlands
 (31 20) 547 9900

Japan:

Hewlett-Packard Japan Ltd.
 Measurement Assistance Center
 9-1, Takakura-Cho, Hachioji-Shi,
 Tokyo 192, Japan
 Tel: (81) 426 56 7832
 Fax: (81) 426 56 7840

Latin America:

Hewlett-Packard
 Latin American Region Headquarters
 5200 Blue Lagoon Drive, 9th Floor
 Miami, Florida 33126, U.S.A.
 Tel: (305) 267-4245
 (305) 267-4220
 Fax: (305) 267-4288

Australia/New Zealand:

Hewlett-Packard Australia Ltd.
 31-41 Joseph Street
 Blackburn, Victoria 3130, Australia
 1 800 629 485

Asia Pacific:

Hewlett-Packard Asia Pacific Ltd.
 17-21/F Shell Tower, Times Square,
 1 Matheson Street, Causeway Bay,
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 Fax: (852) 2506 9285