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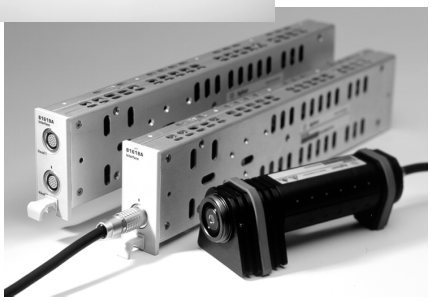
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Agilent Power Sensor Modules
Agilent Optical Heads
Agilent Return Loss Modules

Technical Specifications

February 2002_1





Agilent Technologies

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Power sensor module specifications (Autorange mode)

	Agilent 81635A	Agilent 81634B
Sensor element	InGaAs (dual)	InGaAs
Wavelength range	800 – 1650 nm	800 – 1700 nm
Power range	+10 to –80 dBm	+10 to –110 dBm
Applicable fiber type	Standard SM and MM up to 62.5 µm core size, NA ≤0.24	Standard SM and MM up to 100 µm core size, NA ≤0.3
Uncertainty (accuracy) at reference conditions [1]	± 3 % (1200 nm to 1630 nm)	± 2.5 % (1000 nm to 1630 nm)
Total uncertainty [2]	± 5% ± 20 pW[8], [9] (1200 nm to 1630 nm)	± 4.5% ± 0.5 pW (1000 nm to 1630 nm)
Relative uncertainty: - due to polarization [3] - spectral ripple (due to interference) [4]	 typ. ±0.015 dB typ. ±0.015 dB	 < ±0.005 dB < ±0.005 dB
Linearity (power): [5] - at 23°C ± 5°C - at operating temp. range	CW +10 to –60 dBm (1200 nm to 1630 nm) < ±0.02 dB ±20 pW [9] < ±0.06 dB ±20 pW [9]	CW +10 to –90 dBm (1000 nm to 1630 nm) < ±0.015 dB ± 0.2 pW < ±0.05 dB ± 0.5pW
Return loss [7]	> 40 dB	> 55 dB
Noise (peak to peak) [5] [6]	< 20 pW	< 0.2 pW
Averaging time (minimal)	100 µs	100 µs
Analog Output	none	included
Dimensions (H x W x D)	75 mm x 32 mm x 335 mm (2.8" x 1.3" x 13.2")	
Weight	0.5 kg	
Recalibration period	2 years	
Operating temperature	+10°C to +40°C	0°C to +45°C
Humidity	Non-condensing	Non-condensing
Warm-up time	20 min	20 min

[1] Reference conditions:
- Power level 10 µW (-20dBm), continuous wave (CW)
- Fiber 50 µm graded-index, NA = 0.2
- Ambient temperature 23°C ± 5°C
- On day of calibration (add ± 0.3 % for aging over one year, add ± 0.6 % over two years)
- Spectral width of source < 10nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4 nm

[2] Operating Conditions:
- Fiber ≤ 50 µm, NA ≤ 0.2
- Only Agilent 81635A: For fiber 62.5 µm graded-index (NA = 0.24) : add ± 2 %
- Within one year after calibration, add 0.3 % for second year
- Add ± 1% for Biconic connector
- Operating temperature range as specified humidity: none condensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power, straight connector,
T = 23°C ± 5°.
For angled connector (8°) add ± 0.01 dB typ.

[4] Conditions:
Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power,
Temperature 23°C ± 5°C
Linewidth of source ≥ 100 MHz, angled connector 8°.

[5] At const. Temperature ($_{\Delta}$T = ±1 °C)

[6] Averaging time 1s, T = 23°C ±5°C,
observation time 300 s.
Wavelength range 1200-1630 nm.

