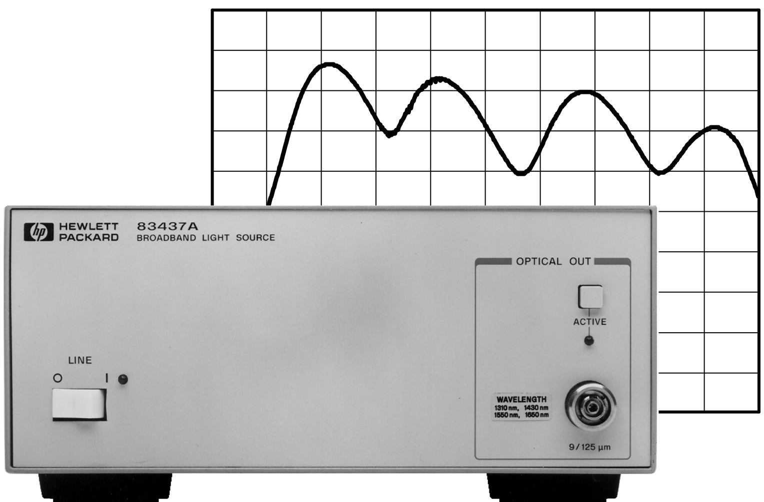
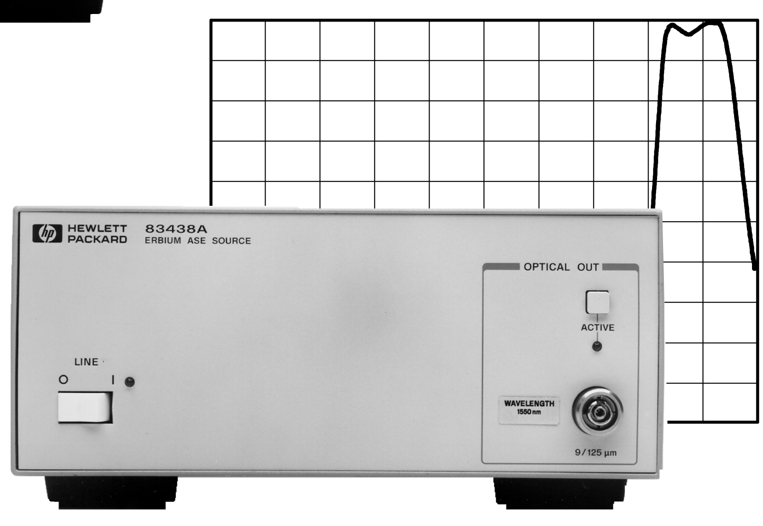
HP 83437A
Broadband Light Source

HP 83438A
Erbium ASE Source

Product Overview

Incoherent light sources for single-mode component and sub-system characterization



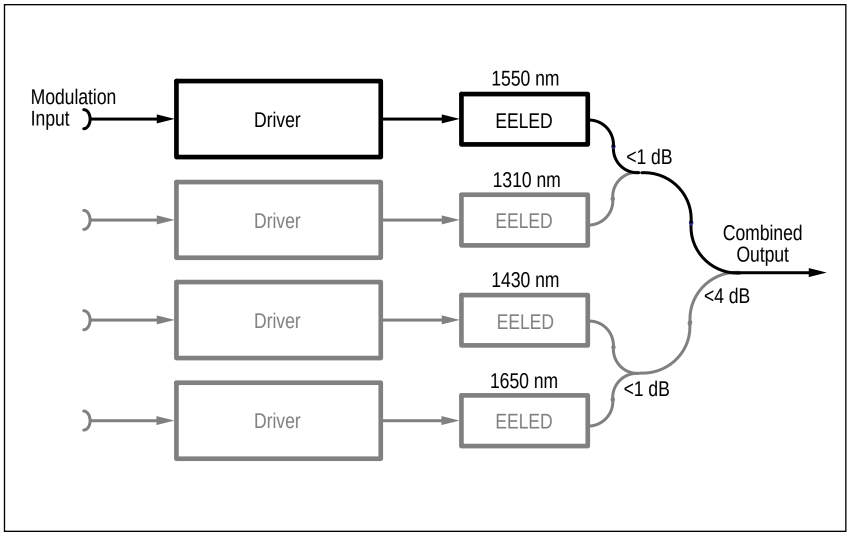


The Technology

The HP 83437A Broadband Light Source (BBLS) is based on HP's Edge-emitting LED (EELED) technology. An EELED provides significantly more power density into a single-mode fiber than a regular LED and more than one hundred times that of a white light source.

