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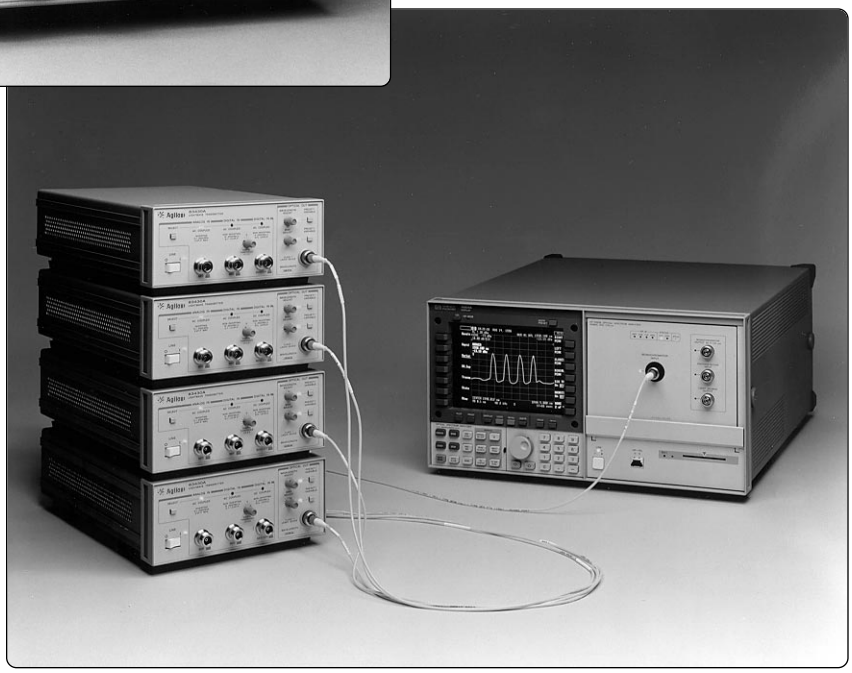
Find the *Keysight / Agilent 83430A* at our website: ***Click HERE***

Agilent 83430A
Lightwave Digital Source
Product Overview

SDH/SONET Compliant DFB laser source for digital, WDM, and analog test up to 2.5 Gb/s



- 52 Mb/s STM-0/OC-1
- 155 Mb/s STM-1/OC-3
- 622 Mb/s STM-4/OC-12
- 2488 Mb/s STM-16/OC-48



- User adjustable extinction ratio
- User selectable wavelengths:
  1310 nm
  1535 nm
  1539 nm
  1543 nm
  1546.2 nm
  1550 nm
  1553.4 nm
  1557 nm
  1560.5 nm

Agilent Technologies

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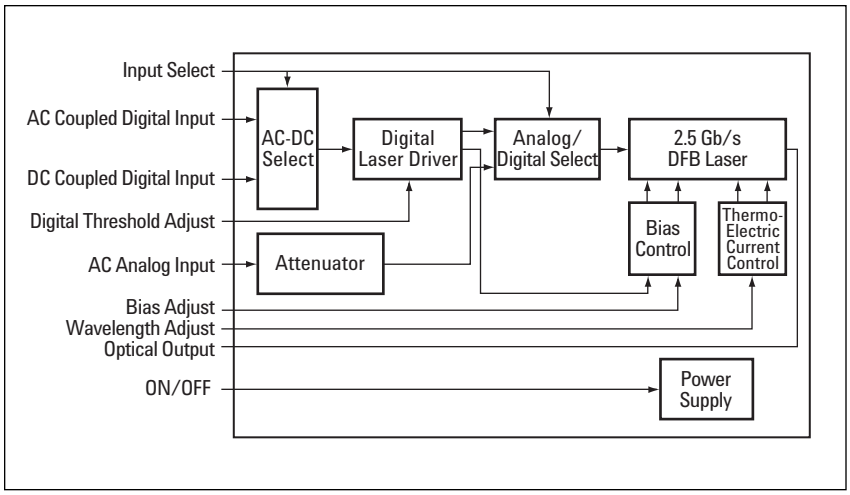


Figure 1. Agilent 83430A block diagram

The Agilent 83430A is a SDH/SONET compliant transmitter designed for evaluating the performance of high-speed TDM (time division multiplexed) and WDM (wave-length division multiplexed) optical receivers and systems. It can be used for SDH/SONET "STM-0"/OC-1 (51.84 Mb/s) through STM-16/OC-48 (2.488 Gb/s) testing.

