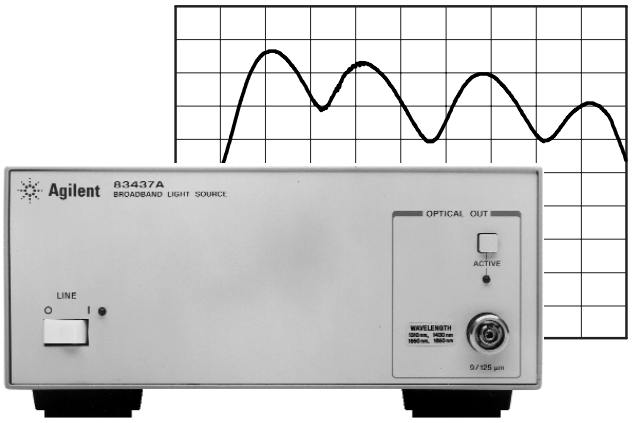
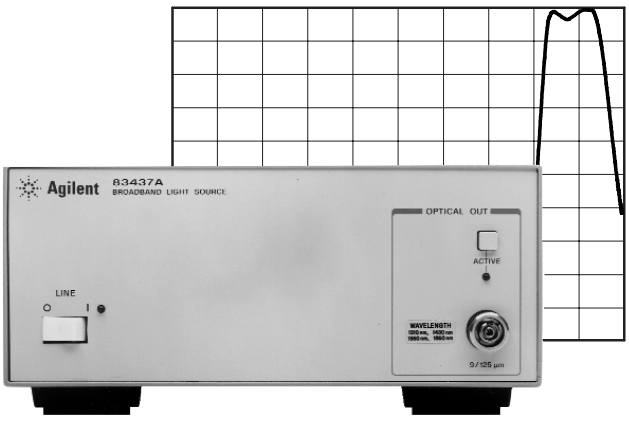
# Agilent 83437A Broadband Light Source

# Agilent 83438A Erbium ASE Source

## Product Overview




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

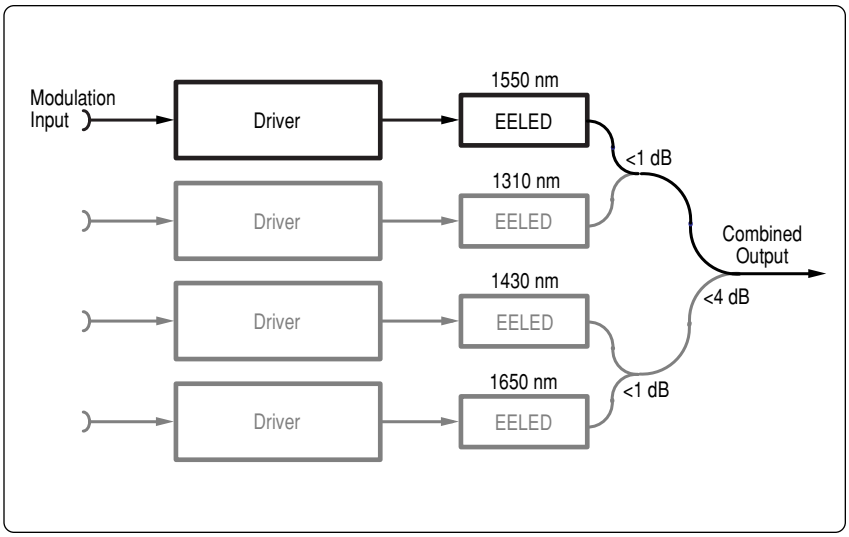



Agilent Technologies

# The Technology

The Agilent Technologies 83437A Broadband Light Source (BBLS) is based on Agilent Technologies' 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.