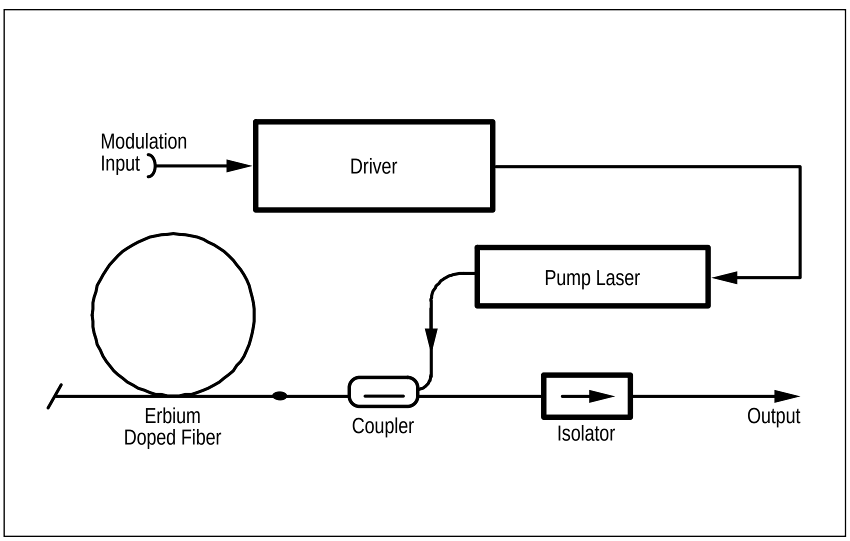
Built-to-order, the HP 83437A can incorporate up to four EELEDs, with five available wavelengths in the 1200 to 1650 nm range. Connectors on the back panel allow you to modulate the light by applying a TTL compatible signal, or to selectively turn any of the EELEDs on (open connection) or off (shorted).

In configurations with multiple EELEDs installed, optical couplers combine the light to a single output. In order to minimize coupler losses, HP uses wavelength-dependent and wavelength-independent couplers depending on the ordered configuration.



HP 83437A block diagram (shown with options 003, 004, and 006). Only the 1310/1550 and the 1430/1650 couplers are wavelength dependent to minimize the loss, all others are standard "3 dB" couplers.

Furthermore, an optional isolator and angled contact output connector help to increase the instrument's return loss for applications sensitive to reflections in the test setup.



HP 83438A block diagram

The HP 83438A Erbium ASE source emits amplified spontaneous emission (ASE) from an Erbium doped fiber. Such light is one hundred times stronger than an EELED, and ten thousand times stronger than a white light source. This makes it an ideal source for characterizing components with high losses (such as crosstalk or isolation).

A pump laser activates the fluorescence of the Erbium doped fiber. The modulation input allows on/off control or modulation up to 300 Hz for applications using lock-in techniques.

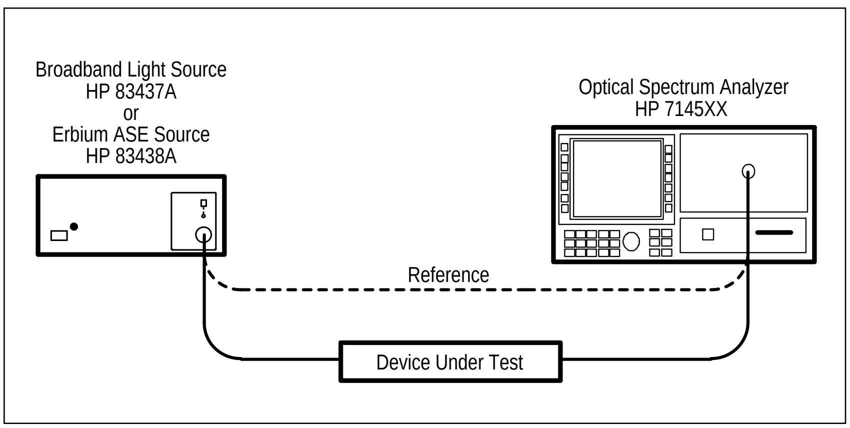
An optical isolator (standard in each instrument) protects the active fiber from backreflections from the device under test, which significantly improves the stability of this source. An angled contact output and a built-in polarizer are available as options.

