

**Agilent**  
Agilent 86120B, 86120C, 86122A  
Multi-Wavelength Meters  
Data Sheet



Agilent multi-wavelength meters are Michelson interferometer-based instruments that measure wavelength and optical power of laser light over a specified wavelength range. Simultaneous measurements of multiple laser lines are performed allowing measurements of DWDM signals and multiple lines of Fabry-Perot lasers. Each laser line is assumed to have a linewidth (including modulation sidebands) of less than:

- 10 GHz for the 86120B,
- 5 GHz for the 86120C and
- 2.5 GHz for the 86122A.

This technical specifications sheet describes the measurement accuracy and operating conditions of the Agilent 86120B, 86120C and 86122A Multi-Wavelength Meters. The specifications apply to all functions over the temperature range of 0 to 55 °C and relative humidity <95% (unless otherwise noted). All specifications apply after the instrument's temperature has been stabilized after 15 minutes continuous operation, and when the instrument is in NORMAL UPDATE mode (86120B and 86120C).

## **Definitions of Terms**

### **Characteristics and Specifications**

The distinction between specifications and characteristics is described as follows:

- Specifications describe warranted performance.
- Characteristics provide useful, but non-warranted information about the functions and performance of the instrument.
- General Characteristics Give additional information for using the instrument. These are general descriptive terms that do not imply a level of performance.

### **Wavelength**

- Range refers to the allowable wavelength range of the optical input signal.
- Absolute accuracy indicates the maximum wavelength error over the allowed environmental conditions.
- Differential accuracy indicates the maximum wavelength error in measuring the wavelength difference between two signals that are simultaneously present.
- Minimum resolvable separation indicates the minimum wavelength separation of two laser lines input required to measure each wavelength simultaneously. Two laser lines closer in wavelength than the minimum resolvable separation are not resolved and one average wavelength is displayed.
- Display resolution indicates the minimum incremental change in displayed wavelength.

### **Power**

- Calibration accuracy indicates the maximum power calibration error at the specified wavelengths over the allowed environmental conditions.
- Flatness refers to the maximum amplitude error in a measurement between two lines that are separated in wavelength by no more than the specified amount.
- Linearity indicates the maximum power error in measuring the change in power of one laser line.
- Polarization dependence indicates the maximum displayed power variation as the polarization of the input signal is varied.
- Display resolution indicates the minimum incremental change in displayed power.

### **Sensitivity**

- Sensitivity is defined as the minimum power level of a single laser line input to measure wavelength and power accurately. A laser line with less than the minimum power may be measured but with reduced wavelength and power accuracy. For multiple laser lines input, sensitivity may be limited by total input power.

### **Selectivity**

- Selectivity indicates the ability to measure the wavelength and power of a weak laser line in the proximity of a specified stronger laser line and separated by the specified amount.

**Input Power**

- Maximum displayed level indicates the maximum total input power (total of all laser lines present) to accurately measure wavelength and power.
- Maximum safe input power indicates the maximum total input power (total of all laser lines present) to avoid permanent optical damage to the instrument.

**Maximum Number of Lines Input**

- Maximum number of lines input is the maximum number of displayed lines. If more than the specified number of lines is input, only the longest wavelength lines are displayed.

**Input Return Loss**

- Input return loss indicates the optical power reflected back to the user's fiber cable relative to the input power. It is limited by the return loss of the front panel connector, and assumes the user's connector is good.

**Measurement Cycle Time**

- Measurement cycle time refers to the cycle time when measuring wavelength and power of laser lines. Specific advanced applications may require longer cycle times.

