
HP 11982A Amplified Lightwave Converter

Product Overview

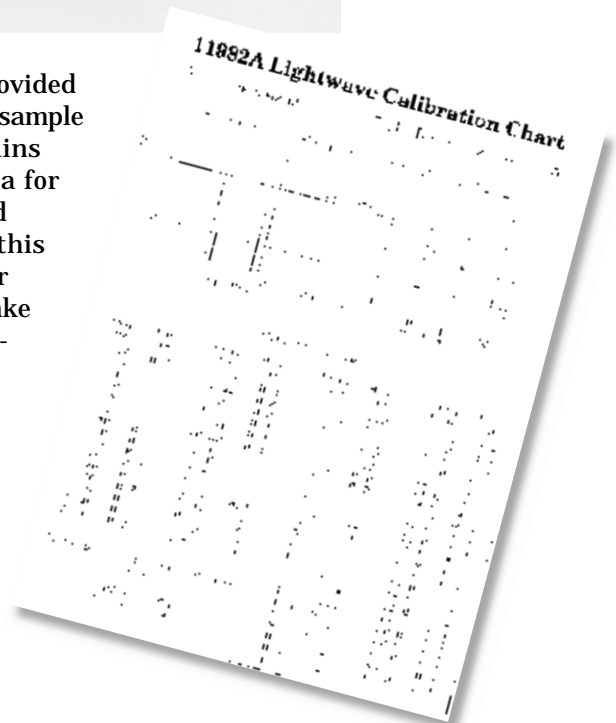
**Wide bandwidth,
sensitive O/E converter
for characterizing
lightwave systems and
components**



Hewlett-Packard's lightwave converter, the HP 11982A, combines a PIN photodetector with a low-noise preamplifier to provide a general-purpose front-end for lightwave frequency- and time-domain measurements. It can be used with HP spectrum analyzers, oscilloscopes, bit-error-rate testers (BERT), and network analyzers, as well as with other manufacturers' instrumentation.

The HP 11982A covers the wavelengths from 1,200 nm to 1,600 nm and bandwidths from dc to 15 GHz. Its 300 volts/watt conversion gain and 0.05% input optical reflection significantly improve sensitivity for characterizing lightwave systems and components.

A calibration chart is provided with each HP 11982A. A sample chart is shown; it contains instrument-specific data for frequency response and responsivity. Applying this calibration data to your system enables you to make corrected, accurate lightwave measurements.



Frequency Domain



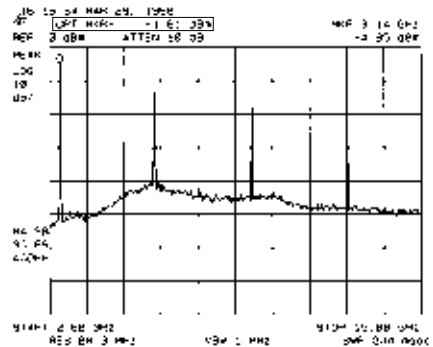
When used with an electrical spectrum analyzer, the HP 11982A displays optical modulation power as a function of frequency. Intensity modulation, distortion, and laser intensity noise can also be displayed and measured.

The laser's relaxation oscillation appears as a peaking in the intensity-noise floor of the laser. The location of this resonance peak is directly related to the maximum modulation rate of the laser. The 300 volts/watt conversion gain of the converter improves the frequency-domain sensitivity so that the relaxation oscillation frequency can be easily distinguished.

When a laser is modulated, its noise floor and modulation distortion products change dramatically. Often, knowing static noise performance is not enough to predict the effects of laser noise on the system. The HP 11982A and frequency-response corrections, combined with an HP electrical spectrum analyzer, help you accurately measure these changes and dynamically observe their effect.

