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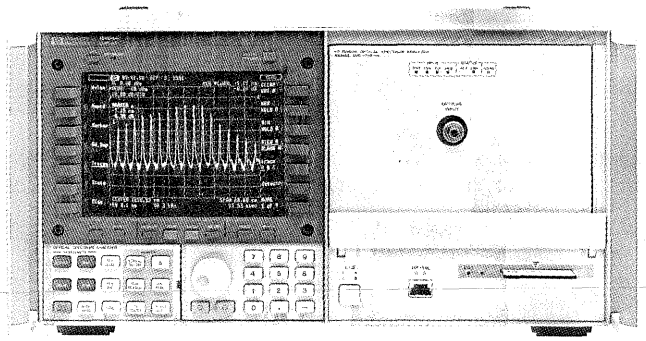
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LIGHTWAVE TEST EQUIPMENT

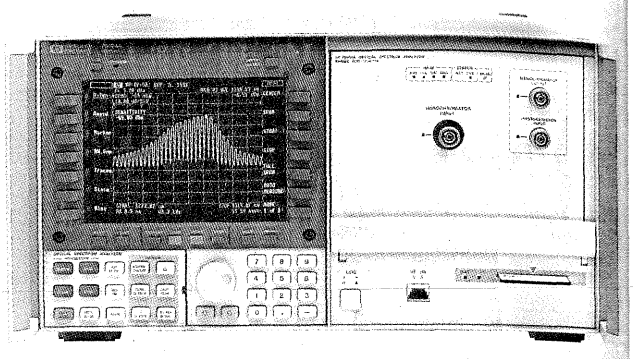
Optical Spectrum Analyzers, 600 nm to 1700 nm

HP 71450A, 71451A

- Spectral measurements from 600 to 1700 nm
- Unique double-pass monochromator
- Real-time sweep rates
- −85 dBm sensitivity and 60 dB dynamic range
- Excellent amplitude accuracy, low polarization dependency
- Wavelength and amplitude calibration across full measurement range
- Optional current-source output
- Five modes of operation (HP 71451A)



HP 71450A



HP 71451A

DESIGNED FOR HP-IB SYSTEMS

HP 71450A and 71451A Optical Spectrum Analyzers

The HP 71450A and 71451A 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 −85 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

The features of an electrical spectrum analyzer are found in the HP 71450A and 71451A. 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.

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 256 KB or optional 1 MB memory, stored on a memory card, or sent over HP-IB to an external disk drive.

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

Five Modes of Operation with the HP 71451A

The HP 71451A 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 71451A to be operated in five modes.

- OSA mode provides basic optical spectrum analysis with precise amplitude accuracy and less than ±0.5 dB polarization sensitivity.
- Preselector mode allows front-panel output of light that has passed through the monochromator. Wavelength-division multiplexed channels, individual modes of Fabry-Perot lasers, and selected widths of LEDs or white light sources can be output on 62.5 μm fiber.
- Stimulus-response mode allows you to take the output light from the monochromator, pass it through a device or filter, and then reinsert it into the analyzer for spectral analysis.
- Power-meter mode offers direct access to the photodetector. In this mode, a trace of average power versus time is displayed, allowing you to log amplitude changes over time. Long-term drift can be monitored, and a digital readout of power is provided.
- Photodetector mode allows access to the transimpedance amplifier input. With the monochromator also active, a white light source can quickly plot or display a photodetector's responsivity over the full spectral range of the optical spectrum analyzer.

Specifications

Wavelength

Range: 600 to 1700 nm
Span Range (contin. variable): 0.2 nm to full range
Absolute Accuracy[1]**:** ±1 nm
Absolute Accuracy[1] (after user cal): ±0.5 nm
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
Readout Resolution[2]**:** Span/trace length

Resolution[1]

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%

Amplitude (for resolutions ≥0.2 nm)

Calibration Accuracy[1] **at −30 dB, 1300 nm:** ±0.5 dB
Scale Fidelity, sensitivity in Auto: ±0.1 dB
sensitivity in Manual: ±0.2 dB
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 Dependence[1]**:**	±2.5 dB[2]	±1.5 dB[2]	±0.5 dB[3]

Sensitivity[4]

600 to 750 nm: −65 dBm
750 to 1100 nm: −75 dBm
1100 to 1600 nm: −90 dBm
1600 to 1750 nm[3]**:** −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 Loss[1]

With PC or HMS-10/HP Connector: > 14 dB + 2 times monochromator loss

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

Additional Specifications for the HP 71451A

Monochromator Insertion Loss

1350 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 Dependence[1]**, for Resolutions ≥0.2 nm**
1250 to 1600 nm: ±0.5 dB[3]
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 dBm[1] (ref to 1300 nm): ±0.25 dB
Maximum Safe Power Level: +20 dBm
1 dB Compression Level: ≥7 dBm
Scale Fidelity on Screen[5] **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
Flatness[1] (for ≤3 dBm inputs):	±2.0 dB[3]	±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 71451A): 62.5 μm fiber
Optical Input: 62.5 μm fiber, standard; 9 μm fiber, Opt 009
Optical Connectors: FC/PC standard; other interface adapters available
Rear Panel Connectors: SMB (electrical)
Size: 222 mm H × 425.4 mm W × 526 mm D (8.74 in H × 16.75 in W × 20.7 in D)

Weight

HP 71450A, 71451A: 28 kg (61.6 lb)
HP 70950A, 70951A: 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

HP 71450A Optical Spectrum Analyzer
- **Opt 001** Built-in Programmable Current Source
- **Opt 002** Built-in White Light Source
- **Opt 009** 9 μm Input Connector
- **Opt 010** Delete FC/PC Connector Interface
- **Opt 051** EDFA Test Personality

HP 71451A Optical Spectrum Analyzer
- **Opt 001** Built-in Programmable Current Source
- **Opt 002** Built-in White Light Source
- **Opt 003** Swept PDL Kit
- **Opt 009** 9 μm Input Connector
- **Opt 010** Delete FC/PC Connector Interface
- **Opt 051** EDFA Test Personality

HP 70950A Optical Spectrum Analyzer Module
- **Opt 001** Built-in Programmable Current Source
- **Opt 002** Built-in White Light Source
- **Opt 009** 9 μm Input Connector
- **Opt 010** Delete FC/PC Connector Interface
- **Opt 051** EDFA Test Personality

HP 70951A Optical Spectrum Analyzer Module
- **Opt 001** Built-in Programmable Current Source
- **Opt 002** Built-in White Light Source
- **Opt 003** Swept PDL Kit
- **Opt 009** 9 μm Input Connector
- **Opt 010** Delete FC/PC Connector Interface
- **Opt 051** EDFA Test Personality

Additional Interface Connectors

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

[1]With applied input fiber 9/125 μm
[2]Characteristic
[3]Temperature range 20° to 30° C
[4]Signal value ≥6 times the RMS noise value
[5]To within 15 dB of the sensitivity noise limit

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 654.

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