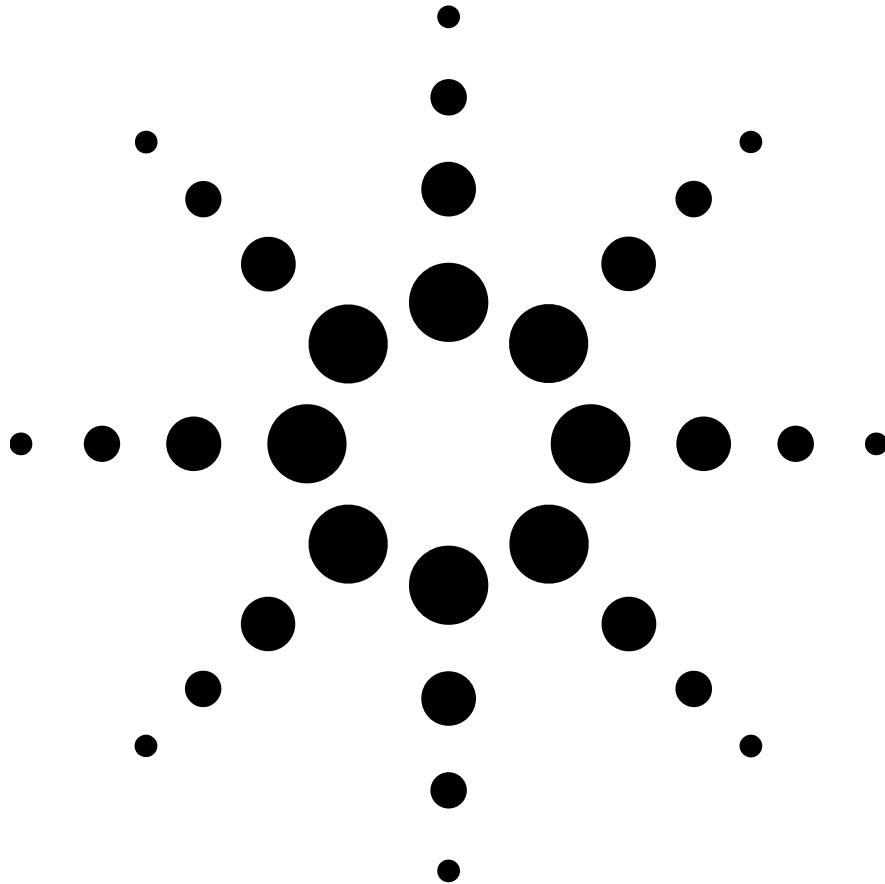


# Agilent 81600B Tunable Laser Source Family

Technical Specifications

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The Agilent 81600B Tunable Laser Source Family offers the full wavelength range from 1260 nm to 1640 nm with the minimum number of lasers and no wavelength gaps. This provides test instrumentation with maximum flexibility.

Investing in the Agilent 81600B Tunable Laser Source Family can realize the cost efficiency and performance required to test components for coarse and dense wavelength division multiplexing (CWDM, DWDM) and passive optical networks (PON).



**Agilent Technologies**

## **Agilent 81600B Tunable Laser Source Family**

The Agilent 81600B Tunable Laser Source Family consists of seven modules that fit into the bottom slot of the Agilent 8164B Lightwave Solution Mainframe.

The 81600B option 201 All-band Tunable Laser Source is the flagship model, featuring the widest tuning range of 185 nm with a single laser and a 70 dB/nm signal-to-source spontaneous emission ratio (signal-to-SSE ratio). The excellent low-SSE performance typically allows cross-talk measurements of better than 70 dB for an 8 channel CWDM multiplexer.

The 81600B option 160, 150, 140 and the new 81600B option 130 Tunable Laser Sources offer other wavelength ranges and are equipped with two optical outputs, like the option 201. By selecting the port, high power or low-SSE can be obtained.

The 81600B option 142 and 132 Tunable Laser Sources have a single high power output port.

### **Full wavelength range from 1260 nm to 1640 nm with the minimum number of lasers**

The Agilent 81600B Tunable Laser Source Family offers the full wavelength range from 1260 nm to 1640 nm with the minimum number of lasers and no wavelength gaps. This provides test instrumentation with the maximum flexibility.

### **New O-band model available**

The new 81600B option 130 Tunable Laser Source covers the wavelength range from 1260 nm to 1375 nm, providing high power and low SSE outputs.

## **Realize the cost efficiency and performance benefits in WDM component tests**

The testing of optical filters is based on a generic principle, namely the stimulus-response test. The state-of-the-art approach is a wavelength-resolved stimulus-response measurement utilizing a tunable laser source that is capable of fast and precise sweeps across the entire wavelength range, and optical power meters.

