

HP 83400-60005

DC Cable (Probe Power)



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System lightwave source characteristics

Table 2.1.
Lightwave source characteristics*

Description	HP 83400A/B	HP 83401A	HP 83402A/B
Wavelength	1308 ±10 nm	1308 ±10 nm	1308 ±20 nm
Spectral width (typical)	≤ 2.5 nm	≤ 2.5 nm	≤ 2.5 nm
Average optical output power:			
Maximum	(A) 1500 μW (1.8 dBm)	1500 μW (1.8 dBm)	(A) 2400 μW (3.8 dBm)
Typical	(A) 1100 μW (0.4 dBm)	1100 μW (0.4 dBm)	(A) 1300 μW (1.1 dBm)
Minimum	(A) 700 μW (-1.5 dBm)	700 μW (-1.5 dBm)	(A) 700 μW (-1.5 dBm)
Maximum	(B) 1200 μW (0.8 dBm)		(B) 1900 μW (2.8 dBm)
Typical	(B) 550 μW (-2.6 dBm)		(B) 750 μW (-1.2 dBm)
Minimum	(B) 275 μW (-5.6 dBm)		(B) 290 μW (-5.4 dBm)
Responsivity (at 50 MHz, nominal)	(A) 0.022 W/A (-33 dBe) (B) 0.011 W/A (-39 dBe)	0.022 W/A (-34 dBe)	(A) 0.022 W/A (-33 dBe) (B) 0.011 W/A (-39 dBe)
Modulation bandwidth	300 kHz to 3 GHz	300 kHz to 3 GHz	300 kHz to 6 GHz
Modulation frequency resolution ⁸	1 Hz	1 Hz	1 Hz
Modulated optical output power (nominal)			
Peak-to-peak	(A) 968 μW (-0.1 dBm)	968 μW (-0.1 dBm)	(A) 968 μW (-0.1 dBm)
Peak	(A) 484 μW (-3.2 dBm)	484 μW (-3.2 dBm)	(B) 484 μW (-3.2 dBm)
Peak-to-peak	(A) 484 μW (-3.2 dBm)		(B) 484 μW (-3.2 dBm)
Peak	(B) 242 μW (-6.2 dBm)		(B) 242 μW (-6.2 dBm)
Modulation index (typical) ¹⁰	(A) 44% (B) 44%	44%	(A) 37% (B) 32%
Laser isolation	(A) none (B) 50 dB	none	(A) none (B) 50 dB
Reflection sensitivity (nominal) ¹¹	(A) ±1.0 dB (B) ±0.25 dB	±1.0 dB	(A) ±2.0 dB (B) ±0.25 dB
Optical port return loss (nominal) ¹²	(A) 10 dBo (B) 37 dBo	10 dBo	(A) 10 dBo (B) 37 dBo
Harmonic distortion (nominal) ¹³	-25 dBc (300 kHz-1 GHz) -7 dBc (1 GHz-3 GHz)	-25 dBc (300 kHz-1 GHz) -7 dBc (1 GHz-3 GHz)	-25 dBc (300 kHz-1 GHz) -8 dBc (1 GHz-3 GHz)
Laser type	Fabry-Perot	Fabry-Perot	Fabry-Perot
Laser Class	FDA Class I and IEC Class IIIB	FDA Class I and IEC Class IIIB	FDA Class I and IEC Class IIIB
Compatible fiber	9/125 μm	50/125 μm	9/125 μm
Electrical port return loss	14 dB	14 dB	14 dB

8 Lightwave source characteristics are described given a >30 dBo return loss optical termination and a 14 dBm RF drive power. The HP 83404 requires a 12 dBm RF drive power.

9 When used with the HP 8702B's synthesized RF source.

10 Modulation index is defined as peak modulated optical power divided by average optical power. For example, the HP 83400A has a modulation index of 44% (= 484 μW / 1100 μW).

11 Laser reflection sensitivity is tested using a 95% reflection, an optical coupler (15 dB coupling factor and 1.5 dB main arm loss) and the optical output power shown in Table 2.1 and 2.2.