[7] Conditions:
Wavelengths 1310nm ± 30 nm and 1550nm ± 30 nm.
Standard single mode fiber, angled connector min 8°.
T = 23°C ± 5°C

[8] For wavelengths > 1600 nm add ± 0.06%/nm

[9] For input power > 2 mW add ± 0.02dB

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High power sensor module specifications (Autorange mode)

	Agilent 81630B
Sensor element	InGaAs
Wavelength range	970 – 1650 nm
Power range	+28 to –70 dBm
Applicable fiber type	Standard SM and MM up to 100 µm core size, NA ≤0.3
Uncertainty (accuracy) at reference conditions [1]	±3.0 % for 1255 nm to 1630 nm at 980 nm ±3.5 % (add ±0.5% per nm if 980 nm is not the center wavelength) at 1060 nm ±4.0 % (add ±0.6% per nm if 1060 nm is not the center wavelength),
Total uncertainty [2] [8]	±5 % ±1.2 nW for 1255 nm to 1630 nm) at 980 nm ±5.5 % ± 1.2 nW (add ±0.5% per nm if 980 nm is not the center wavelenth) at 1060 nm ±6.0 % ± 1.2 nW (add ±0.6 % per nm if 1060 nm is not the center wavelenth)
Relative uncertainty: - due to polarization [3] - spectral ripple (due to interference) [4]	< ±0.01 dB < ±0.005 dB
Linearity (power): [5] - at 23°C ± 5°C - at operating temp. range	CW + 28 to – 50 dBm 970 – 1630 nm ≤±0.05 dB ± 1.2 nW[8] ≤±0.15 dB ± 1.2 nW[8]
Return loss [7]	> 55 dB
Noise (peak to peak) [5] [6]	< 1.2 nW
Averaging time (minimal)	100 µs
Analog Output	Included
Dimensions (H x W x D)	75 mm x 32 mm x 335 mm (2.8" x 1.3" x 13.2")
Weight	0.6 kg
Recalibration period	2 years
Operating temperature	0°C to +35°C
Humidity	Non-condensing
Warm-up time	20 min

[1] Reference conditions:
- Power level 80 µW, continuous wave (CW)
- SM Fiber; 9µm; NA = 0.1
- Ambient temperature 23°C ± 5°C
- On day of calibration (add ± 0.3 % for aging over one year, add ± 0.6 % over two years)
- Spectral width of source < 10nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4 nm

[2] Operating Conditions:
- Fiber ≤ 50 µm, NA ≤ 0.2
- Within one year after calibration, add 0.3 % for second year
- Add ± 1% for Biconic connector
- Operating temperature range as specified, humidity: non-condensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power, straight connector,
T = 23°C ± 5°.
For angled connector (8°) add ± 0.01 dB typ.

[4] Conditions:
Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power,
Temperature 23°C ± 5°C
Linewidth of source ≥ 100 MHz, angled connector 8°.

[5] At const. Temperature (ΔT = ±1 °C)

[6] Averaging time 1s, T = 23°C ±5°C, observation time 300 s.
Wavelength range 1255-1630 nm.

[7] Conditions:
Wavelengths 1310nm ± 30 nm and 1550nm ± 30 nm.
Standard single mode fiber, angled connector min 8°.
T = 23°C ± 5°C

[8] For input power > +10 mW add:
typ. ± 0.0012 dB/mW
In case of negative power change > 50dB allow additional recovery time of 3 min

[9] 30°C for > +20dBm input power

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Fast power sensor module specifications (Autorange mode)