The block diagram of the 83430A is shown in Figure 1. The instrument has three separate modulation input ports. The AC coupled analog input provides a general-purpose input for direct modulation of the DFB laser. The AC and DC coupled digital inputs convert ECL compatible input signals to a preset optical output level that is SDH/SONET compliant.

The digital input threshold is user adjustable so that the desired symmetry of optical one and zero levels may be obtained. The 83430A has a user adjustable extinction ratio so that a wide range of optical signals can be simulated.

The standard product has a 1550 nm center wavelength. There are eight optional center wavelength versions including 1310 nm and seven wavelengths between 1535 nm and 1560.5 nm. The center wavelength of the 83430A can be adjusted by means of a front panel temperature control.

Parametric Test System

With the 83430A and 83446A, Agilent Technologies offers complete optical parametric test systems for test needs up to 2.5 Gb/s. A complete high performance optical parametric test system consists of the Agilent 86130A Error Performance Analyzer with the 83430A Lightwave Digital Source and the 83446A Lightwave Clock/Data Receiver. Measurements such as optical receiver sensitivity and dispersion power penalty of single-mode fiber can be made using such a system.

The 83430A can be combined with the 86100B Infiniium Digital Communications Analyzer to provide transceiver waveform testing such as filtered conformance mask testing, extinction ratio and eye-diagram measurements.

Wavelength Selection and Tunability

The 83430A wavelength adjustment gives you the ability to select a preset wavelength or to tune the wavelength to some specific value within ±1.25 nm of the center wavelength. This is accomplished by adjusting the temperature of the laser ±10°C about 25°C. Figure 2 shows the upper limit of the tunable range of the standard 1550 nm 83430A, the nominal wavelength and the lower limit of the range measured on the Agilent Optical Spectrum Analyzer.

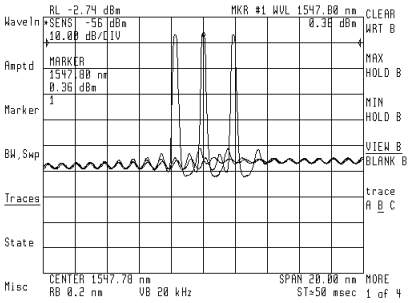


Figure 2. Wavelength tunability of 83430A as shown on Agilent OSA

The wavelength tunability feature of the 83430A gives you the ability to tune any of the wavelength options to the nearest ITU grid wavelength for WDM applications. You can select the desired center wavelength to test WDM system component performance with the 83430A.

Option 130	1310 ±20 nm
Option 350	1535 ±1 nm
Option 390	1539 ±1 nm
Option 430	1543 ±1 nm
Option 462	1546.2 ±1 nm
Option 534	1553.4 ±1 nm
Option 570	1557 ±1 nm
Option 605	1560.5 ±1 nm

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Special Wavelengths

Other specific wavelengths in the 1550 nm region are available upon request as special ordering options.

A combination of one or more Agilent Technologies 83430As and DWDM transmitters may be used to evaluate WDM MUX/DEMUX alignment and channel-to-channel crosstalk (interference). The wavelength tunability feature of the 83430A allows determination of crosstalk as a function of transmitter wavelength.