For DWDM components, high wavelength accuracy and dynamic range are critical. For CWDM and PON components, a wide wavelength range, dynamic range and tight costing are key targets. If the investment in the test solution can be shared among many different type of filters, the contribution to each individual filter is minimized. In this way, cost targets for CWDM and PON components can be met without sacrificing accuracy.

Investing in the Agilent 81600B Tunable Laser Source Family can realize both the cost efficiency and performance benefits required.

### **Specified performance in the continuous sweep mode**

As manufacturing yield expectations becomes more and more stringent, it is important that all instruments deliver optimum performance under all measurement conditions.

The Agilent 81600B Tunable Laser Source Family can sweep as fast as 80 nm/s with specified accuracy during the sweep.

## **Low SSE output port for high dynamic range**

The low-SSE output port of the dual-output models delivers a signal with ultra-low source spontaneous emission. It enables accurate cross-talk measurement of DWDM, CWDM and PON wavelength filtering components by producing light only at the desired wavelength.

The second output port provides high optical power, adjustable over a power range of more than 60 dB via a built-in optical attenuator.

### **High Power output for multi-purpose component tests**

The Agilent 81600B options 142 and 132 provide one output port with high stimulus power for applications where the SSE level is not critical.

The 81600B option 142 can also be equipped with a built-in optical attenuator, so providing an adjustable power range of 60 dB.

### **Built-in wavelength meter for optimum tuning precision**

The Agilent 81600B Tunable Laser Source Family includes a built-in real time wavelength meter which realizes an absolute wavelength accuracy of  $\pm 10$  pm (typ.  $\pm 3.6$  pm) as a stand-alone instrument.

### **Polarization Maintaining Fiber for the test of integrated optical devices**

The 81600B Tunable Laser Source Family is ideal for characterizing integrated optical devices. Its PMF output ports provide a well-defined state of polarization to ensure constant measurement conditions for waveguide devices. A PMF cable easily connects to an external optical modulator.

## 81600B opt. 201 All-Band Tunable Laser Source, 1455 nm – 1640 nm, low SSE

		<b>Agilent 81600B opt. 201</b>			2.4
Wavelength range	1455 nm to 1640 nm				
Wavelength resolution	0.1 pm, 12.5 MHz at 1550 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ± 3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[4]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. On	> 50 MHz (1475 nm – 1625 nm, at max. constant output power)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Maximum output power (continuous power during sweep)	≥ +3 dBm peak (typ.) ≥ +2 dBm (1520 nm – 1610 nm) ≥ -2 dBm (1475 nm – 1625 nm) ≥ -7 dBm (1455 nm – 1640 nm)		≥ +9 dBm peak (typ.) ≥ +8 dBm (1520 nm – 1610 nm) ≥ +4 dBm (1475 nm – 1625 nm) ≥ -1 dBm (1455 nm – 1640 nm)		
Attenuation			max. 60 dB		
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[4]</sup>	±0.01 dB, 1 hour typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB		±0.1 dB (±0.3 dB in attenuation mode)		
Power flatness versus wavelength	±0.25 dB <sup>[3]</sup> , typ. ±0.1 dB		±0.3 dB <sup>[3]</sup> , typ. ±0.15 dB		
		Continuous sweep mode			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.02 dB	±0.04 dB	
Side-mode suppression ratio (typ.)	≥ 60 dB (1520 nm – 1610 nm)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 70 dB/nm (1520 nm – 1610 nm) ≥ 80 dB/0.1 nm (typ., 1520 nm – 1610 nm) ≥ 66 dB/nm (typ., 1475 nm – 1625 nm) ≥ 60 dB/nm (typ., 1455 nm – 1640 nm)		≥ 48 dB/nm (1520 nm – 1610 nm) ≥ 58 dB/0.1 nm (typ., 1520 nm – 1610 nm) ≥ 43 dB/nm (1475 nm – 1625 nm) ≥ 37 dB/nm (1455 nm – 1640 nm)		
Signal to total source spontaneous emission ratio <sup>[2]</sup>	≥ 65 dB (1520 nm – 1610 nm) ≥ 57 dB (typ., 1455 nm – 1640 nm)		≥ 30 dB (typ., 1520 nm – 1610 nm)		
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	-145 dB/Hz (1520 nm – 1610 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] Wavelength range 1455 nm – 1640 nm.