Your Benefits

Respond to market pressure…

Manufacturers of fiberoptic components and subsystems are experiencing a dynamic and growing market. At the same time, competition is appearing from around the world. This increases the pressure on profit margins because production costs must fall while the devices become more complex. Per-unit test cost, as well as the initial investment in test instrumentation needs to be reduced.

Increase your productivity and competitiveness with more accurate tests and higher throughput.



Basic stimulus/ response setup

…with just the right equipment…

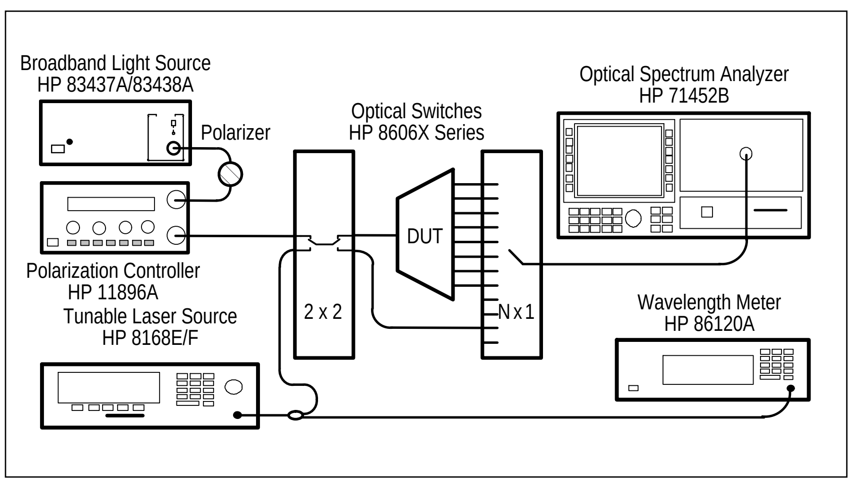
The JET philosophy (Just Enough Test) provides the right amount of light necessary for key component and subsystem tests (see next pages) without carrying excessive features or a complicated user interface.

…to improve the quality and the performance of *your* device…

Together with an optical spectrum analyzer (OSA), the HP 83437A or the HP 83438A will ensure that your device is accurately characterized. Reliable and repeatable measurements help to tighten margins, allowing you to sell a better product with greater profit due to a higher yield.

…while increasing throughput.

The significantly higher power density compared to white light and regular LED sources allow much faster OSA sweep times. Whether you need only a simple test versus wavelength or a complex characterization including polarization and other effects, test setups using these sources significantly reduce your total measurement time.

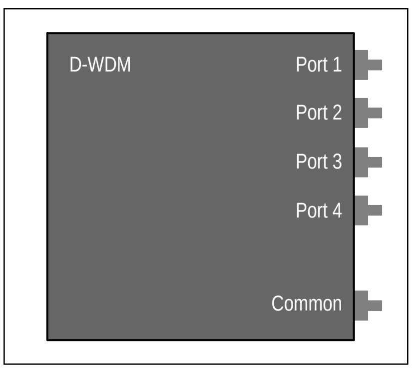


HP's fully customized systems (such as the HP 83464A series testing DWDM devices) help you to focus on your product while getting the measurements and the accuracy you need to be successful.

Stimulus/Response Applications

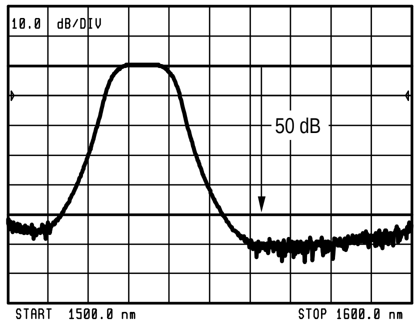
The performance of most passive optical components depend on wavelength, either within several nanometers or over a few hundred nanometers. If that is a critical parameter in the application of your component, then the HP 83437A or the HP 83438A is the perfect stimulus to probe the device under test and to characterize its wavelength dependence quickly with an optical spectrum analyzer.

Some parameters, such as isolation or crosstalk, may require a large measurement range of the test setup.