SDH/SONET Compliant Source

The 83430A may be used as a reference for comparing multiple transmitters because in its preset condition the 83430A meets the requirements for SDH/SONET compliance. In both DC and AC coupled digital preset mode the 83430A laser output eye mask performance conforms to Bellcore GR-253 and ITU-T G.957 requirements at OC-1, STM-1/OC-3, STM-4/OC-12 and STM-16/OC-48.

The preset condition of the 83430A sets the extinction ratio to 10 dB. The front panel bias control can be adjusted to simulate a wide range of signal performance by varying the extinction ratio. Extinction ratio can be adjusted to less than 8.2 dB and greater than 13 dB. Figure 6 shows the extinction ratio tuning range of one 83430A at its extreme and nominal values.

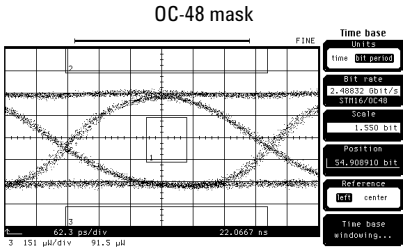


Figure 3. Agilent 83430A SDH/SONET STM-16/OC-48 Eye Mask Conformance

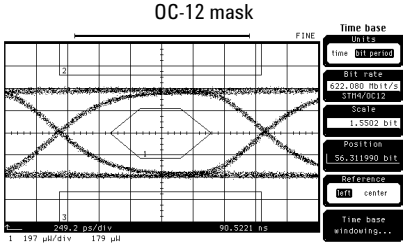


Figure 4. Agilent 83430A SDH/SONET STM-4/OC-12 Eye Mask Conformance

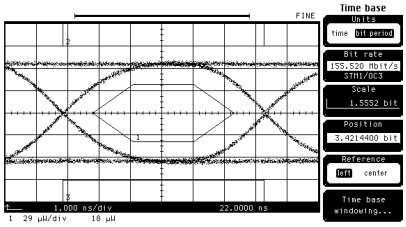


Figure 5. Agilent 83430A SDH/SONET STM-1/OC-3 Eye Mask Conformance

The front panel digital threshold adjustment feature of the 83430A allows the user to set the ECL decision threshold to optimize eye symmetry for a range of ECL signals from the drive circuitry.

General-Purpose Optical Source

The 83430A is also a general-purpose optical source. Its internal DFB laser is optically isolated and is thermo-electrically temperature stabilized. It has good input return loss characteristics and a flat frequency response over its operating bandwidth. A characteristic frequency response can be seen in Figure 7.

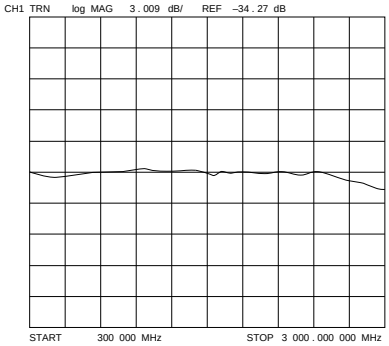


Figure 7. Agilent 83430A frequency response

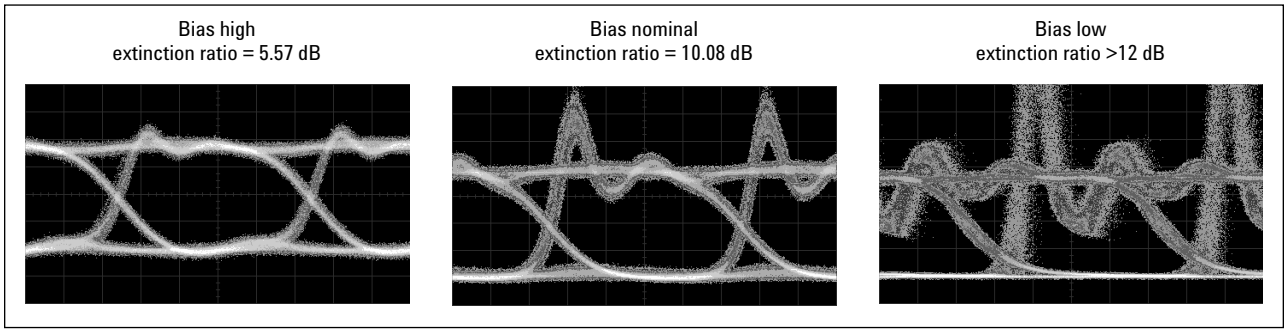


Figure 6. Agilent 83430A extinction ratio versus waveform fidelity at 2.48832 Gb/s