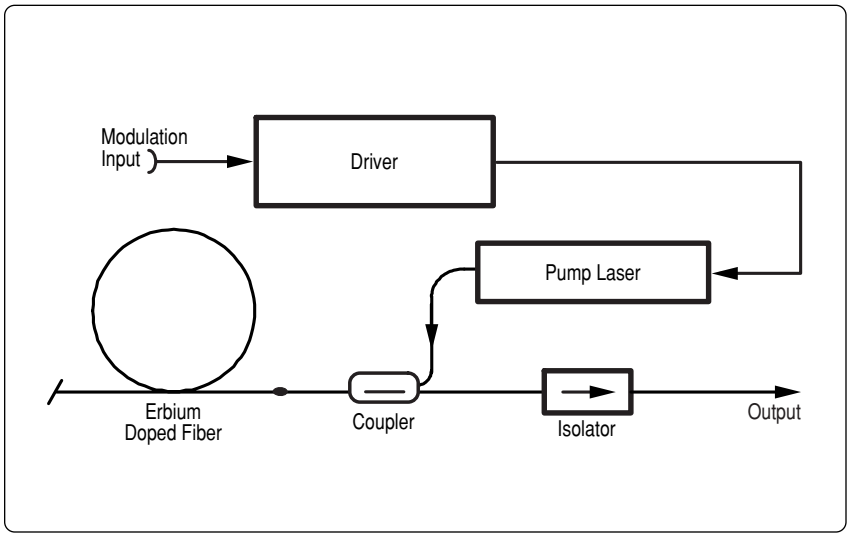
Built-to-order, the 83437A can incorporate up to four EELEDs, with five available wavelengths in the 1200 to 1650 nm range. Connectors on the back panel allow you to modulate the light by applying a TTL compatible signal, or to selectively turn any of the EELEDs on (open connection) or off (shorted).




**Agilent 83437A block diagram (shown with 83437A- 003, 004, 006, and 705). Only the 1310/1550 and the 1430/1650 couplers are wavelength dependent to minimize the loss. All others are standard "3 dB" couplers.**

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

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.




**Agilent 83438A block diagram**

The Agilent 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.

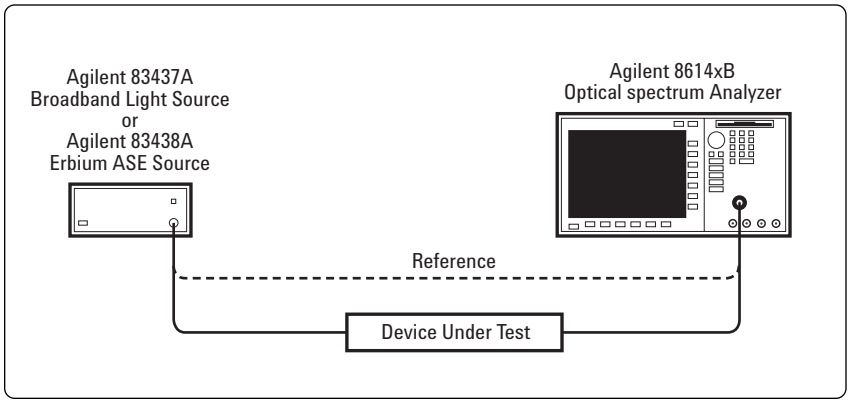
**Increase your productivity and competitiveness with more accurate tests and higher throughput.**

### ...to improve the quality and the performance of *your* device...

Together with an optical spectrum analyzer (OSA), the Agilent Technologies 83437A or the Agilent 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.

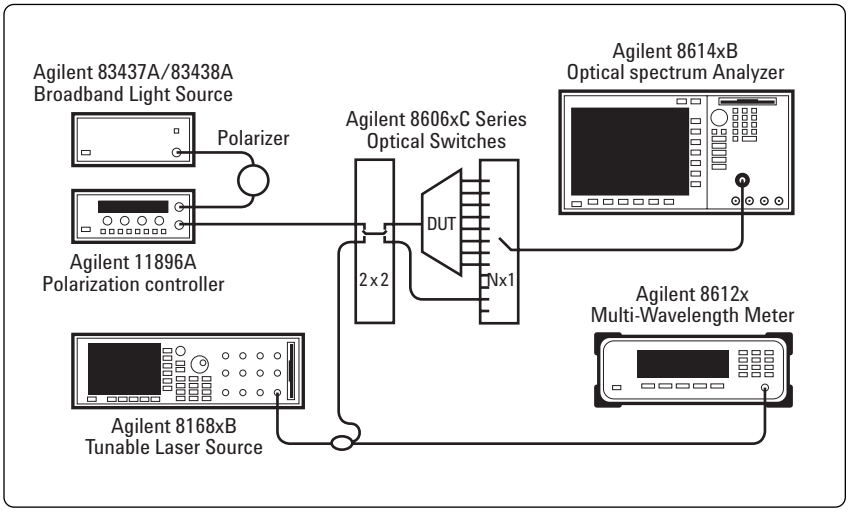
The significantly higher power density compared to white light and regular LED sources allow much faster OSA sweep times. Whether you need only a simple test versus wavelength or a complex characterization including polarization and other effects, test setups using these sources significantly reduce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