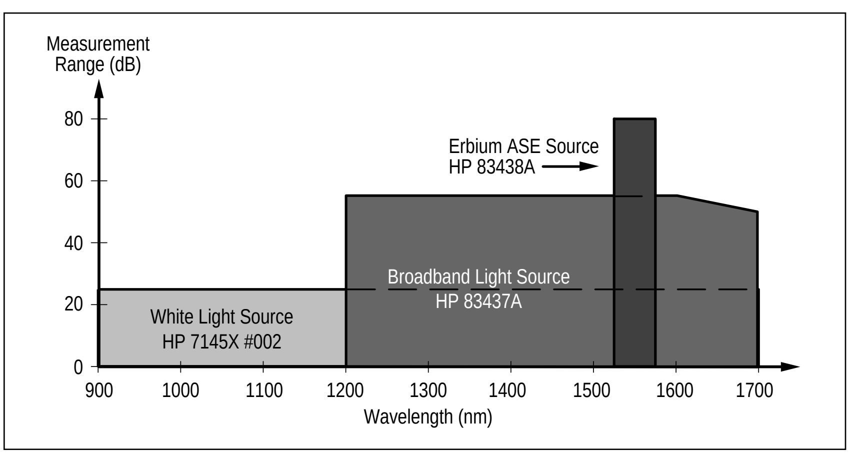
The HP 83438A has the power density necessary to characterize dense WDM (DWDM) components quickly.

The optical power from an HP 83438A Erbium ASE Source in conjunction with the sensitivity and selectivity of an HP 7145XB Optical Spectrum Analyzer stretch the available measurement range up to about 70 dB.

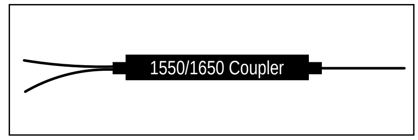


Filter characterization with an HP 83437A Broadband Light Source and an HP 7145XB Optical Spectrum Analyzer (OSA)

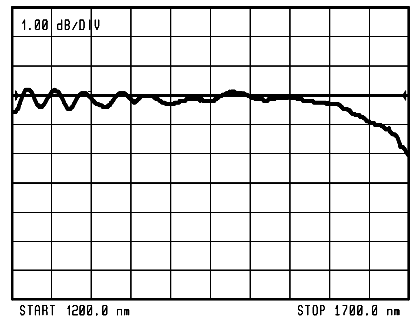
Because an HP 83437A equipped with four EELEDs provides more than one hundred times the power density of a white light source, even lossy devices can be comprehensively characterized over a wide wavelength range. Therefore, this source allows you to measure a greater variety of components.



Measurement range of incoherent sources in conjunction with an HP 7145X Optical Spectrum Analyzer at 1 nm resolution bandwidth (RBW). The measurement ranges shown increase and decrease by 10 dB for 10 nm and 0.1 nm RBW.

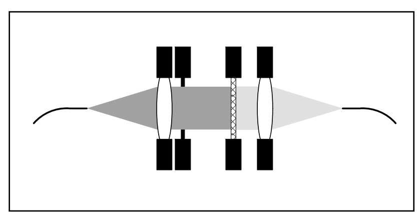


An HP 83437A with multiple EELEDs built-in allow you to characterize insertion loss, crosstalk and polarization dependence of single-mode components at standard as well as less common wavelengths.



Flatness of a 10 dB fixed attenuator measured over 500 nm

Furthermore, less averaging is necessary which drastically reduces the sweep time.



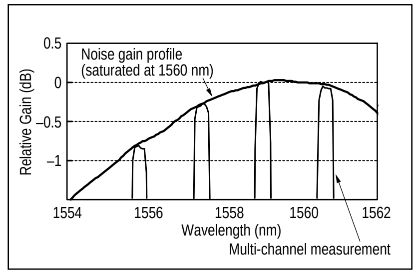
Wavelength dependence of materials (such as infrared filter disks) measured on an optical bench: when the HP 83437A or HP 83438A emit modulated light, the ADC AC trigger mode of the HP 7145XB OSA is able to significantly suppress ambient light.