# Specifications

|   | 86120B   | 86120C  | 86122A                                       | Notes  |
|---|--|---|--|--|
| <b>Wavelength</b>   |  |   |  |  |
| Range   | 700-1650 nm<br>(182-428 THz)   | 1270-1650 nm<br>(182-236 THz)                                       | 1270-1650 nm<br>(182-236 THz)                |  |
| Absolute Accuracy<br>at 1550 nm<br>at 1310 nm<br>for laser lines separated by   | ±3 ppm<br>+0.005 nm<br>+0.004 nm<br>30 GHz   | ±2 ppm<br>+0.003 nm<br>+0.003 nm<br>15 GHz                          | +0.2 ppm<br>±0.3 pm<br>±0.3 pm<br>10 GHz     |  |
| Differential Accuracy <sup>1</sup>  | ±2 ppm   | ±1 ppm  | ±0.15 ppm                                    |  |
| Minimum Resolvable Separation <sup>1</sup><br>(equal power lines input)<br>at 1550 nm<br>at 1310 nm<br>for laser lines separated by | 20 GHz<br>0.16 nm<br>0.11 nm<br>30 GHz   | 10 GHz<br>0.08 nm<br>0.06 nm<br>15 GHz                              | 5 GHz<br>0.04 nm<br>0.03 nm<br>10 GHz        | For lines separated by less than the specified amount, wavelength accuracy is reduced. |
| Display Resolution<br>Fast update mode  |  | 0.001 nm<br>0.01 nm   | 0.0001 nm<br>N/A                             |  |
| Units   | nm (vacuum or standard air), cm <sup>-1</sup> , THz  |   |  |  |
| <b>Power</b>  |  |   |  |  |
| Calibration Accuracy  | ±0.5 dB (at ±30 nm from 780, 1310, and 1550 nm)  | ±0.5 dB (at ±30 nm from 1310 and 1550 nm)                           |  |  |
| Flatness <sup>1</sup>   | ±0.2 dB (1200 to 1600 nm)<br>±0.5 dB (700 to 1650 nm)  | ±0.2 dB (1270 to 1600 nm)<br>±0.5 dB (1270 to 1650 nm)              |  | 30 nm from any wavelength  |
| Linearity   | ±0.3 dB (1200 to 1600 nm)  | ±0.3 dB (1270 to 1600 nm)   |  | Lines above -30 dBm  |
| Polarization Dependence   | ±0.5 dB (1200 to 1600 nm)<br>±1.0 dB <sup>1</sup> (700 to 1650 nm)   | ±0.5 dB (1270 to 1600 nm)<br>±1.0 dB <sup>1</sup> (1600 to 1650 nm) |  |  |
| Display Resolution  | 0.01 dB  |   |  |  |
| Units   | dBm, mW, μW  |   |  |  |
| <b>Sensitivity</b> <sup>2</sup>   |  |   |  | Characteristic noise floor -60 dBm   |
| Single Line Input   | -20 dBm (700 to 800 nm)<br>-25 dBm (800 to 1200 nm)<br>-40 dBm (1200 to 1600 nm)<br>-30 dBm (1600 to 1650 nm)  | -40 dBm (1270 to 1600 nm)<br>-30 dBm (1600 to 1650 nm)              | -32 dBm (1270 to 1650 nm)                    |  |
| Multiple Lines Input <sup>1,3</sup>   | 30 dB below total input power, but not less than single line input sensitivity                                 |   |  |  |
| <b>Selectivity</b> <sup>1</sup>   | 25 dB spacing 100 GHz<br>10 dB spacing 30 GHz  | 25 dB spacing 50 GHz<br>10 dB spacing 15 GHz                        | 25 dB spacing 90 GHz<br>10 dB spacing 10 GHz |  |
| <b>Input Power</b>  |  |   |  |  |
| Maximum Displayed Level   |  | +10 dBm   |  |  |
| Maximum Safe Input Level  |  | +18 dBm   |  | sum of all lines input   |
| Return Loss<br>With Non-Angled (PC) Connectors (Option 021)<br>With Angled (PC) Connectors (Option 022)                             |  | 35 dB<br>50 dB  |  |  |
| <b>Measurement Cycle Time</b>   |  | 1.0 s   | 0.5 s  |  |
| <b>Maximum Number of Lines</b>  | 100  | 200   | 1000 <sup>4</sup>                            |  |
| <b>Measurement Modes</b>  | List by wavelength table, list by power table, signal wavelength and power, average wavelength and total power |   |  | Data Logging and sorting by any parameter are included in the 86122A.                  |
| <b>Delta Modes</b>  | Delta wavelength, delta power, delta wavelength and power  |   |  |  |