**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.

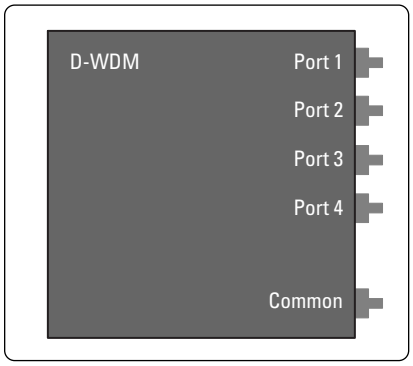



**Agilents' fully customized systems help you to focus on your product while getting the measurements and the accuracy you need to be successful.**

# Stimulus/Response Applications

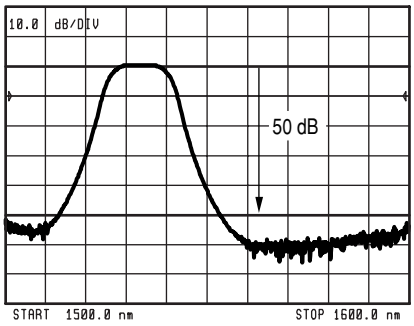
The performance of most passive optical components depends on wavelength, either within several nanometers or over a few hundred nanometers. If that is a critical parameter in the application of your component, then the Agilent Technologies 83437A or the Agilent 83438A is the perfect stimulus to probe 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.



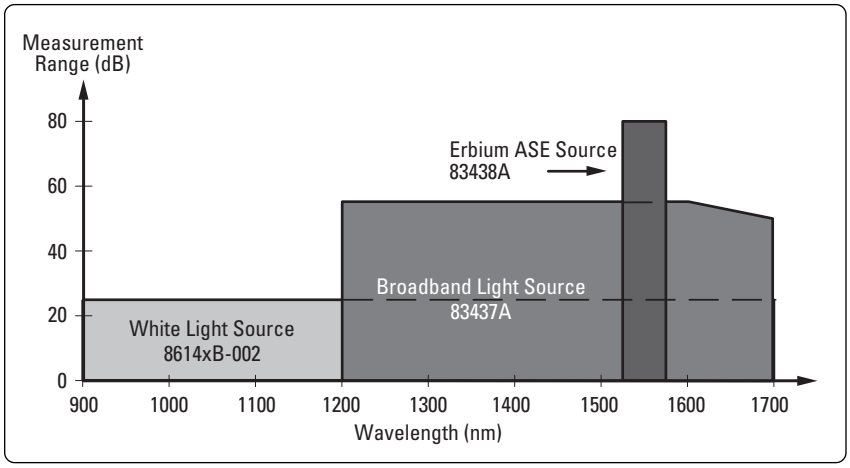

**The Agilent 83438A has the power density necessary to characterize dense WDM (DWDM) components quickly.**

The optical power from an 83438A Erbium ASE Source in conjunction with the sensitivity and selectivity of an Agilent 8614xB Optical Spectrum Analyzer stretch the available measurement range up to about 70 dB.

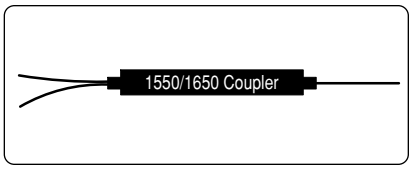



**Filter characterization with an Agilent 83437A Broadband Light Source and an Agilent Optical Spectrum Analyzer (OSA)**

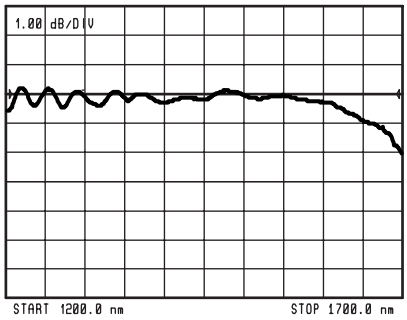
Because an 83437A equipped with four EELEDs provides more than one hundred times the power density of a white light source, even lossy devices can be comprehensively characterized over a wide wavelength range. Therefore, this source allows you to measure a greater variety of components.




**Measurement range of incoherent sources in conjunction with an Agilent 8614xB 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.**

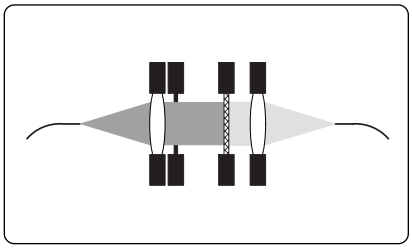



**An agilent 83437A with multiple EELEDs built-in allows you to characterize insertion loss, crosstalk and polarization dependence of single-mode components at standard as well as less common wavelengths.**




**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 Agilent 83437A or 83438A emit modulated light, the ADC AC trigger mode of the OSA is able to significantly suppress ambient light.**