	Agilent 81636B	Agilent 81637B
Sensor element	InGaAs	InGaAs
Wavelength range	1250 - 1640 nm	1250 – 1640 nm
Power range	+10 to –80 dBm	+10 to –80 dBm
Applicable fiber type	Standard SM and MM up to 62.5 µm core size, NA ≤0.24	Standard SM and MM up to 100 µm core size, NA ≤0.3
Uncertainty (accuracy) at reference conditions [1]	± 3 % (1260 nm to 1630 nm)	± 3 % (1260 nm to 1630 nm)
Total uncertainty [2] [9]	± 5% ± 20 pW [8] (1260 nm to 1630 nm)	± 5% ± 20 pW (1260 nm to 1630 nm)
Relative uncertainty: - due to polarization [3] - spectral ripple (due to interference) [4]	 typ. ±0.015 dB typ. ±0.015 dB	 < ±0.005 dB < ±0.005 dB
Linearity (power) [5] [9] - at 23°C ± 5°C - at operating temp. range	CW +10 to –60 dBm (1260 nm to 1630 nm) < ±0.02 dB ± 20 pW < ±0.06 dB ± 20 pW	CW +10 to –60 dBm (1260 nm to 1630 nm) < ±0.02 dB ± 20 pW < ±0.06 dB ± 20pW
Return loss [7]	> 40 dB	> 55 dB
Noise (peak to peak) [5] [6]	< 20 pW	< 20 pW
Averaging time (minimal)	25 µs	25 µs
Dynamic Range at manual range mode [5] [10] - at +10dBm-range - at ± 0dBm-range - at –10dBm-range - at –20dBm-range	 typ. > 55dB typ. > 55dB typ. > 52dB typ. > 45dB	 typ. > 55dB typ. > 55dB typ. > 52dB typ. > 45dB
Linearity (power) at manual range mode: [5] [11] - at +10dBm-range - at ±0dBm-range - at –10dBm-range - at –20dBm-range	CW +10 to –60 dBm (1260 nm to 1630 nm) < ±0.02 dB ± 50 nW < ±0.02 dB ± 5 nW < ±0.02 dB ± 1 nW < ±0.02 dB ± 500 pW	CW +10 to –60 dBm (1260 nm to 1630 nm) < ±0.02 dB ± 50 nW < ±0.02 dB ± 5nW < ±0.02 dB ± 1 nW < ±0.02 dB ± 500 pW
Analog Output	included	included
Dimensions (H x W x D)	75 mm x 32 mm x 335 mm (2.8" x 1.3" x 13.2")	
Weight	0.5 kg	
Recalibration period	2 years	
Operating temperature	+10°C to +40°C	+10°C to +40°C
Humidity	Non-condensing	
Warm-up time	20 min	

[1] Reference conditions:
- Power level 10 µW (-20dBm), continuous wave (CW)
- Fiber 50 µm graded-index, NA = 0.2
- Ambient temperature 23°C ± 5°C
- On day of calibration (add ± 0.3 % for aging over one year, add ± 0.6 % over two years)
- Spectral width of source < 10nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4 nm

[2] Operating Conditions:
- Fiber ≤ 50 µm, NA ≤ 0.2
- Within one year after calibration, add 0.3 % for second year
- Add ± 1% for Biconic connector
- Operating temperature range as specified humidity: non-condensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power, straight connector, T = 23°C ± 5°. For angled connector (8°) add ± 0.01 dB typ.

[4] Conditions:
Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power,
Temperature 23°C ± 5°C
Linewidth of source ≥ 100 MHz, angled connector 8°.

[5] At const. Temperature ($_{\Delta}$T = ±1 °C)

[6] Averaging time 1s, T = 23°C ±5°C, observation time 300 s.
Wavelength range 1260-1630 nm.

[7] Conditions:
Wavelengths 1310nm ± 30 nm and 1550nm ± 30 nm.
Standard single mode fiber, angled connector min 8°. T = 23°C ± 5°C

[8] For wavelengths > 1600 nm add ± 0.06%/nm

[9] For input power > 2 mW add ± 0.02 dB

[10] Conditions:
Avergaing time 25us , T = 23°C ± 5, Observation time 2.5 s

[11] Averaging time 25us, T = 23°C ± 5

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Optical head specifications (Autorange mode)

All optical heads have to be operated with the single (Agilent 81618A) or dual (Agilent 81619A) Interface Modules.