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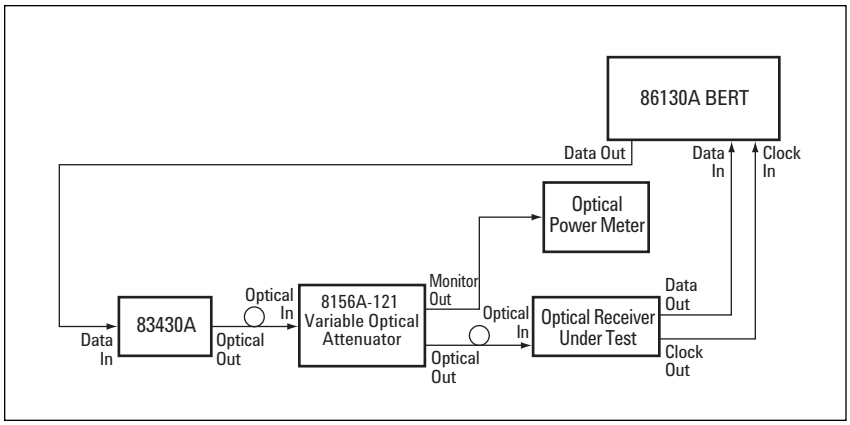


Figure 8. Setup to measure optical receiver sensitivity

Example Uses of the Agilent Technologies 83430A

Optical Receiver Sensitivity

The 83430A in conjunction with a 86130A Error Performance Analyzer, the 8156A-121 High-performance Optical Attenuator with optical monitor output, and the optical power meter can determine the minimum sensitivity for optical receivers. A setup for this measurement is found in Figure 8. The BER is monitored as the power to the optical receiver is reduced. The minimum sensitivity limit is found when the BER increases to some pre-determined level above which the receiver performance is unacceptable. Because the 83430A is a SDH/SONET compliant transmitter in its preset state, the measured BER performance (1 X 10^{-10} for SDH/ SONET system) determines the sensitivity limits of the optical receiver.

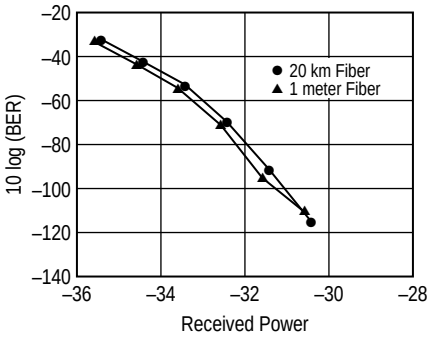


Figure 9. 83430A BER versus received power

Dispersion Power Penalty Testing

Signal degradation due to fiber dispersion can have a major impact on the maximum distance over which optical data can reliably be sent. The dispersion power penalty of a system can be tested with the measurement setup illustrated in Figure 10. The system is first tested with a 1 meter length of fiber. The attenuator is used to adjust the received power until the desired BER is measured. A long length of fiber is then substituted for the 1 meter fiber and the attenuator is adjusted to achieve the desired BER. The difference in received power is the dispersion power penalty. The 83430A can be used as a reference source to isolate system component causes of undesired dispersion power penalty results.

The 83430A is an excellent choice for this as it has a very narrow modulated spectral width (low chirp) and meets the SDH/ SONET dispersion power penalty requirement at 1200 ps/nm.