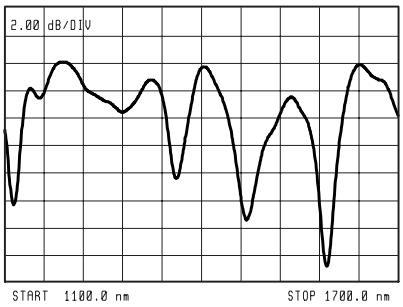
# Other Applications

## Polarization Mode Dispersion

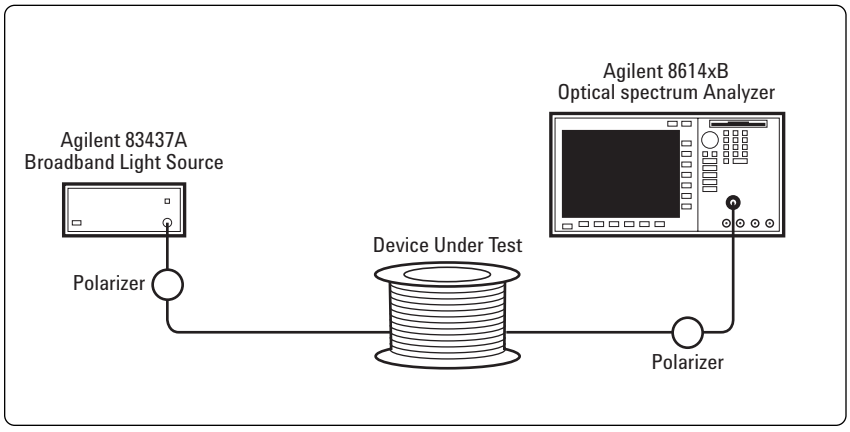
The dispersion of optical energy in different states of polarization can limit the bandwidth of a fiberoptic cable or system. For systems transmitting 2.5 Gb/s or more, it is essential to know the polarization mode dispersion (PMD) of the cable to be installed. One common method is the wavelength-scanning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

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

In order to accurately characterize cable lengths ypically 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**




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

The 83437A covers up to 500 nm, which is necessary for characterizing devices with low but significant PDL insertion loss, and the 83438A has the power density to probe devices with medium or high insertion loss. If the 83437A is modulated, then a lock-in mode (ADC AC trigger) in an 8614xB still can characterize PMD, even if ASE noise from Erbium-doped amplifiers along a link supersedes the probe signal.

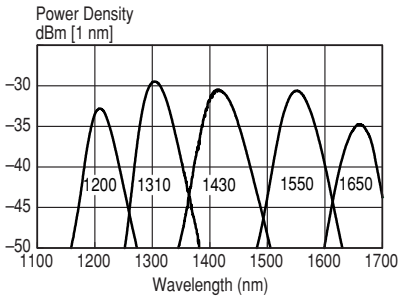
# Agilent 83437A Specifications

## Performance Specifications and Characteristics

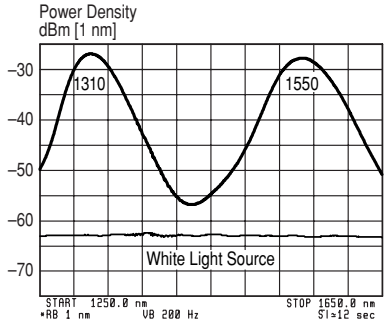
| Peak wavelength | 1200 ±30 nm | 1310 ±20 nm | 1430 ±30 nm | 1550 ±20 nm[1] | 1650 ±30 nm |
|---|---|---|---|---|---|
| 3 dB width[2] | 45 nm | 47 nm | 50 nm | 52 nm | 55 nm |
| Total power[3,7] | > –17 dBm<br>20 µW | > –13 dBm<br>50 µW | > –13 dBm<br>50 µW | > –13 dBm<br>50 µW | > –17 dBm<br>20 µW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

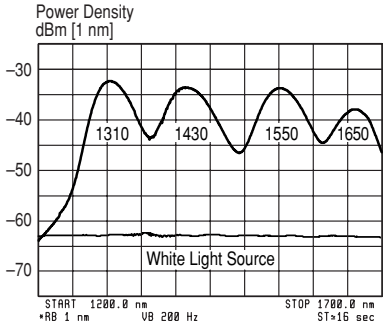
1 Default configuration
2 Characteristic value (not warranted).
3 Configurations with multiple EELEDs have less power. Typical losses are 3.5 dB *per coupler* except the 1310/1550 nm and the 1430/1650 coupler which have less than 1 dB loss (see spectra for typical configurations, and see page 2 for a 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 (83437A-001) and FC/APC connector (83437A-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**