[4] At constant temperature ±1 K

## 81600B opt. 160 Tunable Laser Source, 1495 nm – 1640 nm, low SSE

		<b>Agilent 81600B opt. 160</b>			2.3
Wavelength range	1495 nm to 1640 nm				
Wavelength resolution	0.1 pm, 12.5 MHz at 1550 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[3]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1510 nm – 1620 nm, at max. constant output power)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Maximum output power (continuous power during sweep)	≥ -2 dBm peak (typ.) ≥ -4 dBm (1520 nm – 1610 nm) ≥ -6 dBm (1510 nm – 1620 nm) ≥ -7 dBm (1495 nm – 1640 nm)		≥ +7 dBm peak (typ.) ≥ +5 dBm (1520 nm – 1610 nm) ≥ +3 dBm (1510 nm – 1620 nm) ≥ -1 dBm (1495 nm – 1640 nm)		
Attenuation			max. 60 dB		
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[3]</sup>	±0.01 dB, 1 hour typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB		±0.1 dB (±0.3 dB in attenuation mode)		
Power flatness versus wavelength	±0.25 dB, typ. ±0.1 dB (1495nm – 1630nm)		±0.3 dB, typ. ±0.15 dB		
		Continuous sweep mode			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.02 dB	±0.04 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1520 nm – 1610 nm)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 64 dB/nm (1520 nm – 1610 nm) ≥ 74 dB/0.1 nm (typ., 1520 nm – 1610 nm) ≥ 62 dB/nm (typ., 1510 nm – 1620 nm) ≥ 59 dB/nm (typ., 1495 nm – 1640 nm)		≥ 45 dB/nm (1520 nm – 1610 nm) ≥ 55 dB/0.1 nm (typ., 1520 nm – 1610 nm) ≥ 42 dB/nm (1510 nm – 1620 nm) ≥ 37 dB/nm (1495 nm – 1640 nm)		
Signal to total source spontaneous emission ratio <sup>[2]</sup>	≥ 59 dB (1520 nm – 1610 nm) ≥ 56 dB (typ., 1495 nm – 1640 nm)		≥ 27 dB (typ., 1520 nm – 1610 nm)		
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	-145 dB/Hz (1520 nm – 1610 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] At constant temperature ±1 K

## 81600B opt. 150 Tunable Laser Source, 1450 nm – 1590 nm, low SSE

		<b>Agilent 81600B opt. 150</b>			2.3
Wavelength range	1450 nm to 1590 nm				
Wavelength resolution	0.1 pm, 12.5 MHz at 1550 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[3]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1480 nm – 1580 nm, at max. constant output power)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Maximum output power (continuous power during sweep)	≥ -1 dBm peak (typ.) ≥ -3 dBm (1520 nm – 1570 nm) ≥ -6 dBm (1480 nm – 1580 nm) ≥ -7 dBm (1450 nm – 1590 nm)		≥ +7 dBm peak (typ.) ≥ +5 dBm (1520 nm – 1570 nm) ≥ +4 dBm (1480 nm – 1580 nm) ≥ -1 dBm (1450 nm – 1590 nm)		
Attenuation			max 60 dB		
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[3]</sup>	±0.01 dB, 1 hour typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB		±0.1 dB (±0.3 dB in attenuation mode)		
Power flatness versus wavelength	±0.2 dB, typ. ±0.1 dB		±0.3 dB, typ. ±0.15 dB		
		Continuous sweep mode			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.02 dB	±0.04 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1480 nm – 1580 nm)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 65 dB/nm (1520 nm – 1570 nm) ≥ 75 dB/0.1 nm (typ., 1520 nm – 1570 nm) ≥ 61 dB/nm (typ., 1480 nm – 1580 nm) ≥ 59 dB/nm (typ., 1450 nm – 1590 nm)		≥ 45 dB/nm (1520 nm – 1570 nm) ≥ 55 dB/0.1 nm (typ., 1520 nm – 1570 nm) ≥ 42 dB/nm (1480 nm – 1580 nm) ≥ 37 dB/nm (1450 nm – 1590 nm)		
Signal to total source spontaneous emission ratio <sup>[2]</sup>	≥ 60 dB (1520 nm – 1570 nm) ≥ 50 dB (typ., 1450 nm – 1590 nm)		≥ 30 dB (typ., 1520 nm – 1570 nm)		
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	-145 dB/Hz (1480 nm – 1580 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] At constant temperature ±1 K