Jitter Tolerance of Recovered Clock and Data

High-speed digital receivers are often required to receive or regenerate data using a clock signal that is recovered or extracted from the data waveform. Variation in the data rate, commonly known as jitter, can complicate the clock recovery and

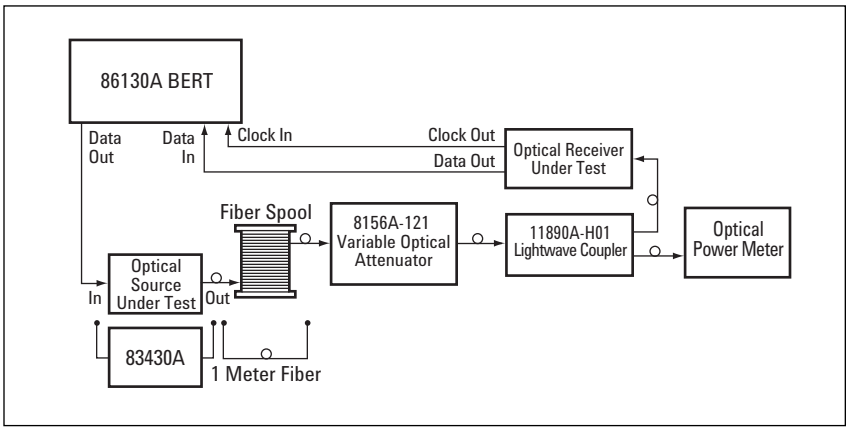


Figure 10. Setup to measure dispersion power penalty of single-mode fiber

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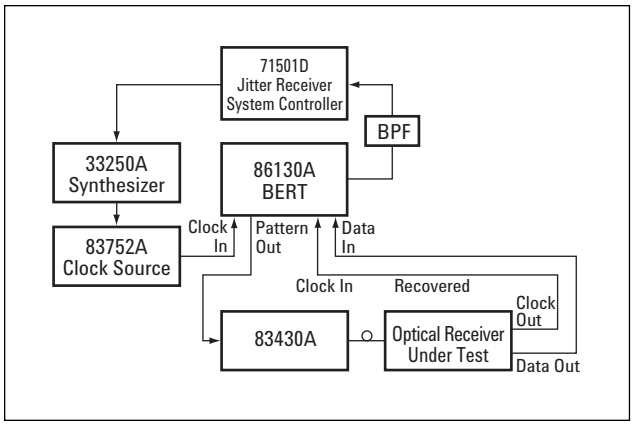


Figure 11. Setup for measuring the wide-band jitter of recovered clock and data

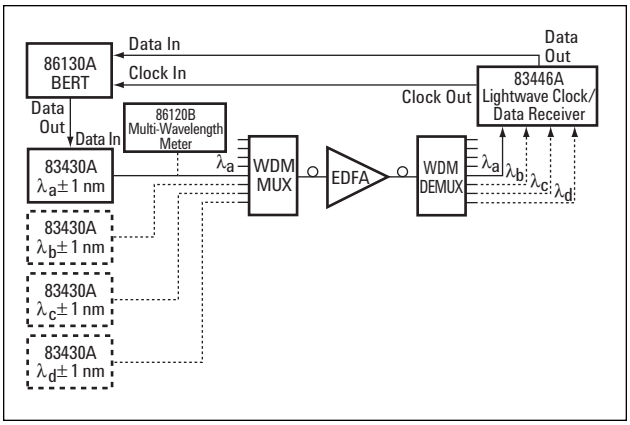


Figure 12. Setup for measuring the alignment of a WDM optical through-channel

data regeneration process. A jitter tolerance test determines the ability of a receiver to maintain communication in the presence of jitter. The jitter tolerance test will determine the actual levels where the DUT can no longer maintain a desired BER. Figure 11 shows the use of the Agilent 83430A and 71501D in the jitter tolerance test. A BER measurement of the receiver under test is made with jitter-free data. The signal power is attenuated until the onset of errors or a specific BER is achieved. The attenuation is then reduced 1 dB. Jitter is then applied to the clock signal to the pattern generator and the recovered clock and data from the receiver under test is routed to the error detector where the BER measurement is performed. The results of the BER test are compared by the 71501D to the desired level defined by the user to determine the pass/fail status.