## Specifications (cont'd)

|  | 86120B   | 86120C   | 86122A  | Notes   |
|--|--|--|---|---|
| <b>Built in Automatic Measurement Applications</b>   |  |  |   |   |
| Signal to Noise Ratio <sup>1,6</sup><br>Channel Spacing 200 GHz<br>Channel Spacing 100 GHz<br>Channel Spacing 50 GHz | >35 dB with 100 averages   | >35 dB with 100 averages<br>>27 dB with 100 averages | >35 dB with 100 averages<br>>27 dB with 100 averages  | 0.1 nm noise bandwidth. Lines above -25 dBm.                                |
| Drift  | Maximum, minimum, total drift (max-min) of wavelengths and powers over time  |  |   |   |
| Fabry-Perot Characterization   | Mean wavelength, peak wavelength, mode spacing<br>full-width half maximum, peak amplitude total power, sigma   |  |   |   |
| <b>Coherence Length</b> <sup>1</sup>   | Fabry-Perot lasers,<br>1 to 200 mm coherence length, accuracy to within<br>±5%, 0.75 cycle time  |  |   |   |
| <b>Additional Features</b>   | Power offset, power bars (on or off), user adjustable peak excursion and peak threshold, user adjustable start and stop wavelength limits, graphical display, save and recall instrument states. |  |   |   |
| <b>Inputs/Outputs</b>  |  |  |   |   |
| Optical Input  | 9/125 μm single-mode fiber   |  |   |   |
| Rear Panel Connectors  | GPIB, parallel printer port, AC line   |  | LAN, PS/2 for Keyboard & Mouse, SVGA for external monitor, GPIB, parallel printer port, AC Line, optional optical input |   |
| <b>Dimensions and Weight</b>   |  |  |   |   |
| Dimensions   | 140 mm high x 340 mm wide x 465 mm deep<br>(5.5 in x 13.4 in x 18.3 in)<br>9 kg (19 lb)  |  | 138 h x 425 w x 520 mm d<br>(5.2 in x 16.7 in x 20.5 in)<br>14.5 kg (32 lb)   |   |
| <b>Environmental</b>   |  |  |   |   |
| Operational Temperature  | 0°C to +55°C   |  | 15°C to 35°C,   |   |
| Humidity <sup>5</sup>  | <95% R.H. at +40°C, 5 day soak   |  | <75% R.H. at 35°C   |   |
| Shock <sup>5</sup>   | 300 g  |  | 120 g   | Half sine, 2 msec pulse   |
| Vibration <sup>5</sup>   | 5 g rms<br><br>0.75 g (0 to peak)  |  | 2 g rms<br><br>0.5 g (0 to peak)  | Random, 5 to 500 Hz,<br>10 min./axis<br>Sine, 5 to 500 Hz,<br>1 octave/min. |
| EMC  | Conducted and radiated interference is in compliance with CISPR Pub 11, IEC 801-2, IEC 801-3, IEC 801-4 and IEC 555-2  |  |   |   |
| Storage Temperature  | -40°C to +70°C   |  |   |   |
| Humidity <sup>5</sup>  | 90% R.H. at +65°C for 24 hrs.  |  | 95% R.H. at +45°C, 5 day cycle  | Non-condensing  |
| <b>Power Requirements</b>  |  |  |   |   |
| Voltage and frequency<br>Maximum Power   | 100 / 115 / 230 / 240 V~, 50 / 60 Hz<br>70 watts max (125 VA max)  |  | 100 / 115 / 230 / 240 V~, 50 / 60 Hz<br>310 VA max  |   |

1 Characteristic

2 Contact Agilent Technologies for availability of special instruments with higher sensitivity.

4 For 86122A number of laser lines may be limited by signal power requirements for accurate wavelength measurements.

5 Type tested means tested, but not warranted, for continuous operation.

6 At 1550 nm

## General Characteristics

The 86122A Wavelength Meter contains an internal HeNe Laser, which is necessary to provide this high level of absolute wavelength accuracy.

HeNe Laser

Typical operating lifetime: 15000 h

## Ordering Information

For the most up-to-date ordering information, please contact your Agilent sales representative

### 86120B/C Multi-Wavelength Meter

#### Optical Connectors

|            |  |
|------------|--|
| 86120x-012 | FC Connector (default)                     |
| 86120x-013 | DIN Connector                              |
| 86120x-014 | ST Connector                               |
| 86120x-017 | SC Connector                               |
| 86120x-021 | Straight (non-angled) Contact Interface-PC |
| 86120x-022 | Angled Contact Interface-APC               |

#### Accessories

|            |   |
|------------|---|
| 86120x-AXE | Rack Flange Kit with Handles                      |
| 86120x-IA4 | Rack Flange Kit without Handles                   |
| 86120x-UK6 | Commercial Calibration Certificate with Test Data |

#### Documentation

|            |                                    |
|------------|------------------------------------|
| 86120x-ABA | English Operation Manual (default) |
| 86120x-OBO | Do not include an Operation Manual |

### 86122A Multi-Wavelength Meter

#### Optical Connectors

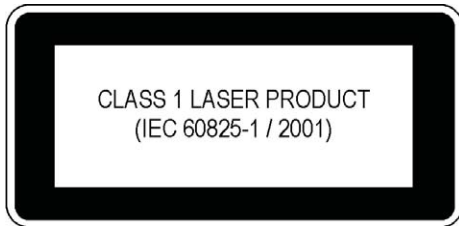
|            |  |
|------------|--|
| 86122A-021 | Straight (non-angled) Contact Interface-PC (default) |
| 86122A-022 | Angled Contact Interface-APC                         |
| 86122A-400 | Front Panel Fiber Input (default)                    |
| 86122A-401 | Rear Panel Fiber Input                               |
| 81000FI    | FC Connector (default)                               |
| 81000KI    | SC Connector   |
| 81000SI    | DIN Connector  |

