



# E6020A Fiber Break Locator

## Technical Data Sheet



Specifications describe the instrument's warranted performance, measured with typical PC- type connectors. Uncertainties due to the refractive index of fiber are not considered.

The following section contains both Specifications and Characteristics:

- *Specifications* describe the instrument's warranted performances
- *Characteristics* and *typical data* provide information about the non-warranted instrument performance.

### ISO 9001

The Agilent Technologies E6020A Mini-FBL is produced to the ISO 9001 international quality system standard as part of Agilent's commitment to continually increasing customer satisfaction through improved quality control.



**Agilent Technologies**

## Characteristics

### Horizontal Parameters

- **Start-km:** 0 km
- **Span:** 0.1 km to 400 km (automatic)
- **Readout resolution:** 0.1 m
- **Minimum sample spacing:** 8 cm (automatic)
- **Refractive index:** 1.00000 to 2.00000
- **Length unit:** km, ft, or miles
- **Measurement points:** 16000

### Vertical Parameters

- **Vertical scale:** 5 dB/Div
- **Read-out resolution:** 0.001 dB
- **Reflectance range:** -14 dB to -60 dB

### Other parameters

- **Pulsewidth:** automatically selected
- **Threshold for fiber breaks:** 0.1 to 10 dB, selectable in 0.1 dB steps
- **Backscatter coefficient:** 48.5 dB (1310 nm), 51.5 dB (1550 nm)

### Source Mode

- **CW output power:** -3 dB
- CW stability (after 10 minute warm-up: 15 min. T=constant):  $\pm 0.1$  dB
- **Modulation:** 270 Hz, 1 KHz, and 2 KHz squarewave

### Output Connector

- Optical Diamond HMS-10, FC/PC, DIN 47256, ST, Biconic, SC, NEC D4, E2000. All options are user-exchangeable

### Documentation

- **3.5" floppy disk drive:** for high density 720/1440 kByte floppy disks. MS-DOS format compatible. Reduced operating temperature of 5°C to 45°C, with 35% to 80% humidity at 40°C.
- **Memory Card:** PCMCIA Type II. 440 MB with up to 13000 traces (typical with 16000 data points).
- **Internal memory:** SRAM up to 2 MB. Up to 100 traces (typical with 1600 data points)
- **Trace format:** compliant to the following Bellcore/Telcordia OTDR trace formats:
  - GR 196, Revision 1.0
  - GR 196, Revision 1.1
  - SR-4731 Revision 2.0.
- **Trace Information:** 5 comment labels of up to 15 alphanumeric characters, and 5 comments of up to 41 alphanumeric characters are provided for each trace.
- Real-time clock and date

### Display

- **Color or monochrome VGA-LCD:** 18.3 cm (7.2")
- **Display points:** 640 x 480 points

### Interfaces

#### RS232C

- **Maximum baud rate:** 115200 bps
- **Transmission time** at 115200 baud for trace data: 16000 points at approx. 4 seconds

- **Centronics:** Standard parallel port (SPP).
- **Keyboard:** PS2 (Min-DIN). For English Standard, PS2, or AT keyboard.

### General

- **Laser Safety Class:** 21 CFR Class 1, IEC 825 Class 3A
- **Recommended recalibration period:** 2 years.
- **Dimensions:** 194 mm H, 290 mm W, 75 mm D (7.7" x 11.4" x 3.0").
- **Weight:** net < 2.9 kg (6.4 lbs), typical, including battery pack and FBL module.

### Built in Applications

- Fiber Break Locator
- Power Meter / Loss Test mode
- Visual Fault Finder mode
- Optical Return Loss
- End to End Loss

### Environmental

- **Operating Temperature:** 0°C to 50°C
- **Storage Temperature:** -40°C to +60°C
- **Humidity:** 95% R.H. from 0°C to 40°C

### Power

- AC: 100–240 Vrms  $\pm 10\%$  50-60 Hz
- DC: 16-24V
- **External Battery:** NiMH typically 8 hours continuous operation (minimum 4 hours). Charging time < 3 hours, non-operating.
- Low battery indicator
- Battery charge status

## Module Specifications/ Characteristics

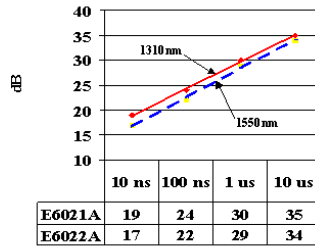
### Specifications: Optical Performance

Measured at 22°C ± 3°C. Guaranteed specifications unless otherwise noted.

**Bold** values are typical specifications.

All Agilent E6000 Series OTDR modules can also be used in the Fiber Break Locator mainframe.

**Dynamic Range**  
(Fiber Break Locator modules)



Values in this table are in dB

### Dynamic Range for Mini-FBL modules

Module	E6021A				E6022A			
	Central Wavelength	1310 ± 25 nm				1550 ± 25 nm		
Applicable Fiber	single-mode				single-mode			
Pulsewidth	10 ns	100 ns	1 μs	10 μs	10 ns	100 ns	1 μs	10 μs
Dynamic Range <sup>1</sup> [dB]	19	<b>24</b>	<b>30</b>	35	17	<b>22</b>	<b>29</b>	34

The guaranteed values above are tested specifications.