## 81600B opt. 140 Tunable Laser Source, 1370 nm – 1495 nm, low SSE

		<b>Agilent 81600B opt. 140</b>			2.4
Wavelength range	1370 nm to 1495 nm				
Wavelength resolution	0.1 pm, 15 MHz at 1450 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s (1372 nm – 1495 nm)				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[4]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1430 nm – 1480 nm, at max. constant output power)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Maximum output power (continuous power during sweep)	≥ -4.5 dBm peak (typ.) ≥ -5 dBm (1430 nm – 1480 nm) ≥ -7 dBm (1420 nm – 1480 nm) ≥ -13 dBm (1370 nm – 1495 nm)		≥ +5.5 dBm peak (typ.) ≥ +5 dBm (1430 nm – 1480 nm) ≥ +3 dBm (1420 nm – 1480 nm) ≥ -3 dBm (1370 nm – 1495 nm)		
Attenuation			max 60 dB		
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[4]</sup>	±0.01 dB, 1 hour (1420 nm – 1495 nm) typ. ±0.01 dB, 1 hour (1370 nm – 1420 nm) typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB (1420 nm – 1495nm) typ. ±0.1 dB (1370 nm – 1420 nm)		±0.3 dB (1420 nm – 1495 nm) typ. ±0.3 dB (1370 nm – 1420 nm)		
Power flatness versus wavelength	±0.2 dB, typ. ±0.1 dB (1420 nm – 1495 nm) typ. ±0.2 dB (1370 nm – 1420 nm)		±0.3 dB, typ. ±0.2 dB (1420 nm – 1495 nm) typ. ±0.3 dB (1370 nm – 1420 nm)		
		Continuous sweep mode <sup>[3]</sup>			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.015 dB	±0.03 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1430 nm – 1480 nm)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 63 dB/nm (1430 nm – 1480 nm) ≥ 73 dB/0.1 nm (typ., 1430 nm – 1480 nm) ≥ 61 dB/nm (1420 nm – 1480 nm) ≥ 55 dB/nm (typ., 1370 nm – 1495 nm)		≥ 42 dB/nm (1430 nm – 1480 nm) ≥ 52 dB/0.1 nm (typ., 1430 nm – 1480 nm) ≥ 40 dB/nm (1420 nm – 1480 nm) ≥ 35 dB/nm (typ., 1370 nm – 1495 nm)		
Signal to total source spontaneous emission ratio <sup>[2]</sup>	≥ 60 dB (1430 nm – 1480 nm) ≥ 58 dB (1420 nm – 1480 nm) ≥ 53 dB (typ., 1370 nm – 1495 nm)		≥ 28 dB (typ., 1430 nm – 1480 nm)		
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	-145 dB/Hz (1430 nm – 1480 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] Valid for absolute humidity of 11.5 g/m<sup>3</sup> (For example, equivalent to 50% relative humidity at 25°C).

[4] At constant temperature ±1 K

## 81600B opt. 130 Tunable Laser Source, 1260 nm – 1375 nm, low SSE

		<b>Agilent 81600B opt. 130</b>			1.0
Wavelength range	1260 nm to 1375 nm				
Wavelength resolution	0.1 pm, 17.7 MHz at 1300 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[4]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1270 nm – 1350 nm, at max. constant output power)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Maximum output power (continuous power during sweep)	≥ -4 dBm peak (typ.) ≥ -6 dBm (1290 nm – 1370 nm) ≥ -9 dBm (1270 nm – 1375 nm) ≥ -13 dBm (1260 nm – 1375 nm)		≥ +5 dBm peak (typ.) ≥ +4 dBm (1290 nm – 1370 nm) ≥ +1 dBm (1270 nm – 1375 nm) ≥ -3 dBm (1260 nm – 1375 nm)		
Attenuation			max 60 dB		
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[4]</sup>	±0.01 dB, 1 hour (1260 nm – 1350 nm) typ. ±0.01 dB, 1 hour (1350 nm – 1375 nm) typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB (1260 nm – 1350 nm) typ. ±0.1 dB (1350 nm – 1375 nm)		±0.3 dB (1260 nm – 1350 nm) typ. ±0.3 dB (1350 nm – 1375 nm)		
Power flatness versus wavelength	±0.2 dB, typ. ±0.1 dB (1260 nm – 1350 nm) typ. ±0.2 dB (1350 nm – 1375 nm)		±0.3 dB, typ. ±0.15 dB (1260 nm – 1350 nm) typ. ±0.3 dB (1350 nm – 1375 nm)		
		Continuous sweep mode <sup>[3]</sup>			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.02 dB	±0.04 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1290 nm – 1370 nm)				
	<b>Output 1 (low SSE)</b>		<b>Output 2 (high power)</b>		
Signal to source spontaneous emission ratio (typ.) <sup>[2]</sup>	≥ 63 dB/nm (1290 nm – 1370 nm) ≥ 61 dB/nm (1270 nm – 1375 nm) ≥ 55 dB/nm (1260 nm – 1375 nm)		≥ 42 dB/nm (1290 nm – 1370 nm) ≥ 40 dB/nm (1270 nm – 1375 nm) ≥ 35 dB/nm (1260 nm – 1375 nm)		
Signal to total source spontaneous emission ratio (typ.) <sup>[2]</sup>	≥ 58 dB (1290 nm – 1370 nm) ≥ 56 dB (1270 nm – 1375 nm) ≥ 51 dB (1260 nm – 1375 nm)		≥ 26 dB (1290 nm – 1370 nm)		
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	-140 dB/Hz (1270 nm – 1375 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] Valid for absolute humidity of 11.5 g/m<sup>3</sup> (For example, equivalent to 50% relative humidity at 25°C).