**Characteristic spectrum in the 1310/1550 nm dual EELED configuration (Agilent 83437A with options 003 and 705)**




**Characteristic spectrum when four EELEDs are installed (Agilent 83437A with options 003, 004, 006 and 705)**

## Ordering Information

**83437A Broadband (EELED) Light Source**

**Source Options**

| | |
|---|---|
| 83437A-002 | 1200 nm EELED |
| 83437A-003 | 1310 nm EELED |
| 83437A-004 | 1430 nm EELED |
| 83437A-705 | 1550 nm EELED (default configuration) |
| 83437A-006 | 1650 nm EELED |

No more than four EELEDs can be installed at a time (see block diagram on page 2). Option 001 requires the default configuration (Option 705, 1550 nm EELED only).

| | |
|---|---|
| 83437A-001 | 1550 nm Isolator |

**Connector Options**

| | |
|---|---|
| 83437A-020 | Straight (non-angled) Contact Interface-PC (default) |
| 83437A-022 | Angled Contact Interface-APC |
| 81000AI | Diamond HMS-10 Connector |
| 81000FI | FC Connector (default) |
| 81000KI | SC Connector |
| 81000SI | DIN Connector |
| 81000VI | ST Connector |

**Accessories and Documentation**

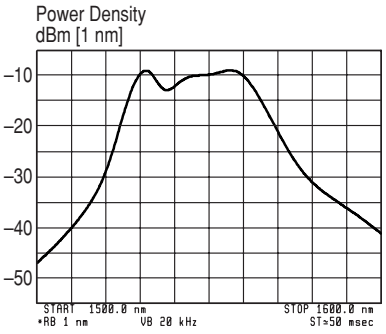
| | |
|---|---|
| 83437A-AB0 | Taiwan-Chinese localization |
| 83437A-UK6 | Commercial calibration certificate with test data |
| 83437A-1CM | Rack mount kit |
| 83437A-1CN | Front handles |
| 83437A-1CP | Rack mount kit with handles |

# Agilent 83438A Specifications

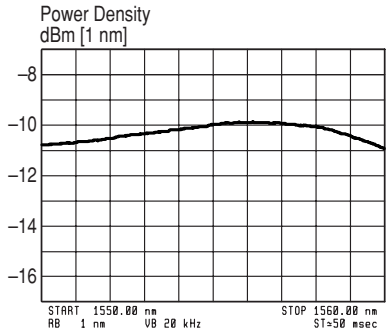
## Performance Specifications and Characteristics

| | | | |
|---|---|---|---|
| **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<br>> –13 dBm [1 nm]<br>>50 µW/nm | at 1550 nm<br>> –13 dBm [1 nm]<br>>50 µW/nm | at 1560 nm<br>> –13 dBm [1 nm]<br>>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 | | |

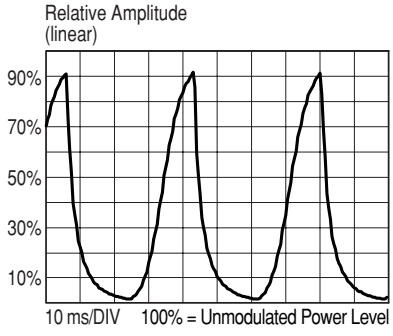
[2] Characteristic value (not warranted).
[3] Measured with an InGaAs power sensor.
[4] Ambient temperature change <±1°C, measured with power meter having >30 dB return loss and after 1 hour warm-up time.
[5] Measured at 1550 nm with FC/APC connector (83438A-022).
[6] System II chassis (half module, 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

**83438A Erbium ASE Source (single-mode)**

**Connector Options**

| | |
|---|---|
| 83438A-020 | Straight (non-angled) Contact Interface-PC (default) |
| 83438A-022 | Angled Contact Interface-APC |

| | |
|---|---|
| 81000AI | Diamond HMS-10 Connector |
| 81000FI | FC Connector (default) |
| 81000KI | SC Connector |
| 81000SI | DIN Connector |
| 81000VI | ST Connector |

**Accessories**

| | |
|---|---|
| 83438A-009 | Polarized light output |
| 83438A-709 | Without Polarizer (default configuration) |
| 83438A-UK6 | Commercial calibration certificate with test data |
| 83438A-1CM | Rack mount kit |
| 83438A-1CN | Front handles |
| 83438A-1CP | Rack mount kit with handles |

## Agilent Technologies'
## Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

### Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

### Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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