12 All specifications are given using HMS-10/HP lightwave connectors.

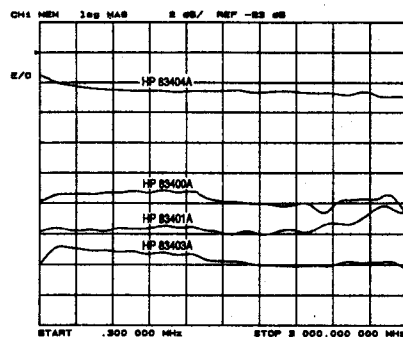
13 Harmonic levels are given for average optical powers and modulation powers listed in Table 2.1 and 2.2. dBc rating is for dBe below the fundamental modulation components.

14

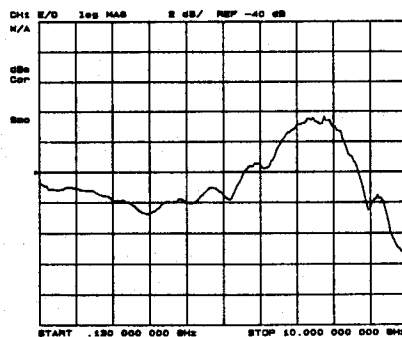


Table 2.2.
Lightwave source characteristics^a

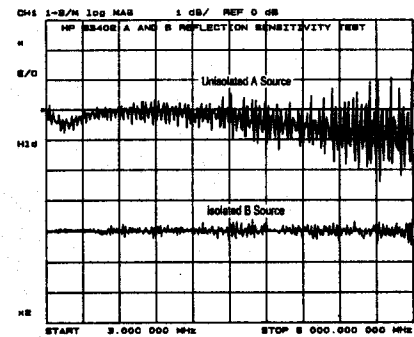
Description	HP 83403A/B	HP 83404A/B ^a
Wavelength	1550 $\pm$ 20 nm	840 $\pm$ 20 nm
Spectral width (typical)	$\leq$ 3.5 nm	$\leq$ 1 nm
Average optical output power:		
Maximum	(A) 1500 μ W (1.8 dBm)	(A) 3000 μ W (4.8 dBm)
Typical	(A) 675 μ W (-1.7 dBm)	(A) 2000 μ W (3.0 dBm)
Minimum	(A) 350 μ W (-4.6 dBm)	(A) 700 μ W (-1.5 dBm)
Maximum	(B) 1200 μ W (0.8 dBm)	(B) 1450 μ W (1.6 dBm)
Typical	(B) 500 μ W (-3.0 dBm)	(B) 600 μ W (-2.2 dBm)
Minimum	(B) 135 μ W (-8.7 dBm)	(B) 345 μ W (-4.62 dBm)
Responsivity (at 50 MHz, nominal)	(A) 0.014 W/A (-37 dBe) (B) 0.007 W/A (-43 dBe)	(A) 0.063 W/A (-24 dBe) (B) 0.011 W/A (-39 dBe)
Modulation bandwidth	300 kHz to 3 GHz	300 kHz to 3 GHz
Modulation frequency resolution ^a	1 Hz	1 Hz
Modulated optical output power (nominal)		
Peak-to-peak	(A) 616 μ W (-2.1 dBm)	(A) 2770 μ W (4.4 dBm)
Peak	(A) 308 μ W (-5.1 dBm)	(A) 1390 μ W (1.4 dBm)
Peak-to-peak	(B) 308 μ W (-5.1 dBm)	(B) 484 μ W (-3.2 dBm)
Peak	(B) 154 μ W (-8.1 dBm)	(B) 242 μ W (-6.2 dBm)
Modulation index (typical) ¹⁰	(A) 46% (B) 30%	(A) 70% (B) 40%
Laser isolation	(A) 0 dB (B) 28 dB	(A) 0 dB (B) 28 dB
Reflection sensitivity (nominal) ¹¹	(A) $\pm$ 1.0 dB (B) $\pm$ 0.25 dB	(A) $\pm$ 1.0 dB (B) $\pm$ 0.25 dB
Optical port return loss (nominal) ¹²	(A) 10 dBo (B) 37 dBo	(A) 10 dBo (B) 37 dBo
Harmonic distortion (nominal) ¹³	-20 dBc (300 kHz to 1 GHz) -7 dBc (1 GHz to 3 GHz)	-20 dBc (300 kHz to 1 GHz) -10 dBc (1 GHz to 3 GHz)
Laser type	Fabry-Perot	Fabry-Perot
Laser Class	FDA Class I and IEC Class IIIB	FDA Class IIIB and IEC Class IIIB
Compatible fiber	9/125 μ m	50/125 μ m
Electrical port return loss	14 dB	14 dB