#### Notes:

**1** Measured with a standard single-mode fiber at SNR=1 noise level and with 3 minutes averaging time.  
optimize mode: dynamic

## Module Characteristics

### Distance Accuracy<sup>A</sup>

- **Offset Error:**  $\pm 1$  m
- **Scale Error:**  $\pm 10^{-4}$
- **Sampling Error:**  $\pm 0.5$  sampling spacing

### Loss/Reflectance Accuracy<sup>B</sup>

- **Backscatter Measurements:**  $\pm 0.05$  dB (1 dB step), typical
- **Reflectance Measurements<sup>C</sup>:**  $\pm 2.0$  dB, typical

### Acoustic Noise Emission

< 40 dBA, not continuous.  
Data are results from type tests per ISO 7779 (EN 27779).

### Deadzones

- **Event Deadzone:** 5m (typical)
- **Attenuation Deadzone<sup>D</sup>:** 25m
- **Attenuation Deadzone<sup>E</sup>:** 10 m (1310 nm), 12m (1550 nm)

## Break Parameters

Module/Wavelength	Loss Budget to Break	Break Locate Distance Range	Fiber attenuation
E6021A: 1310 nm	30.6 dB	90 km	0.34 dB/km
E6022A: 1550 nm	30.0 dB	150 km	0.20 dB/km

### Notes:

**A** Total distance accuracy =  $\pm$  (offset error + scale error \* distance + sampling error).

**B** SNR  $\geq 15$  dB and with 1  $\mu$ s, averaging time max. 3 minutes.

**C** -20 dB to -60 dB

**D** Guaranteed Specification at Reflectance  $\leq -35$  dB at 30 ns pulsewidth, and with span  $\leq 4$  km.  
Optimize mode: resolution.

**E** Typical Specification at Reflectance  $\leq -50$  dB at 30 ns pulsewidth, and with span  $\leq 4$  km (typical value).

# Agilent E6006A Power Meter Submodule

## Characteristics

**Sensor element:** InGaAs

**Wavelength range:** 800 – 1650 nm

**Calibrated wavelengths:** 850 nm, 1300 nm, 1310 nm, 1550 nm, 1625 nm (special wavelength on request).

**Power range:** +10 to –70 dBm

**Max. input power** (damage level): +13 dBm/20 mW

**Display Resolution:** 0.01 dB

**Display Units:** dBm, dB, mW,  $\mu$ W, nW, pW

### Display Contents

- Calibrated  $\lambda$  in nm
- Modulation frequency in Hz
- Reference value in dB

**Display Updates per second:** 3

**Optical input:** User-exchangeable Connector Interface

**Applicable fiber type:** 9/125  $\mu$ m, 50/125  $\mu$ m, 62.5/125  $\mu$ m

## Specifications

**Uncertainty at reference conditions:**  $\pm$  3%

**Power level:** - 20 dBm

**Continuous Wave (CW)**

**Wavelength:** 1300 $\pm$ 3 nm, 1310 $\pm$ 3 nm, 1550 $\pm$ 3 nm

**Fiber type:** 50/125  $\mu$ m graded index, Agilent/HMS-10 connector

**Spectral bandwidth:** up to 10 nm

**Ambient temperature:** +18 to + 28 °C

**At day of calibration** (add 0.3% for aging of over one year; add 0.6% for aging of over two years).

**Total uncertainty:**  $\pm$  5%  $\pm$  0.5 nW (1310, 1550 nm)

**Power level:** +0 to –50 dBm

**Continuous Wave (CW)**

**Wavelength:** 850 $\pm$ 3 nm, 1300 $\pm$ 3 nm, 1310 $\pm$ 3 nm, 1500 $\pm$ 3 nm,

**Fiber type:** SM to 50 $\mu$ m graded index (add 2% to total uncertainty for fiber 62.5 $\mu$ m).

Straight and angled connectors

**Ambient temperature:** +10 to +40°C

Within 2 years after calibration

## Supplementary Performance Characteristics

- Automatic Zeroing Circuitry
- Automatic Ranging
- Modulation frequency recognition (270 Hz, 1 kHz, 2 kHz) is available at power level between +10 and –45 dBm (peak amplitude).
- Wavelength encoding recognition (350 Hz, 550 Hz) is available at

power levels between +10 and –45 dBm (peak amplitude)

- Reference value is presettable from +30 to –80 dBm
- Each calibrated wavelength has its own reference memory.
- The actual display content can be transferred to reference memory(DISP→REF).
- Hold Data functionality

## General Specifications

**Dimensions:** ca. 120 mm H x 40 mm W x 25 mm D (4.7" x 1.6" x 1.0")

**Weight:** <130g.

**Operating Temperature:** 0 to +50 °C

**Storage Temperature:** -40 to +60 °C

**Humidity:** 95% R.H. from 0°C to 40°C non cond.

**Recommended Recalibration Period:** 2 years

# Agilent E6007A Visual Fault Finder Submodule

## Characteristics

**Source type:** Laser diode

**Center Wavelength:** 635 nm  $\pm$  10 nm  
(visible red light)

### Output power level (CW)

- 0 dBm maximum
- into 9 $\mu$ m fiber (typ.): -3 dBm

**Detection range:** up to 5 km

**Optical output:** User-exchangeable  
Connector Interface

Laser Class II (21 CFR 1040), Class II  
(IEC 825-1)

## Supplementary Performance Characteristics

- Continuous Wave and Blink  
Mode(1 Hz for better visibility).
- Single-Mode and multimode  
fibers applicable.