WDM Optical Channel Performance

Wavelength Division Multiplexing systems combine multiple light signals of differing wavelengths onto a single fiber. This increases the channel capacity of the fibers already installed in a network. In WDM transmission systems which include EDFAs (erbium doped fiber amplifiers), the loss of one or more of the channels can potentially cause an undesired increase in signal power on the remaining channels with a resulting increase in stimulated Brillouin scattering which may cause BER degradation. The 83430A along with the 83446A Lightwave Clock/Data Receiver, 86130A Error Performance Analyzer and 86122A Multi-Wavelength Meter can be used to test the performance of a WDM optical MUX/DEMUX channel. The 86122A is used to determine when the 83430A has been tuned to the required wavelength within a MUX/ DEMUX channel. Then the BER of each system channel is measured as a function of optical power as the signal to another channel is dropped.

The wavelength tuning feature of the 83430A can be used to test BER for a channel as the carrier of the adjacent channel is tuned off center. As one carrier wavelength is tuned closer to the adjacent carrier the amount of signal power coupled into that channel (crosstalk) increases. Too much crosstalk can cause an increase in BER.

Other effects on WDM systems are cross-phase modulation in which the intensity of one WDM signal modulates the phase of another and four-wave mixing in which mixing products are generated at existing carrier wavelengths can limit the minimum spacing between wave-lengths. The Raman effect in which energy is transferred from lower wavelength carriers to higher wavelengths can limit the maximum spacing between wavelengths. The wavelength tuning feature of the 83430A can be used to see how these effects cause variations in system BER.

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Agilent 83430A Performance Specifications and Characteristics

Specifications describe the instrument's warranted performance over the 0 to 55°C temperature range, except where noted. **Characteristics** provide information about non-warranted instrument performance in the form of nominal values.

Input Modulation

	Digital AC Coupled	Digital DC Coupled	Analog AC Coupled
Maximum Input Level	2 Volts pk-pk	–4.5 to 0 Volts	2 Volts pk-pk
Bit Rate	50 to 2500 Mb/s[2]	DC to 2500 Mb/s	0.1 to 2500 MHz[3]
Pulse Pattern[1]	40 to 60% ones density	0 to 100% ones density	
Polarity	Non-inverting	Non-inverting	Inverting
Input Level	0.7 to 1.5 Volts pk-pk	–1.7 V low, –0.9 V high (ECL levels)	2 Volts pk-pk maximum[4]
Digital Threshold Adjustment Range[1]	±0.2 Volts	±0.2 Volts	
Impedance[1]	50 ohms	50 ohms to –2 V DC	50 ohms
Input Return Loss[1]			
0.1 to 1 GHz	12 dB	12 dB	12 dB
1 to 2 GHz	8.5 dB	8.5 dB	9 dB
2 to 2.5 GHz	6 dB	6 dB	6 dB

Optical Output

Center Wavelength

83430A-155 . . . . . 1550 ±1 nm	83430A-390. . . . . 1539 ±1 nm	83430A-534 . . . . . 1553.4 ±1 nm
83430A-130 . . . . . 1310 ±20 nm	83430A-430. . . . . 1543 ±1 nm	83430A-570 . . . . . 1557 ±1 nm
83430A-350 . . . . . 1535 ±1 nm	83430A-462. . . . . 1546.2 ±1 nm	83430A-605 . . . . . 1560.5 ±1 nm