Other Applications

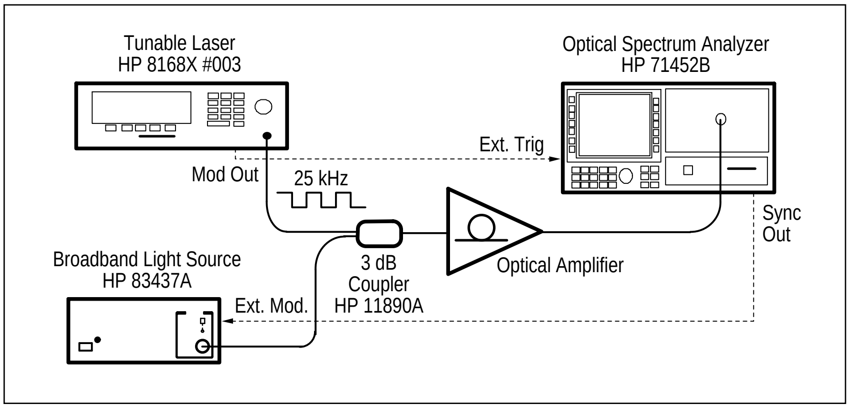
Noise Gain Profiles

DWDM systems transmit several signals around 1550 nm. If such a system incorporates optical amplifiers then it is essential to characterize them fully for their wavelength dependence.

HP has developed the new noise gain profile method, utilizing only a saturating source (such as a tunable laser) and a broad-band light source in order to gain information on how an optical amplifier performs in a WDM environment (for details, see HP product note 71452-3). This noise gain profile method allows you to measure the gain shape of the amplifier accurately enough to predict its performance in a 4, 8 or even 16 channel DWDM system.



The relative shape of the noise gain profile result correlates very well with a measurement using as many lasers as DWDM channels.



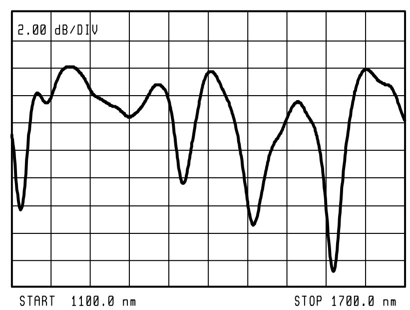
This simple setup measures the DWDM performance of an optical amplifier in a very repeatable way.

Polarization Mode Dispersion

The dispersion of optical energy in different states of polarization can limit the bandwidth of a fiberoptic cable or system. For systems transmitting 2.5 Gb/s or more, it is essential to know the polarization mode dispersion (PMD) of the cable to be installed. One common method is the wavelength-scanning technique.

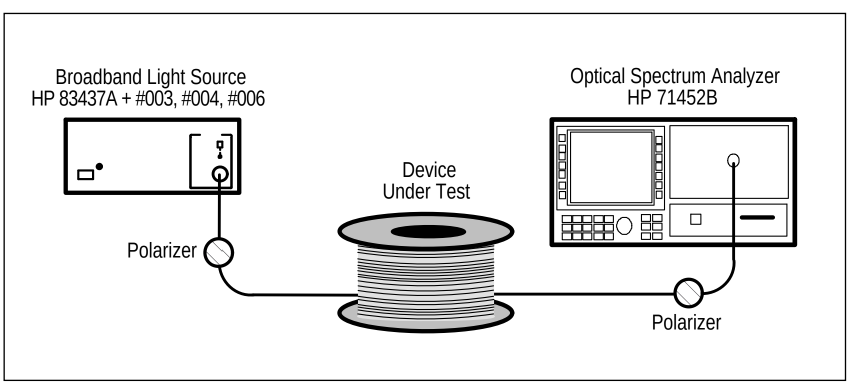
This technique uses an optical noise source, two polarizers and an optical spectrum analyzer.

In order to accurately characterize cable lengths typically used during deployment (few kilometers), it is necessary to probe the device under test (DUT) over a wide wavelength range. For longer cables, or for testing a previously installed link, the wavelength range may be smaller but the source power has to be higher.



PMD measurement of a 4 km low-PMD fiber on a shipping spool

The HP 83437A covers up to 500 nm, which is necessary for characterizing devices with low but significant PDL insertion loss, and the HP 83438A has the power density to probe devices with medium or high insertion loss. If the HP 83437A is modulated, then a lock-in mode (ADC AC trigger) in an HP 7145XB still can characterize PMD, even if ASE noise from Erbium-doped amplifiers along a link supersedes the probe signal.



Test setup of a PMD measurement using the wavelength-scanning method.

