HEWLETT® PACKARD

HP E6000A Mini-OTDR

Technical Specifications

Product Specifications and Characteristics

Single-Mode Modules
HP E6001A, HP E6002A, HP E6003A, HP E6004A

Specifications

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 HP E6000A Mini-OTDR is produced to the ISO 9001 international quality system standard as part of HP's commitment to continually increasing customer satisfaction through improved quality control.

Optical performance[1]

Module	HP E6002A				HP E6003A			
Central wavelength	**1310** ± 25 nm				**1310/1550** ± 25 nm			
Fiber type	single-mode				single-mode			
Pulsewidth	10 ns	100 ns	1 µs	10 µs	10 ns	100 ns	1 µs	10 µs
Dynamic range (dB)[2]	19	24	30	**35**	19/17	24/22	30/29	**35/34**

Module	HP E6001A				HP E6004A			
Central wavelength	**1310** ± 25 nm				**1310/1550** ± 25 nm			
Fiber type	single-mode				single-mode			
Pulsewidth	10 ns	100 ns	1 µs	10 µs	10 ns	100 ns	1 µs	10 µs
Dynamic range (dB)[2]	13	18	23	**28**	13/13	18/18	23/23	**28/28**

Resolution

Module	HP E6001A	HP E6002A	HP E6003A	HP E6004A
Event deadzone [3]	5 m	5 m	5 m	5 m
Attenuation deadzone [4]	25 m	20 m	20/25 m	25/25 m

Characteristics

Distance accuracy[5]

Offset error	Scale error	Sampling error
±1 m	$\pm 10^{-4}$	±0.5 sampling spacing

Loss/reflectance accuracy[6]

Backscatter measurements	Reflectance measurements [7]
1 dB step	
±0.05 dB	±2.0 dB

Note:
[1] Measured at 25 °C.
[2] Measured at SNR = 1 noise level and with 3 minutes averaging time.
[3] Reflectance ≤ -35 dB at pulsewidth 10 ns and with span ≤ 4 km.
[4] Reflectance ≤ -35 dB at pulsewidth 30 ns and with span ≤ 4 km.
[5] Total distance accuracy: offset error + scale error x distance + sampling error.
[6] SNR ≥ 15 dB and with 1 µs, averaging time maximum 3 minutes.
[7] -20 dB to -60 dB.

Minimum sample spacing: 8 cm.
Modulation: 270 Hz, 1 kHz, and 2 kHz squarewave.
Pulsewidth: selectable, from 10 ns to 10 µs.

	HP E6001A, HP E6002A built-in laser CW source	HP E6003A, HP E6004A built-in dual laser CW source
Central wavelength	**1310** ± 25 nm	**1310/1550** ± 25 nm
Output power level (CW)	-3 dBm	
Stability [1]	± 0.1 dB	
Optical output	User-exchangeable connector interfaces	
Output connector	Optional Diamond HMS-10, FC/PC, DIN 47256, ST, Biconic, SC, NEC D4	

Note:
[1] After 10 minute warm-up with 15 min. @ T = constant.

General

Laser safety class: 21 CFR class 1, IEC825 class 3A.
Operating temperature: 0 °C to +50 °C.
Storage temperature: -40 °C to +60 °C.
Humidity: 95 % R.H. from 0 °C to +40 °C.
Recalibration period: 2 years.

Specifications

Optical performance[1]

Module	HP E6005A				HP E6009A		
Central wavelength	**850/1300** ± 30 nm				**850/1300** ± 30 nm		
Fiber type	multimode 62.5 µm				multimode 62.5 µm		
Pulsewidth	10 ns	100 ns	1 µs	10 µs	10 ns	100 ns	1µs
Dynamic range (dB)[2]	19/17	26/22	- /28	- /34	12/12	18/18	- /23

Resolution

Module	HP E6005A	HP E6009A
Event deadzone[3]	3 m	3 m
Attenuation deadzone[4]	10 m	10 m

Characteristics

Distance accuracy[5]

Offset error	Scale error	Sampling error
±1 m	$\pm 10^{-4}$	±0.5 sampling spacing

Loss/reflectance accuracy[6]

Backscatter measurements	Reflectance measurements [7]
1 dB step	
±0.05 dB	±2.0 dB

Note
[1] Measured at 25 °C.
[2] Measured at SNR = 1 noise level and with 3 minutes averaging time.
[3] Reflectance ≤ -35 dB at pulsewidth 5 ns and with span ≤ 4 km.
[4] Reflectance ≤ -35 dB at pulsewidth 10 ns and with span ≤ 4 km.
[5] Total distance accuracy: offset error + scale error x distance + sampling error.
[6] SNR ≥ 15 dB and with 1 µs @ 1300 nm, SNR ≥ 15 dB and with 100 ns @ 850 nm.
[7] -20 dB to -60 dB.