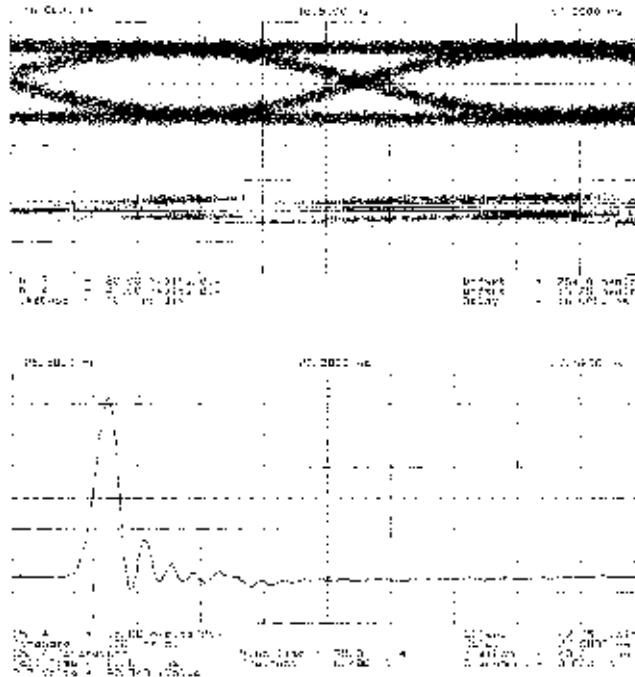
The HP 11982A Option 001 is a memory card that is programmed with HP 11982A frequency-response corrections and light-wave menus. Use it with the HP 8591A RF spectrum analyzer or HP 8593A microwave spectrum analyzer. Option 001 lets you load correction data and menus directly into the spectrum analyzer, enabling easy, accurate, and corrected measurements to 22 GHz.

The HP 83810A, a complete light-wave signal analyzer, combines the HP 11982A, Option 001, the HP 8593A, an interconnect cable, and an N-type to SMA adapter to conveniently provide a calibrated frequency-domain lightwave measurement system.



Adding the HP 11980A fiber-optic Mach-Zehnder interferometer to the lightwave signal analyzer allows you to make linewidth, chirp, and frequency modulation (FM) measurements of single-line lasers.

Time Domain



Combining the dc-coupled HP 11982A with an HP 83480A Digital Communications Analyzer or HP 54750A High Speed Oscilloscope provides the capability for optical eye-pattern, extinction-ratio, and impulse-response measurements. Use these measurements to verify optical and electro-optic components, optical system-level performance, and standards testing (i.e. SONET/SDH, FDDI, and ISDN) on telecommunications signals.

Eye diagrams and extinction ratios help you to adjust your transmission system for the best qualitative performance. To make the most accurate measurements, the receiver systems require dc coupling, bandwidth, sensitivity, and variable and infinite persistence. DC coupling is essential for extinction-ratio measurements. Bandwidths typically must be at least four to five times the transmission data rate to reduce measurement errors. Eye diagrams cannot use the averaging feature of the oscilloscope to increase signal-to-noise ratios.

For best extinction ratio accuracy and repeatability, the HP 83480A, together with one of its broad range of optical plug-ins (HP 83481A, 83482A, 83485A/B, 83486A, 83487A) is recommended.

The presence of a preamplifier in front of the oscilloscope can be critical to boost the electrical signal detected by the photodiode above the oscilloscope's noise floor.

The variable and infinite persistence feature enables worst-case eye-pattern closure analysis without masking hidden low-probability tails.

You can also make impulse measurements such as full-width half-maximum (FWHM), jitter, overshoot, undershoot, and ringing. When measuring points in a communication system where signal levels are low, using an amplifier makes the difference between success or failure.

The HP 11982A provides dc coupling with 20 dB of electrical gain and 15 GHz of bandwidth. The HP 83480A Digital Communications Analyzer has a wide range of bandwidths, low jitter, and the averaging and persistence features you need to make time-domain measurements.

The HP 83480A gives you a wide range of time-domain characterization capabilities including automated eye-diagram measurements, auto-aligning SONET/SDH/Fibre Channel/Gigabit Ethernet Masks, repeatable extinction ratio measurements, and HP Eyeline mode for eye diagram analysis.

