

LIGHTWAVE TEST EQUIPMENT

Lightwave Multimeter

HP 8153A

- User-exchangeable plug-in modules for tailor-made measurements
- Traceable to NIST and PTB for accurate absolute power measurements
- Installed application software for standard measurements without external controller

- Dump to printer and dump to plotter for easy documentation
- Measurement of absolute power, insertion loss, and return loss
- Solutions for parallel-beam, unpackaged-chip, connectorized, and bare-fiber measurements



HP 8153A

HP 8153A Lightwave Multimeter

High Flexibility through Modular Design

The HP 8153A lightwave multimeter main-frame offers two slots for plug-in modules. Since modules can be combined in any configuration, the instrument can be used as a 1/2-channel power meter, as a 1/2-channel light source, as a loss test set, or even as a return-loss test set.

Power Sensor Modules with High Accuracy and Sensitivity

Four different power sensor modules, with different sensitivities from -70 dBm down to -110 dBm, cover the 450 nm to 1700 nm wavelength range. Each is individually calibrated over its entire wavelength range and is traceable to NIST and PTB for precise optical power measurements. Their excellent linearity and the high stability of the source

modules provide the basis for precise determination of optical insertion loss for both single-mode and multimode components.

Stabilized Laser- and LED-Source Modules

The source modules offer very good short-term and long-term stability. The high output power can be internally attenuated by up to 6 dB. All sources output CW or pulse-modulated light (internal modulation at 270 Hz, 1 kHz, or 2 kHz).

Return-Loss Measurements with Unsurpassed Accuracy

By calibrating directly at the connector under test using the HP 81000BR reference reflector, an exceptional accuracy is achieved: ± 0.4 dB for return-loss measurements over a dynamic range of 50 dB (± 0.65 dB between 50 dB and 60 dB). The reference reflector is a gold-plated connec-

tor capable of providing a 96 percent reflection with just ± 2 percent uncertainty. Unwanted reflections in front of the DUT can also be calibrated and compensated for. Both steps require just the push of a button.

Built-In Software for Advanced Applications

Without the need for an external controller, long-term power, insertion loss, or return-loss monitoring up to 100 hours can be performed. For easy documentation, the measured curves can be dumped to the HP ThinkJet or to any HP-GL plotter. Automatic loss measurements can be made simultaneously at 2 wavelengths. Procedures to maximize the amount of coupled light are supported as well.

Optical Heads Featuring Large-Area Detectors

The HP 81520A and HP 81521B optical heads and their various accessories offer elegant solutions for every sophisticated measurement. They can be used for high-precision power measurements in both parallel-beam and connectorized applications. Together with the HP 81230FL attenuating lens adapter, they can easily be used to perform calibrated absolute power measurements on unpackaged laser chips or LED chips. The HP 81000BA bare-fiber adapter facilitates interfacing to a fiber pigtail with a typical repeatability of less than 0.02 dB. For A/B relative power measurements or power monitoring during a bit error rate test, the HP 81000BS optical power splitter offers both low insertion loss and low polarization sensitivity. For more detailed information about accessories and specification, see the *Lightwave Test and Measurement Catalog*.

Sensor Module Specifications

	HP 81530A	HP 81536A	HP 81531A	HP 81532A	HP 81533A + 81520A	HP 81533A + 81521B
Sensor element	Si	InGaAs			Si	Ge
Wavelength range	450 to 1020 nm	800 to 1700 nm			450 to 1020 nm	900 to 1700 nm
Power range	+3 to -110 dBm	+3 to -70 dBm	+3 to -90 dBm	+3 to -110 dBm	+10 to -100 dBm	+3 to -80 dBm
Display resolution (dB)	0.001 dBm, 0.001 dB (0.0001 dB/dBm on printout)					
Display resolution (W)	0.01 pW	100 pW	1 pW	0.01 pW	0.1 pW	10 pW
Applicable fiber type	9/125 to 100/140 μ m, (NA ≤ 0.3)				Parallel beam, 9/125 to 100/140 μ m (NA ≤ 0.3)	
Accuracy (at ref. cond.)	$\pm 2.5\%$ (600 to 1020 nm)	$\pm 2.5\%$ (1000 to 1650 nm)			$\pm 2.2\%$ (600 to 1020 nm)	$\pm 2.2\%$ (1000 to 1650 nm)
Total uncertainty	$\pm 5\% \pm 0.5$ pW (600 to 1020 nm)	$\pm 5\% \pm 50$ pW (1000 to 1650 nm)	$\pm 5\% \pm 1.5$ pW (1000 to 1650 nm)	$\pm 5\% \pm 0.5$ pW (1000 to 1650 nm)	$\pm 4\% \pm 0.5$ pW (600 to 1020 nm)	$\pm 4\% \pm 50$ pW (1000 to 1650 nm)
Linearity 18° to 28° C, const. temp. 0° to 55° C, const. temp.	± 0.015 dB ± 0.3 pW ± 0.05 dB ± 0.5 pW	± 0.015 dB ± 30 pW ± 0.05 dB ± 50 pW	± 0.015 dB ± 1 pW ± 0.05 dB ± 1.5 pW	± 0.015 dB ± 0.3 pW ± 0.05 dB ± 0.5 pW	± 0.04 dB ± 0.5 pW ± 0.15 dB ± 0.5 pW (+10 to -80 dBm)	± 0.04 dB ± 50 pW ± 0.15 dB ± 50 pW (+3 to -60 dBm)

The display may vary by ± 1 count, in -50 dBm range ± 3 counts.

Source Module Specifications

	81551MM	81552SM	81553SM	81554SM	81541MM	81542MM	81542MM Opt 001
Diode type	Laser	Laser	Laser	Laser	LED	LED	LED
Central wavelength (nm)	850 ± 10	1310 ± 20	1550 ± 20	1310/1550 ± 20	850 ± 30	1300 ± 40	1300 ± 40
Fiber type	50/125 μ m	9/125 μ m	9/125 μ m	9/125 μ m	50/125 μ m	50/125 μ m	62.5/125 μ m
Spectr. bandwidth	<1.5 nm	<2.5 nm	<4 nm	<2.5/4 nm	<90 nm	<90 nm	<90 nm
Output power	> -2 dBm	> 0 dBm	> 0 dBm	> -1 dBm	> -17 dBm	> -20 dBm	> -20 dBm
CW stability (15 min, T-const.)	± 0.01 dB	± 0.003 dB	± 0.003 dB	± 0.005 dB	± 0.003 dB	± 0.002 dB	± 0.002 dB