Minimum sample spacing: 8 cm.
Modulation: 270 Hz, 1 kHz, and 2 kHz squarewave.
Pulsewidth: selectable, from 5 ns to 100 ns (850 nm), 5 ns to 1 µs (HP E6009A @ 1300 nm), and 5 ns to 10 µs (HP E6005A @ 1300 nm).

	HP E6005A/E6009A built-in dual laser (CW) source
Central wavelength	**850/1300** ± 30 nm
Output power level (CW)	-17 dBm (850 nm) -13 dBm (1300 nm)
Stability [1]	±0.15 dB
Optical output	User-exchangeable connector interfaces
Output connector	Optional Diamond HMS-10, FC/PC, DIN 47256, ST, Biconic, SC, NEC D4

Note:
[1] After 10 minute warm-up with 15 min.
@ T = constant.

General

Laser safety class: 21 CFR class 1, IEC825 class 3A.
Operating temperature: 0 °C to +50 °C.
Storage temperature: -40 °C to +60 °C.
Humidity: 95 % R.H. from 0 °C to +40 °C.
Recalibration period: 2 years.

Sub-Module Power Meter HP E6006A

Characteristics

	HP E6006A optical power meter sub-module
Sensor element	InGaAs
Wavelength range	800 - 1650 nm
Calibrated wavelengths	850, 1300, 1310, 1550 nm (special wavelengths on request)
Power range	+10 to -70 dBm
Maximum input power (damage level)	+13 dBm/20 mW
Display:	
Resolution	0.01 dB
Units	dBm, dB, mW, µW, nW, pW
Contents	Calibrated λ in nm Modulation frequency in Hz REFerence value in dB
Updates per second	3
Optical input	User-exchangeable connector interfaces
Applicable fiber type	9/125 µm, 50/125 µm, 62.5/125 µm

Specifications

Uncertainty at reference conditions	±3 %[1]
Total uncertainty @ 1300 nm, 1310 nm and 1550 nm Total uncertainty @ 850 nm	±5 % ± 0.5 nW[2] ±10 % ± 2.5 nW[2]

[1]	[2]
Power level: -20 dBm. Continuous wave (CW). Wavelengths: 1300 ± 3 nm, 1310 ± 3 nm, 1550 ± 3 nm. Fiber type: 50/125 µm graded index. HP/HMS-10 connector. Spectral bandwidth up to 10 nm. Ambient temperature: +18 to +28 °C. At day of calibration (add 0.3 % for aging over one year, add 0.6 % over two years).	Power level: +0 to -50 dBm. Continuous wave (CW). Wavelengths: 850 ± 3 nm, 1300 ± 3 nm, 1310 ± 3 nm, 1550 nm ± 3 nm. Fiber type: SM to 50 µm graded index. (for fiber 62.5 µm, add 2 % to total uncertainty). Straight and angled connectors. Ambient temperature: +10 to +40 °C. Within 2 years after calibration.

Supplementary Performance Characteristics

- Automatic zeroing circuitry.
- Modulation frequency recognition (270 Hz, 1 kHz, 2 kHz) is available at power levels 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 pre-settable 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

Dimensions: approx. 120 mm H x 40 mm W x 25 mm D.
(4.7" x 1.6" x 1.0").
Weight: <130 g.
Operating temperature:
0 °C to +50 °C.
Storage temperature:
-40 °C to +60 °C.
Humidity: 95 % R.H. from 0 °C to +40 °C non cond.
Recommended recalibration period: 2 years.

Sub-Module Visual Fault Finder HP E6007A

Characteristics

	HP E6007A visual fault finder sub-module
Source type	Laser diode
Central wavelength	635 ± 10 nm (visible red light)
Output power level (CW)	max. 0 dBm
Output power level (CW) into 9 μm fiber (typ.)	-3 dBm
Detection range up to:	5 km
Laser class II (21 CFR 1040) class II (IEC 825-1)	
Optical output	User-exchangeable connector interfaces

Supplementary Performance Characteristics

- Continuous wave and blink mode (1 Hz for better visibility).
- Single-mode and multimode fibers applicable.