## General Specifications:

**Dimensions:** ca. 120 mm H x  
40 mm W x 25 mm D (4.7" x 1.6" x 1.0")

**Weight:** < 100g

**Operating Temperature:** 0 to 40 °C

**Storage Temperature:** -40 to +60 °C

**Humidity:** 95% R.H. from 0°C to 40°C  
non cond.

## Accessories

The Agilent Technologies E6020A is a high performance time domain reflectometer. It is available in various configurations for the best possible match to the most common applications.

### Instrument and Options

Agilent Product	Opt	Description
E6020A		Fiber Break Locator Mainframe
	003	Color screen VGA LCD
	006	B/W Screen VGA-LCD
	AB2	Simplified Chinese user interface
	ABD	German user interface
	ABF	French user interface

### Modules

Agilent Product	Opt	Description
E6021A	022	1310 nm, 35 dB single-mode module
		angled connector
E6022A	022	1550 nm, 35 dB single-mode module
		angled connector
E6006A		Optical Power Meter
E6007A		Visual Fault Finder

### Support Options

For all Agilent Mini-FBLs, the following support options are available.

W30	3 years of Customer Return Repair Service
W32	3 years of Customer Return Calibration Service
W50	5 years of Customer Return Repair Service
W52	5 years of Customer Return Calibration Service

### Accessories supplied

The following accessories are supplied with your Mini-FBL Mainframe:

	Soft carrying case
	Power cord
	AC/DC adapter
	User 's Guide

	Support CD RS 232 cable Mini-FBL Reference Card Cleaning Procedures Pocket Guide NiMH battery pack
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The following accessories are supplied with your Mini-FBL modules:

81000FI	FC/PC connector interface (single-mode modules only)
81000KI	SC connector interface

All modules come with a commercial calibration certificate.

### Additional Accessories

The following accessories are also available. To order these products, please contact your Agilent Technologies representative.

Product	Description
E6080A	Spare NiMH battery pack
E6081A	Mini-Keyboard
E6082A	Hard transit case
E6083A	64 MB Compac / Flash™ disk with PCMCIA adapter
E6091A	OTDR Toolkit II <i>Plus</i> software
5180-0010C	Centronics cable
24542U	RS232 cable, 9-pin to 9-pin

### Connector Interfaces and Other Accessories

The Agilent E6021A/E6022A Mini-FBL modules are usually supplied with a straight contact output connector interface.

#### Optical Connector

Agilent Model No.	Description
81000AI	Diamond HMS/10 connector interface
81000FI	FC/PC connector interface
81000GI	D4 connector interface
81000HI	E2000 connector interface
81000KI	SC connector interface
81000SI	DIN 47256 connector interface
81000VI	ST connector interface
81000WI	Biconic connector interface

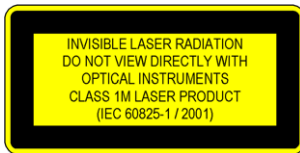


## Safety Information

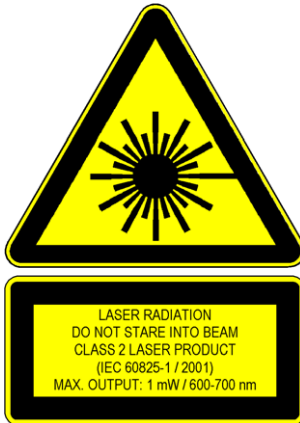
All laser sources specified by this data sheet are classified as class 1M or class 2 according to IEC 60825-1 (2001).

All laser sources comply with FDA 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26.

The class 1M laser sources (all Mini-FBL modules except E6006A and E6007A submodules) bear the laser label



The class 2 laser source (E6007A) bears the laser labels



All modules also bear the CE conformity marking



You **must** return instruments with malfunctioning laser modules to an Agilent Technologies Service Center for repair and calibration, or have the repair and calibration performed on-site by Agilent Technologies personnel.

## 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."

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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

### Online assistance:

[www.agilent.com/comms/otdr](http://www.agilent.com/comms/otdr)

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(fax) (31 20) 547 2390

Japan:  
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(fax) (81) 426 56 7840

Latin America:  
(tel) (305) 269 7500  
(fax) (305) 269 7599

Australia:  
(tel) 1 800 629 485  
(fax) (61 3) 9210 5947

New Zealand:  
(tel) 0 800 738 378  
(fax) 64 4 495 8950

Asia Pacific:  
(tel) (852) 3197 7777  
(fax) (852) 2506 9284

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