	Agilent 81623B	**Agilent 81624B**	**Agilent 81627B**
Sensor element	Ge, ∅ 5 mm	InGaAs, ∅ 5 mm	InGaAs,∅ 3mm
Wavelength range	750 – 1800 nm	800 – 1700 nm	800 – 1700 nm
Power range	+10 to –80 dBm	+10 to –90 dBm	+10 to –90 dBm
Applicable fiber type	Standard SM (max 100 µm core size), NA ≤0.3 Standard MM max 100 µm core size, NA ≤0.3		Standard SM (max 10 µm core size), NA ≤0.11 (straight and angled connector) Standard MM (max 62.5 µm core size), NA ≤0.22 (straight connector)
Open beam	Parallel beam max ∅ 4 mm		Parallel beam max ∅ 2.5 mm
Uncertainty at reference conditions [1]	±2.2 % (1000 – 1650 nm)	±2.2 % (1000 – 1630 nm)	±2.5 % (1000 – 1630 nm)
Total uncertainty [2]	±3.5 % ±100 pW [8] (1000 – 1650 nm)	±3.5 % ±5 pW (1000 – 1630 nm)	±4.0 % ±5 pW (1000 – 1630 nm)
Relative uncertainty: [7] - due to polarization [3] - spectral ripple (due to interference) [4]	≤±0.01 dB [9] (typ. ±0.005 dB) ≤±0.006 dB (typ ± 0.003 dB)	≤±0.005 dB (typ. ±0.002 dB) ≤±0.005 dB (typ ± 0.002 dB)	≤±0.005 dB (typ. ±0.002 dB) ≤±0.005 dB (typ ± 0.002 dB)
Linearity (power): [5] - at 23°C ±5°C - at operating temp. range	(CW +10 to –60 dBm) (1000 – 1650 nm) <±0.025 dB ±100 pW[8] <±0.05 dB ±100 pW [8]	(CW +10 to –70 dBm) (1000 – 1630 nm) <±0.02 dB ±5 pW <±0.05 dB ±5 pW	(CW +10 to –70 dBm) (1000 – 1630 nm) <±0.02 dB ±5 pW <±0.05 dB ±5 pW
Return loss [7]	>50 dB typ. >55 dB	typ. 60 dB	>60 dB
Noise (peak to peak) [5] [6]	<100 pW	<5 pW	<5 pW
Averaging time (minmal)	100 µs	100 µs	100 µs
Analog Output	included		
Dimensions	57 mm x 66 mm x 156 mm		
Weight	0.5 kg		
Recalibration period	2 years		
Operating temperature	0°C to 40°C	0°C to 40°C	0°C to +40°C
Humidity	Non-condensing	Non-condensing	Non-condensing
Warm-up time	40 min		

[1] Reference conditions:
- Power level 10 µW (-20 dBm),continuous wave (CW)
- Parallel beam, 3 mm spot diameter on the center of the detector; for 81627B 2mm spot diameter
- Ambient temperature 23°C ± 5°C
- On day of calibration (add ±0.3% for aging over one year, add ±0.6% over two years)
- Spectral width of source < 10 nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4nm

[2] Operating Conditions:
- Parallel beam, 3mm spot diameter on the center of the detector or connectorized fiber with NA ≤0.2 (straight connetor); for 81627B 2mm spot diameter
- For NA >0.2: add 1%
- For 81627B and MM fiber add 1%
- Within one year after calibration, add 0.3 % for second year.

Operating temperature range as specified
humidity: non-condensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power, straight connector, T = 23°C ± 5°. For angled connector (8°) add 0.01 dB typ.

[4] Conditions:
Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power,
Temperature 23°C ± 5°C
Linewidth of source ≥100 MHz,
angled connector 8°.

[5] At const. temperature ($_{\Delta}$T = ± 1 °C)
Zeroing required

[6] Averaging time 1s, T = 23°C ± 5°C,
observation time 300 s.
Wavelength range 1200-1630nm

[7] Conditions:
- Wavelengths 1550nm ± 30 nm.
- Standard singlemode fiber,angled connector min 8°

[8] For input power > 2 mW
add ± 0.004 dB / mW

[9] Specification valid for optical heads with S/N started with "DE413..." or higher
(shipping started April 1, 2001)

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High power optical head specifications (Autorange mode)

All optical heads have to be operated with the single (Agilent 81618A) or dual (Agilent 81619A) Interface Modules