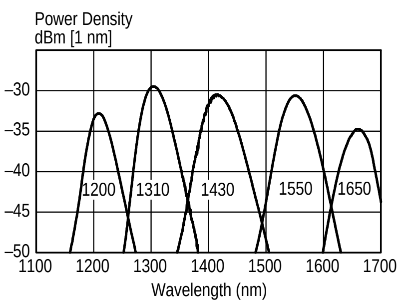
HP 83437A Specifications

Performance Specifications and Characteristics

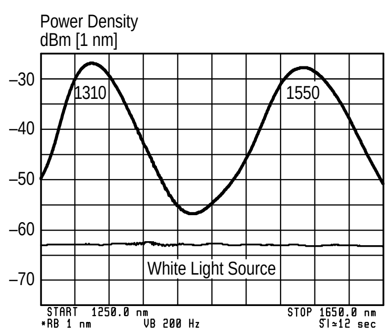
Peak wavelength	1200 ±30 nm	1310 ±20 nm	1430 ±30 nm	1550 ±20 nm[1]	1650 ±30 nm
3 dB width[2]	45 nm	47 nm	50 nm	52 nm	55 nm
Total power[3,7]	>–17 dBm 20 µW	>–13 dBm 50 µW	>–13 dBm 50 µW	>–13 dBm 50 µW	>–17 dBm 20 µW
Peak density[2,3]	>–37 dBm [1 nm] >200 nW/nm	>–33 dBm [1 nm] >500 nW/nm	>–33 dBm [1 nm] >500 nW/nm	>–33 dBm [1 nm] >500 nW/nm	>–37 dBm [1 nm] >200 nW/nm

Compatible fiber	9/125 µm, single-mode
Output return loss[2]	>25 dB (50 dB[5])
Power stability[4]	(1310/1430/1550) <±0.02 dB (15 min), <±0.05 dB (6 h) (1200/1650) <±0.03 dB (15 min), <±0.05 dB (6 h)
Modulation[2]	Digital (TTL compatible input), 100% on-off, DC to 100 kHz
LED safety	IEC 825-1 Class 1
Weight	5.5 kg (12 lbs)
Dimensions[6]	102 H x 213 W x 450 D mm (4.02 H x 8.39 W x 17.72 D in)
Power	90 to 132 V or 198 to 264 V AC, 47 to 63 Hz, 50 W
Operating temperature	0 to +45°C
Storage temperature	–40 to +70°C

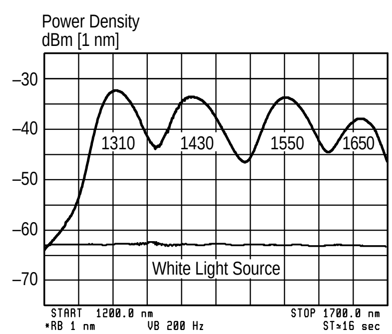
1 Shipped as standard. Option 005 deletes this wavelength.
2 Characteristic value (not warranted).
3 Configurations with multiple EELEDs have less power. Typical losses are 3.5 dB *per coupler* except the 1310/1550 nm and the 1430/1650 coupler which have less than 1 dB loss (see spectra for typical configurations, and see page 2 for a block diagram).
4 Ambient temperature change <±1°C, measured with power meter having >30 dB return loss and after 1 hour warm-up time.
5 Measured at 1550 nm with isolator (option 001) and FC/APC connector (option 022).
6 System II chassis (half module, 3 1/2" height, 1.75" hole spacing).
7 Measured with an InGaAs power sensor.



Characteristic spectra in single EELED configurations (HP 83437A with options 002 & 005, 003 & 005, 004 & 005 , standard, and 006 & 005)



Characteristic spectrum in the 1310/1550 nm dual EELED configuration (HP 83437A with option 003)



Characteristic spectrum when four EELEDs are installed (HP 83437A with options 003, 004 and 006)

Ordering Information

HP 83437A Broadband Light Source (1550 nm EELED standard)
Option 001 Add 1550 nm Isolator
Option 002 Add 1200 nm EELED
Option 003 Add 1310 nm EELED
Option 004 Add 1430 nm EELED
Option 005 Delete 1550 nm EELED
Option 006 Add 1650 nm EELED

No more than four EELEDS can be installed at a time (see block diagram on page 2). Option 001 requires the standard configuration (1550 nm EELED only).