General

Dimensions: approx. 120 mm H x 40 mm W x 25 mm D. (4.7" x 1.6" x 1.0").
Weight: <100 g.
Operating temperature: 0 °C to +40 °C.
Storage temperature: -40 °C to +60 °C.
Humidity: 95 % R.H. from 0 °C to +40 °C non cond.

Mainframe Characteristics

Horizontal parameters

Start-km: 0 km - 100 km.
Span: 1 km - 200 km.
Readout resolution: 0.1 m.
Minimum sample spacing: 0.08 m.
Refractive index: 1.00000 - 2.00000.
Backscatter coefficient: 20 - 60 dB at 1 µs.
Length unit: km, kft or miles.
Measurement points: up to 16000.

Vertical parameters

Vertical scale: 0.1 - 5.0 dB/Div.
Readout resolution: 0.001 dB.
Reflectance range: -14 dB to > -60dB.

Auto setup and analysis: provided.
Instrument settings: storage and recall of user-selectable instrument settings.
Real-time clock and date: provided.

Scan Trace

Type of events: reflective and non-reflective events.
Maximum number of events: 100.
Threshold for non-reflective events: 0.0 to 5.0 dB, selectable in 0.01 dB steps.
Threshold for reflective events: -14.0 to -65.0 dB, selectable in 0.1 dB steps.
Threshold for fiber breaks: 0.1 to 10 dB, selectable in 0.1 dB steps.

Documentation

3.5" floppy disk drive (optional): for high density, 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: SRAM up to 2 MB.
Internal memory: up to 100 traces (typ. with 4000 data points selected).
Trace format: compliant to Bellcore GR-196-CORE Issue 1 OTDR Data Standard.
Trace information: five comment labels of up to 15 alpha-numeric characters and five comments of up to 41 alpha-numeric characters are provided for each trace.

Display

VGA-LCD: 18.3 cm (7.2"), mono.
Display points: 640 x 480 points.

Interfaces

RS232C: maximum baud rate 115200 bps.
Centronics: standard parallel port (SPP).

General

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

Power

AC: 100 - 240 Vrms ± 10 %, 50 - 60 Hz.
DC: 16 - 24 V.
Battery: NiMH typ. eight hours continuous operation (minimum four hours).
Charging time: <3 hours non-operating.
Low battery indicator: provided.
Battery charge status: provided.
Dimensions: 194 mm H, 290 mm W, 75 mm D (7.7" x 11.4" x 3.0").
Weight: net <2.8 kg (6.2 lbs), including battery pack.

Ordering Information

HP E6000A Mainframe.
Options:
001 Floppy disk drive.
AB2 Chinese user interface.
AB9 Portuguese user interface.
ABD German user interface.
ABE Spanish user interface.
ABF French user interface.
ABJ Japanese user interface.
ABZ Italian user interface.

HP E6001A	1310 nm single-mode module.
HP E6002A	1310 nm single-mode module.
HP E6003A	1310/1550 nm single-mode module.
HP E6004A	1310/1550 nm single-mode module.
HP E6005A	850/1300 nm multimode module (high performance).
HP E6006A	Optical power meter.
HP E6007A	Visual fault finder.
HP E6009A	850/1300 nm multimode module (economy).

81000AI	Diamond HMS-10 connector interface.
81000FI	FC/PC connector interface.
81000GI	D4 connector interface.
81000KI	SC connector interface.
81000SI	DIN 47256 connector interface.
81000VI	ST connector interface.
81000WI	Biconic connector interface.

Accessories supplied:
- user's guide,
- NiMH battery pack,
- AC/DC adapter,
- power cord,
- soft carrying case.

Optional accessories:

E6000-68950	NiMH battery pack.
E6000-68951	2 MB SRAM card.
24542U	RS232 cable.
C2950A	Centronics cable.

HP Related Literature

HP E6000A Mini-OTDR "Maximize your network uptime", brochure, p/n 5965-1256E.

For more information about Hewlett-Packard test & measurement products, applications, services, and for a current sales office listing, visit our web site, http://www.hp.com/go/tmdir. You can also contact one of the following centers and ask for a test and measurement sales representative.

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