	Agilent 81622B	**Agilent 81626B**
Sensor element	Ge, ∅ 5mm	InGaAs,∅ 5mm
Wavelength range	850-1650nm	850-1650nm
Power range	+27 to –55 dBm (1250-1650nm) +23 to –55 dBm (850- 1650 nm)	+27 to –70 dBm (1250-1650 nm) +23 to –70 dBm (850- 1650 nm)
Applicable fiber type Open beam	Standard SM and MM max 100 µm core size, NA ≤0.3 Parallel beam max ∅ 4 mm	
Uncertainty at reference conditions [1]	±3.0 % (950-1630 nm)	±3.0 % (950 – 1630 nm)
Total uncertainty [2]	±5 % ±40 nW [10] (950-1630 nm)	±5.0% ± 500 pW [10] (950-1630 nm)
Relative uncertainty: [7] - due to polarization [3] - spectral ripple (due to interference) [4]	 ≤± 0.01 dB (typ. ± 0.005 dB) ≤± 0.006 dB (typ ± 0.003 dB)	 ≤±0.005 dB (typ.±0.002 dB) ≤±0.005 dB (typ. ±0.002 dB)
Linearity (power): [5] - at 23°C ±5°C - at operating temp. range	(CW +27 to –40 dBm) (950 – 1630 nm) < ±0.05 dB ±40 nW [10] < ±0.15 dB ±40 nW [10]	(CW + 27 to – 50 dBm) (950 – 1630 nm) ≤±0.04 dB ± 500 pW[10] ≤±0.15 dB ± 500 pW[10]
Return loss [7]	>45 dB	>45 dB
Noise (peak to peak) [5] [6]	< 40 nW	<500 pW
Averaging time (minmal)	100 µs	100 µs
Analog Output	included	
Dimensions	57 mm x 66 mm x 156 mm	
Weight	0.5 kg	
Recalibration period	2 years	
Operating temperature	0°C to +35°C[9]	0°C to +35°C[9]
Humidity	Non-condensing	Non-condensing
Warm-up time	40 min	

[1] Reference conditions:
- Power level 10 µW (-20 dBm),continuous wave (CW)
- Parallel beam, 3 mm spot diameter on the center of the detector
- Ambient temperature 23°C ± 5°C
- On day of calibration (add ±0.3% foraging over one year, add ±0.6% over two years)
- Spectral width of source < 10 nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4nm

[2] Operating Conditions:
- Parallel beam, 3mm spot diameter on the center of the detector or connectorized fiber with NA ≤0.2 (straight connetor)
- For NA >0.2: add 1%.
- Within one year after calibration, add 0.3 % for second year.

Operating temperature range as specified
humidity: none-ondensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power, straight connector, T = 23°C ± 5°. For angled connector (8°) add 0.01 dB typ.

[4] Conditions:
Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power,
Temperature 23°C ± 5°C
Linewidth of source ≥100 MHz,
angled connector 8°.

[5] At const. temperature ($_{\Delta}$T = ± 1 °C)
Zeroing required

[6] Averaging time 1s, T = 23°C ± 5°C,
observation time 300 s.
Wavelength range 1200-1630nm

[7] Conditions:
- Wavelengths 1550nm ± 30 nm.
- Standard singlemode fiber,angled connector min 8°

[8] For input power > 2 mW
add ± 0.004 dB / mW

[9] 30°C for > +20dBm input power

[10] For input power > +10 mW add:
typ. ± 0.0016 dB/mW without Agilent 81000FA
or add: ±0.0008dB/mW with Agilent 81000AF (direct coupled)
In case of negative power change >50dB allow additional recovery time of 3 min

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High power optical head specifications (Autorange mode)

All optical heads have to be operated with the single (Agilent 81618A) or dual (Agilent 81619A) Interface Modules.