Typical frequency response for
HP 83400A/B, HP 83401A, HP 83403A/B
and HP 83404A/B sources



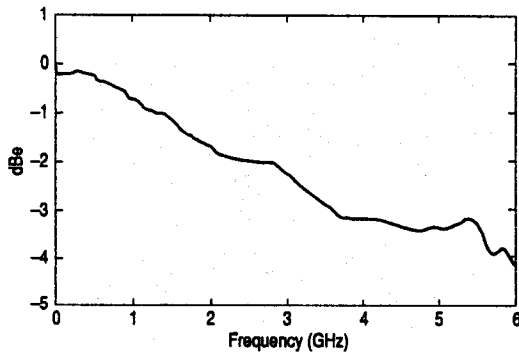
Typical frequency response
for HP 83402A/B sources



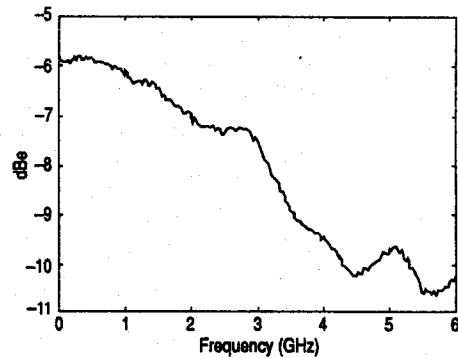
Built-in isolation in the HP 8340xB
sources greatly reduces reflection
sensitivity compared to the HP 8340xA
models (plots show HP 83402 A and B
responses to a 95% reflection
termination).

Lightwave Source Performance Summary

Specifications and Characteristics (<i>in italics</i>)	HP 83402C	HP 83403C
Center wavelength ^{8,9}	1310 ±30 nm	1550 ±30 nm
Center wavelength stability ⁸	0.3% per year	0.3% per year
Spectral Width ^{8,9}	<50 MHz	<50 MHz
Average optical output power ^{8,9}	2000–3000 µW	2000–3000 µW
Optical port return loss	≥35.0 dBo	≥35.0 dBo
Modulation range	300 kHz to 6 GHz	300 kHz to 6 GHz
RF input power (max)	+11 dBm	+11 dBm
DC into RF port (max)	20 V	20 V
Electrical port return loss ¹⁰	≥11 dB	≥11 dB
Modulation frequency response (300 kHz to 6 GHz) ⁸		
Corrected (disk) (specification)	±0.5 dBe	±0.5 dBe
Corrected (disk)	±0.31 dBe	±0.31 dBe
Corrected (polynomial)	±1.5 dBe	±1.5 dBe
Uncorrected	±0.2/-4.8 dBe	+0.2/-4.8 dBe
Responsivity at 140 MHz modulation frequency	0.053 W/A (-25.5 dBe)	0.053 W/A (-25.5 dBe)
Modulation (harmonic) distortion ¹¹		
300 kHz to 1 GHz	25.0 dBc	25.0 dBc
1 GHz to 3 GHz	(footnote 12)	(footnote 12)
1 GHz to 6 GHz	8.0 dBc	8.0 dBc
Third order intercept (min) ¹¹	23 dBm	23 dBm
1 dB modulation compression level at 50 MHz	—	—
Equivalent Input Noise		
0.01 to 5 GHz	-124 dBm/Hz	-124 dBm/Hz
5 to 6 GHz	-119 dBm/Hz	-119 dBm/Hz
Reflection Sensitivity (300 kHz to 6 GHz) ¹³	±0.04 dBe	±0.04 dBe
Laser Type	DFB	DFB
Laser Class	FDA Class I and IEC Class IIIB	FDA Class I and IEC Class IIIB
Optical Fiber	9/125 µm	9/125 µm



HP 83402C modulation frequency response (characteristic)



HP 83403C modulation frequency response (characteristic)

⁸ Factory test system

⁹ No intensity modulation applied.

¹⁰ Measured on HP 8703 from 130 MHz to 6 GHz.

¹¹ Measured with +10 dBm RF input power 0.01 to 6 GHz.

¹² Changes linearly from 25 dBc at 1 GHz to 8 dBc at 3 GHz.

¹³ To a Fresnel reflection using a 9:1 optical coupler, averaging factor = 16

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