Specifications

Specifications describe the instrument's warranted performance over the 0°C to 55°C temperature range, except where noted. **Characteristics** provide information about non-warranted instrument performance in the form of nominal values. All amplitude specifications are in optical power units unless noted by an asterisk(*).

Specifications/Characteristics

Wavelength (characteristic)	1,200 nm to 1,600 nm	
Bandwidth (characteristic)	dc to 15 GHz (optical)	dc to 11 GHz (electrical)
Full Width Half Maximum (calculated from FWHM = 0.44/BW opt)	29.4 ps	
Conversion Gain (dc responsivity) ¹ (provided value accurate to ±20%)	>200 V/W	300 V/W, nominal
Noise Equivalent Power ² (characteristic)	30 pW√Hz	
Input Return Loss (characteristic with HMS 10/HP connector)	>23 dB	
Aberrations (characteristic)	<20% peak-to-peak	
Corrected Freq Response ³ dc–22 GHz	20–30°C ±2.2 dB*	0–55°C ±4.7 dB*
Harmonic Distortion Output <–10 dBm	>41 dB* below fundamental	
Maximum Safe Optical Input Power (average)	10 mW (+10 dBm)	
Maximum Operating Optical Input Power (peak)	1.5 mW (+1.76 dBm)	
Output Voltage Range (into 50 ohms)	>700 mV	
Output Offset Voltage (into 50 ohms)	<1 mV	

Output Electrical Return Loss	
0.1 to 12 GHz (characteristic)	>11 dB*
12 GHz to 22 GHz	>9 dB*

Inputs/Outputs

Optical Input Connector (front panel)	Single Mode Fiber Connectors: Diamond HMS 10/HP, FC/PC, ST Biconic, DIN
Output Connector (front panel)	APC 3.5, male, 50 ohms (nominal)

General

Environmental	
Temperature Range	Operational 0 to +55°C Storage –40 to +75°C
EMI	Conducted and radiated emission are in compliance with the requirements of FTZ 1046; CISPR Publication 11 (1975); and MIL-STD-461C, Part 7, Methods CE03 and RE02.
Power Requirements	100, 120, 220, or 240 volts (±10%), 47–63 Hz Power consumption <75VA
Weight	3.76 kg (8.4 lb)
Dimensions	102 mm (4.02") height, 213 mm (8.39") width, 368 mm (14.49") length

* Refers to electrical power units

¹ ± Connector variation

² = 3.7 μW in a 15 GHz bandwidth

³ Corrections are either downloaded into the HP 8593A spectrum analyzer or obtained from the calibration chart.

Ordering Information

HP 11982A⁴ Amplified Lightwave Converter

Option 001	Frequency Response Correction/Menus (for use with HP 8591A/8593A/8590B/8592B spectrum analyzers only)
Option 020	Re-calibration (tabular data only)
Option 021	Re-calibration (tabular data and memory card)
Option 090⁵	Firmware Upgrade for HP 8590B Spectrum Analyzer
Option 091⁵	Firmware Upgrade for HP 8591A Spectrum Analyzer
Option 092⁵	Firmware Upgrade for HP 8592B Spectrum Analyzer
Option 093⁵	Firmware Upgrade for HP 8593A Spectrum Analyzer

Recommended Accessories

HP 11980A	Fiber-Optic Interferometer
HP 11742A	Blocking Capacitor
HP 15475A	Cleaning Kit for Optical Surfaces
HP 5952-9654	Fiber-Optics Handbook
HP 87441	Family of SDH/SONET/Fibre Channel Filters

⁴ Must order one of the connector options listed below:

Option 011 Diamond HMS-10/HP Connector Interface

Option 012 FC/PC Connector Interface

Option 013 DIN 47265 Connector Interface

Option 014 ST Connector Interface

Option 015 Biconic Connector Interface

⁵ **Option 001** must also be ordered.

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>.

**Data Subject to Change
Copyright © 1990
Hewlett-Packard Company
Printed in U.S.A. 10/97
5966-1583E**