	Agilent 81628B with integrating sphere
Sensor element	InGaAs
Wavelength range	800 – 1700nm
Power range	+40 to –60 dBm (800 – 1700nm) For operation higher than 34 dBm see safety note ⚠
Damage Power	40.5 dBm
Applicable fiber type Open beam	Single mode NA ≤0.2, Multimode NA ≤0.4 ∅≤ 3mm center of sphere
Uncertainty at reference conditions [1] [8]	±3.0% (970nm to 1630nm)
Total uncertainty [2] [8] ≤ 10 dBm >10 dBm to ≤20 dBm >20 dBm to ≤38 dBm	 ±4.0% ± 5 nW ±4.5% ±5% (970nm to 1630nm)
Relative uncertainty: - due to polarization [3] - due to speckle noise at source linewidth: [4] 0.1pm to 100pm >100pm	 typ. ≤±0.006dB typ. ≤±0.02 dB typ. ≤±0.002 dB
Linearity (power): [5] [8] ≤ 10 dBm >10 dBm to ≤20 dBm >20 dBm to ≤37 dBm >37 dBm to ≤38 dBm	(CW + 38 to –40 dBm) (970nm to 1630nm) ≤±0.03 dB ± 5 nW ≤±0.06 dB ≤±0.09 dB ≤±0.10 dB at 23°C ±5°C for operating temperature range add ±0.03dB
Return loss	typ. >75 dB
Noise (peak to peak) [5] [6]	<5 nW
Averaging time (minimal)	100 μs
Analog Output	Included
Dimensions	55mm x 80 mm x 250 mm
Weight	0.9 kg (without heatsink)
Recalibration period	2 years
Operating temperature [7]	0°C to +40°C
Humidity	Non-condensing
Warm-up time	40 min

⚠ **Safety Note:**

For optical power higher than 34 dBm the attached heatsink MUST be used !
For continuous optical power or average optical power higher than 38 dBm the connector adapters will get warmer than permitted according to the safety standard IEC 61010-1.

The 81628B Optical Head can handle optical power up to 40 dBm, however, operation above 38 dBm is at own risk of the operator. Agilent Technologies Deutschland GmbH will not be liable for any damages caused by an operation above 38 dBm.

[1] Reference conditions:
- Power level 10 µW (-20 dBm), continuous wave (CW)
- Parallel beam, 3 mm, center of sphere input
- Ambient temperature 23 °C ±5 °C
- On day of calibration (add ±0.3 % for aging over one year, add ±0.6 % over two years)
- Spectral width of source < 10 nm (FWHM)
- Wavelength setting at powermeter must correspond to source wavelength ±0.4 nm
- Humidity 50 % ±10 %

[2] Operating Conditions:
- Parallel beam, ∅3mm , center of sphere input, or connectorized fiber with NA ≤0.2 (straight connector)
- For NA >0.2: add 1%.
- Within one year after calibration, add ±0.3% for second year.
- Operating temperature range as specified, humidity <80% and non-condensing

[3] All states of polarization at constant wavelength (1550 nm ± 30 nm) and constant power

[4] Conditions:
- Wavelength 1550 nm ± 30 nm, fixed state of polarization, constant power
- Temperature 23°C ± 5°C
  Measurement time ≤ 3 min.

[5] At const. temperature (ΔT = ± 1 °C), Zeroing required

[6] Averaging time 1s, T = 23°C ± 5 °C, observation time 300 s, wavelength range 970-1630nm

Thermal drift at 38 dBm, exposure time 30 min:
Recovery time 10 min: ≤30nW
30 min: ≤10nW

[7] For optical power >30 dBm the maximal operating temperature is limited to 35 °C

[8] Wavelength must not be equal to any water absorption line

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Return loss module specifications

All modules require angled contact (8°) at input and output connectors

	81610A	
Source	external input only [1]	
Sensor element	InGaAs	
Fiber type	Standard single-mode 9 / 125 µm	
External input	max input power: 10 dBm min input power: 0 dBm damage input power: 16 dBm	
Wavelength range for external input	1250 nm to 1640 nm	
Dynamic range	70 dB	
Relative uncertainty of [2] Return Loss (RL)	with broadband source	with Agilent FP sources
• RL ≤55 dB • RL ≤60 dB • RL ≤65 dB • RL ≤70 dB	< ±0.25 dB < ±0.3 dB < ±0.65 dB < ± 1.7 dB	typ. < ± 0.5 dB typ. < ± 1.0 dB typ. < ± 2.0 dB
Total uncertainty	add ± 0.2 dB	add typ. ± 0.2 dB
Dimensions (H x W x D)	75 mm x 32 mm x 335 mm (2.8″ x 1.3″ x 13.2″)	
Weight	0.6 kg	
Recalibration period	2 years	
Operating temperature	10 to 40°C	
Humidity	Non-condensing	
Warm-up time [5]	20 minutes	