Connector options replacing the standard FC/PC connector interface of the HP 83437A or HP 83438A (for additional connector interfaces, order the HP 81000XI series):

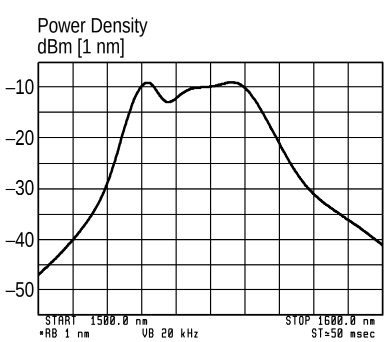
Option 011 HMS-10/HP
Option 013 DIN
Option 014 ST
Option 017 SC
Option 022 Angled contact output (compatible to FC/APC, DIN 4108, ST/APC, etc.)
Option UK6 Commercial calibration certificate with test data
Option 1CM Rack mount kit
Option 1CN Front handles
Option 1CP Rack mount kit with handles

HP 83438A Specifications

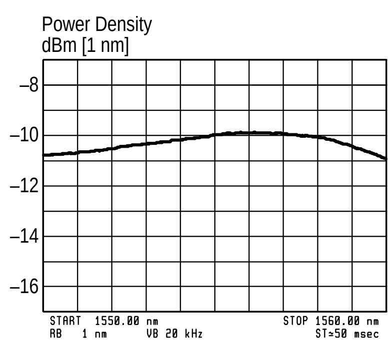
Performance Specifications and Characteristics

Compatible fiber	9/125 µm, single-mode		
Total output power[3,7]	Min. +5.5 dBm, max. +8.1 dBm		
Spectral density[2,7]	at 1530 nm >–13 dBm [1 nm] >50 µW/nm	at 1550 nm >–13 dBm [1 nm] >50 µW/nm	at 1560 nm >–13 dBm [1 nm] >50 µW/nm
Output return loss[2]	>30 dB (50 dB[5])		
Power stability[4]	<±0.02 dB (15 min), <±0.05 dB (6 h)		
Degree of polarization[2]	<5% (standard), >95% (option 009)		
Modulation[2]	Digital (TTL input), DC to 300 Hz		
Laser safety	21 CFR 1040.10 Class I, IEC 825-1 Class 1		
Weight	5.5 kg (12 lbs)		
Dimensions[6]	102 H x 213 W x 450 D mm (4.02 H x 8.39 W x 17.72 D in)		
Power	90 to 132 V or 198 to 264 V AC, 47 to 63 Hz, 50 W		
Operating temperature	0 to +45°C		
Storage temperature	–40 to +70°C		

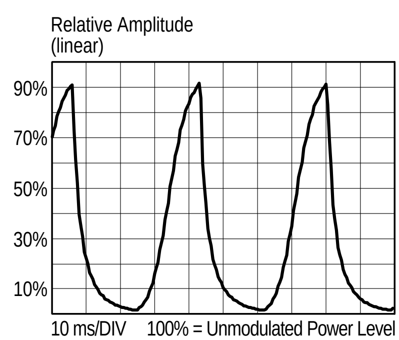
2 Characteristic value (not warranted).
3 Measured with an InGaAs power sensor.
4 Ambient temperature change <±1°C, measured with power meter having >30 dB return loss and after 1 hour warm-up time.
5 Measured at 1550 nm with FC/APC connector (option 022).
6 System II chassis (half module, 3 1/2" height, 1.75" hole spacing)
7 3 dB less with option 009 Polarized Light Output



Characteristic output spectrum in the range 1500 to 1600 nm



Characteristic output spectrum in the range 1550 to 1560 nm



Characteristic output waveform when modulated with 270 Hz square-wave

Ordering Information

HP 83438A Erbium ASE Source
Option 009 Polarized Light Output
Option UK6 Commercial calibration certificate with test data
Option 022 Angled Contact Output (compatible to FC/APC, DIN 4108, SC/APC, etc.)
See also: HP 71452B with Option 031: DWDM Passive Component Test Kit

Connector options replacing the standard FC/PC connector interface of the HP 83437A or HP 83438A (for additional connector interfaces, order the HP 81000XI series):

Option 011 Diamond HMS-10
Option 013 DIN
Option 014 ST
Option 017 SC
Option 1CM Rack mount kit
Option 1CN Front handles
Option 1CP Rack mount kit with handles

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