#### Accessories

|            |   |
|------------|---|
| 86122A-1CM | Rack Mount Kit without Handles                    |
| 86122A-1CN | Handle Kit  |
| 86122A-1CP | Rack Mount Kit plus Handles                       |
| 86122A-UK6 | Commercial Calibration Certificate with Test Data |

#### Documentation

|            |                                    |
|------------|------------------------------------|
| 86122A-ABA | English Operation Manual (default) |
| 86122A-OBO | Do not include an Operation Manual |



## Optical instruments online information

Optical test instruments  
[www.agilent.com/find/oct](http://www.agilent.com/find/oct)

Lightwave Component Analyzers  
[www.agilent.com/find/lca](http://www.agilent.com/find/lca)

Polarization solutions  
[www.agilent.com/find/pol](http://www.agilent.com/find/pol)

Spectral analysis products  
[www.agilent.com/comms/octspectral](http://www.agilent.com/comms/octspectral)

Electro-optical converters  
[www.agilent.com/find/ref](http://www.agilent.com/find/ref)

Optical test instruments accessories  
[www.agilent.com/comms/oct-accessories](http://www.agilent.com/comms/oct-accessories)

Firmware and driver download  
[www.agilent.com/comms/octfirmware](http://www.agilent.com/comms/octfirmware)

Agilent photonic discussion forum  
[www.agilent.com/find/photonic\\_forum](http://www.agilent.com/find/photonic_forum)

## Remove all doubt

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

Agilent offers a wide range of additional expert test and measurement services for your equipment, including initial start-up assistance onsite education and training, as well as design, system integration, and project management.

For more information on repair and calibration services, go to

[www.agilent.com/find/removealldoubt](http://www.agilent.com/find/removealldoubt)



## Agilent Email Updates

[www.agilent.com/find/emailupdates](http://www.agilent.com/find/emailupdates)  
Get the latest information on the products and applications you select.



## Agilent Direct

[www.agilent.com/find/agilentdirect](http://www.agilent.com/find/agilentdirect)  
Quickly choose and use your test equipment solutions with confidence.



[www.agilent.com/find/open](http://www.agilent.com/find/open)  
Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.



[www.lxistandard.org](http://www.lxistandard.org)  
LXI is the LAN-based successor to GPIB, providing faster, more efficient connectivity. Agilent is a founding member of the LXI consortium.

## www.agilent.com

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

### Americas

|               |                |
|---------------|----------------|
| Canada        | (877) 894-4414 |
| Latin America | 305 269 7500   |
| United States | (800) 829-4444 |

### Asia Pacific

|           |                |
|-----------|----------------|
| Australia | 1 800 629 485  |
| China     | 800 810 0189   |
| Hong Kong | 800 938 693    |
| India     | 1 800 112 929  |
| Japan     | 0120 (421) 345 |
| Korea     | 080 769 0800   |
| Malaysia  | 1 800 888 848  |
| Singapore | 1 800 375 8100 |
| Taiwan    | 0800 047 866   |
| Thailand  | 1 800 226 008  |

### Europe & Middle East

|                           |  |
|---------------------------|--|
| Austria                   | 0820 87 44 11  |
| Belgium                   | 32 (0) 2 404 93 40   |
| Denmark                   | 45 70 13 15 15   |
| Finland                   | 358 (0) 10 855 2100  |
| France                    | 0825 010 700*  |
|                           | *0.125 €/minute  |
| Germany                   | 01805 24 6333**  |
|                           | **0.14 €/minute  |
| Ireland                   | 1890 924 204   |
| Israel                    | 972-3-9288-504/544   |
| Italy                     | 39 02 92 60 8484   |
| Netherlands               | 31 (0) 20 547 2111   |
| Spain                     | 34 (91) 631 3300   |
| Sweden                    | 0200-88 22 55  |
| Switzerland               | 0800 80 53 53  |
| United Kingdom            | 44 (0) 118 9276201   |
| Other European Countries: | <a href="http://www.agilent.com/find/contactus">www.agilent.com/find/contactus</a> |

Revised: March 27, 2008

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2008  
Printed in USA, April 17<sup>th</sup>, 2008  
5988-5422EN



Agilent Technologies