[1] Insertion Loss is in the range of 7dB.

[2] Averaging time 1s,
calibration prior to measurement,
constant temperature,
Broadband source:Agilent 83438A
FP Sources: Agilent 81650A,81651A,81652A,81654A
with active Coherence Control.
Reference Cable 81610CC used for total uncertainty
Length of measurement patchcord ≤ 2m,
angled connector in optimal optical conditions

[3] Warm-up time 60 min, if previously not stored at the same temperature.

Reference Cable Specification

(To connect to Return Loss Modules the cable requires connector Interface 81000SI DIN47256/4108)

	81610CC Reference cable
Return loss	as printed on cable
Return loss uncertainty	±0.2 dB[1]
Wavelengths	1310 and 1550 nm ± 15 nm
[1] Clean reference reflector in perfect optical condition (Do not use with contact-type connectors)	

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Return loss module specifications with internal source
(for use with external sources the specifications of 81610A return loss module apply)

All modules require angled contact (8°) at input and output connectors

	81611A	81612A	81613A	81614A
Source	Fabry-Perot Laser (internal)			
Output Power	typ. – 4dBm			
Center wavelength [1]	1310 nm ±20 nm typ.	1550 nm ±20 nm typ.	1310/1550 nm ±20 nm typ.	1550/1625 ±20 nm typ.
Sensor Element	InGaAs			
Fiber Type	Standard single-mode 9 / 125 µm			
Dynamic Range	75 dB			
Relative uncertainty of Return Loss (RL)	User calibration [2]			Plug and play [3]
• RL ≤55 dB	< ±0.5 dB (typ. < ±0.3 dB)			typ. < ± 0.6 dB
• RL ≤60 dB	< ±0.6 dB (typ. < ±0.4 dB)			typ. < ± 1.5 dB
• RL ≤65 dB	< ±0.8 dB (typ. < ±0.5 dB)			
• RL ≤70 dB	< ±1.9 dB (typ. < ±0.8 dB) [4]			
• RL ≤75 dB	typ. < ±2.0 dB [4]			
Total uncertainty	add ±0.2 dB			add typ. ±0.2 dB
Dimensions (H x W x D)	75 mm x 32 mm x 335 mm (2.8" x 1.3" x 13.2")			
Weight				
Recalibration period	2 years			
Operating temperature	10 to 40°C			
Humidity	Non-condensing			
Warm-up time [5]	20 minutes			

[1] At 25ºC constant temperature, coherence control on, warm-up time after laser turn on > 5 min.

[2] Averaging time 1s, calibration prior to measurement, constant temperature, coherence control on, warm-up time after laser turn on > 5 min, length of measurement patchcord ≥2m, angled connector in optimal optical condition. Reference cable 81610CC used for total uncertainty.

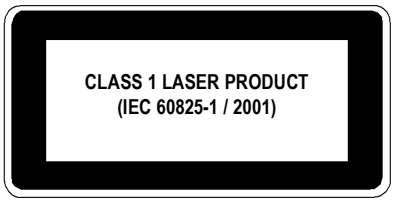
[3] Use defaults settings (no user calibration necessary): length of measurement patchcord ≤ 2m, return loss of connectors ≥70 dB.

[4] For measurements performed immediately after calibration.

[5] Warm-uptime 60 min, if previously not stored at the same temperature.

Laser Safety Information

The above products are classified as Class 1 according to IEC 60825-1 (2001).
All laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26.



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February, 13 2002
5988-1569EN

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