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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

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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): ±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°
- **Humidity:** 95% R.H. from 0°C to 40°C

Power

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

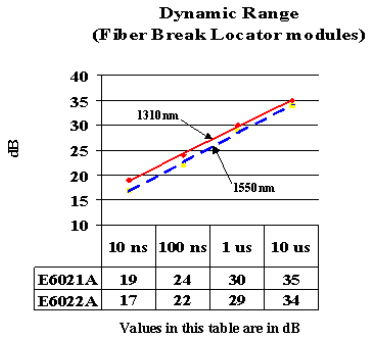
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Module Specifications/ Characteristics

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.



	10 ns	100 ns	1 us	10 us
E6021A	19	24	30	35
E6022A	17	22	29	34

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	1µs	10µs	10 ns	100 ns	1µs	10µs
Dynamic Range[1] [dB]	19	**24**	**30**	35	17	**22**	**29**	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

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Module Characteristics

Distance Accuracy[A]

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

Loss/Reflectance Accuracy[B]

- **Backscatter Measurements:** ± 0.05 dB (1 dB step), typical
- **Reflectance Measurements[C]:** ± 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[D]:** 25m
- **Attenuation Deadzone[E]:** 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 =± (offset error + scale error * distance+ sampling error).

B SNR ≥ 15 dB and with 1 µs, averaging time max. 3 minutes.

C –20 dB to –60 dB

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

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

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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, µW, nW, pW

Display Contents

- Calibrated λ 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 µm, 50/125 µm, 62.5/125 µm

Specifications

Uncertainty at reference conditions: ± 3%

Power level: - 20 dBm

Continuous Wave (CW)

Wavelength: 1300±3 nm, 1310±3 nm, 1550±3 nm

Fiber type: 50/125 µm 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: ± 5% ± 0.5 nW (1310, 1550 nm)

Power level: +0 to –50 dBm

Continuous Wave (CW)

Wavelength: 850±3 nm, 1300±3 nm, 1310±3 nm, 1500±3 nm,

Fiber type: SM to 50µm graded index (add 2% to total uncertainty for fiber 62.5µm).

Straight and angled connectors

Ambient temperature: +10 to +40°C

Within 2 years after calibration

Supplementary Performance Characteristics

- Automatic Zeroing Circuity
- 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

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Agilent E6007A Visual Fault Finder Submodule

Characteristics

Source type: Laser diode

Center Wavelength: 635 nm ± 10 nm (visible red light)

Output power level (CW)

- 0 dBm maximum
- into 9µm 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.

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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		1310 nm, 35 dB single-mode module
	022	angled connector
E6022A		1550 nm, 35 dB single-mode module
	022	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

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	Support CD RS 232 cable Mini-FBL Reference Card Cleaning Procedures Pocket Guide NiMH battery pack

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 *Plus* 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

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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.

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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."

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(fax) (905) 206 4120

Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(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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