Wavelength Adjustment Range:[5]
±1.25 nm (±1.8 nm typical)
Extinction Ratio:[5,6] 10 dB ±1 dB
Bias/Extinction Ratio Adjustment Range:[1]
from less than 8.2 dB to greater than 13 dB
Peak Coupled Power: (Digital mode)[7]
1.3 mW minimum (+ 1 dBm)
Average Coupled Power: (Analog mode)[7]
0.63 mW minimum (–2 .0 dBm)
Relative Intensity Noise:
(RIN) @ 1 GHz[1] –145 dB/Hz
Spectral Width:[8] 0.3 nm maximum at –3 dB
1 nm maximum at –20 dB
Dispersion Power Penalty:[1,9] < 2.0 dB
Side-mode Suppression Ratio:[8] 33 dB minimum
Jitter Generation:[10] 0.05 maximum UI pk-pk
0.005 maximum UI rms
Eye Mask Performance: Conforms to Bellcore GR-253 and ITU-T G.957 at OC-1, STM-1/OC-3, STM-4/OC-12, STM-16/OC-48

1 Characteristic value (not warranted).
2 Tested with 2^{23}- 1 PRBS pattern.
3 3 dB frequency.
4 Voltage swing required to reach 80% peak modulation in preset bias condition.
5 Valid only over 25 ±10°C ambient temperature range.
6 Measured at OC-48/STM-16 rate in instrument preset condition.
7 In preset bias condition.
8 Measured with digital modulation at 2.5 Gb/s with SONET reflection conditions.
9 Measurement conditions:
2.5 Gb/s, 2^{23}- 1 PRBS, NRZ, preset bias condition, dispersion = 1200 ps/nm, 1 X 10^{-10} BER.
10 Measured per GR-253 and ITU-T G.958, 12 kHz–20 MHz filter, SDH/SONET pattern.

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General

Input Connectors: Type N female
Optical Interface: Diamond HMS-10 with universal interface adapter
Connector Interface: FC/PC standard, other connectors available - see Ordering Information
Output Fiber: 9/125 um, single-mode
Laser Safety: 21 CFR 1040.10 Class 1, IEC 825-1 Class 1
Power: 90 to 132 V or 198 to 264 V AC, 47 to 63 Hz, 50 W
Operating Temperature: 0 to 55°C
Storage Temperature: –40 to 70°C
Weight: 3.6 kg (8 lbs)
Dimensions:[11] 102 mm (4.02 in) height, 213 mm (8.39 in) width, 368 mm (14.49 in) length
EMI: Radiated and conducted emissions are in compliance with the requirements of CISPR Publication 11 and EN 55011 Group 1, Class A

Ordering Information

Agilent 83430A Lightwave Digital Source

Source wavelengths (choose one)
83430A-130 1310 nm center wavelength
83430A-155 1550 nm center wavelength
83430A-350 1535 nm center wavelength
83430A-390 1539 nm center wavelength
83430A-430 1543 nm center wavelength
83430A-462 1546.2 nm center wavelength
83430A-534 1553.4 nm center wavelength
83430A-570 1557 nm center wavelength
83430A-605 1560.5 nm center wavelength

[11] Agilent System II half-width case.

Optical Connectors

For additional connector interfaces order the Agilent 81000XI series.

81000 FI FC/PC connector (default)
81000 AI HMS-10 connector
81000 SI DIN 47256 connector
81000 VI ST connector
81000 KI SC/PC/APC connector

Related Products

Agilent 83446A Lightwave Clock/Data Receiver
Agilent 86100B Infiniium Digital Communications Analyzer
Agilent 83440B/C/D Lightwave Converters
Agilent 87441A/B/C/D SONET/SDH Filters
Agilent 8156A Optical Attenuator
Agilent 11890A Lightwave Directional Coupler
Agilent 11982A Amplified Lightwave Converter
Agilent 10086A ECL Terminator
Agilent 86130A BitAlyzer® Error Performance Analyzer
Agilent 71501D Jitter Analysis System

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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.

By internet, phone, or fax, get assistance with all your test & measurement needs.

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(fax) (905) 282 6495

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(fax) 1-0800-650-0121

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Printed in USA April 30, 2002
5965-5074E

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