[4] At constant temperature ±1 K

## 81600B opt. 142 Tunable Laser Source, 1370 nm – 1495 nm, high power

		Agilent 81600B opt. 142			2.4
Wavelength range	1370 nm to 1495 nm				
Wavelength resolution	0.1 pm, 15 MHz at 1450 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s (1372 nm – 1495 nm)				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[4]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1430 nm – 1480 nm, at max. constant output power)				
Maximum output power (continuous power during sweep)	≥ +8.5 dBm peak (typ.) ≥ +7.5 dBm (1430 nm – 1480 nm) ≥ +5 dBm (1420 nm – 1480 nm) ≥ 0 dBm (1370 nm – 1495 nm)				
With option 003	Reduced by 1.5 dB.				
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[4]</sup>	±0.01 dB, 1 hour (1420 nm – 1495 nm) typ. ±0.01 dB, 1 hour (1370 nm – 1420 nm) typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB (1420 nm – 1495 nm) typ. ±0.1 dB (1370 nm – 1420 nm)				
With option 003	Add ±0.2 dB				
Power flatness versus wavelength	±0.2 dB, typ. ±0.1 dB (1420 nm – 1495 nm) typ. ±0.2 dB (1370 nm – 1420 nm)				
With option 003	Add ±0.1 dB				
		Continuous sweep mode <sup>[3]</sup>			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.015 dB	±0.03 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1430 nm – 1480 nm)				
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 42 dB/nm (1430 nm – 1480 nm) ≥ 52 dB/0.1 nm (typ., 1430 nm – 1480 nm) ≥ 40 dB/nm (1420 nm – 1480 nm) ≥ 35 dB/nm (typ., 1370 nm – 1495 nm)				
Signal to total source spontaneous emission ratio (typ.) <sup>[2]</sup>	≥ 28 dB (1430 nm – 1480 nm)				
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	–145 dB/Hz (1430 nm – 1480 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] Valid for absolute humidity of 11.5 g/m<sup>3</sup> (For example, equivalent to 50% relative humidity at 25°C).

[4] At constant temperature ±1 K



## 81600B opt. 132 Tunable Laser Source, 1260 nm – 1375 nm, high power

		Agilent 81600B opt. 132			2.4
Wavelength range	1260 nm to 1375 nm				
Wavelength resolution	0.1 pm, 17.7 MHz at 1300 nm				
Mode-hop free tunability	full wavelength range; see page 10 for conditions to assure mode-hop free continuous sweeps				
Maximum sweep speed	80 nm/s				
	Stepped mode	Continuous sweep mode (typ.)			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Absolute wavelength accuracy <sup>[1]</sup>	±10 pm, typ. ±3.6 pm	±4.0 pm	±4.6 pm	±6.1 pm	
Relative wavelength accuracy <sup>[1]</sup>	±5 pm, typ. ±2 pm	±2.4 pm	±2.8 pm	±4.0 pm	
Wavelength repeatability	±0.8 pm, typ. ±0.5 pm	±0.3 pm	±0.4 pm	±0.7 pm	
Wavelength stability <sup>[2]</sup> (typ.)	≤ ±1 pm, 24 hours				
Linewidth (typ.), coherence control off	100 kHz				
Effective linewidth (typ.), coherence ctrl. on	> 50 MHz (1270 nm – 1350 nm, at max. constant output power)				
Maximum output power (continuous power during sweep)	≥ +9 dBm peak (typ.) ≥ +7 dBm (1290 nm – 1370 nm) ≥ +3 dBm (1270 nm – 1375 nm) ≥ 0 dBm (1260 nm – 1375 nm)				
Power repeatability (typ.)	±0.003 dB				
Power stability <sup>[4]</sup>	±0.01 dB, 1 hour (1260 nm – 1350 nm) typ. ±0.01 dB, 1 hour (1350 nm – 1375 nm) typ. ±0.03 dB, 24 hours				
Power linearity	±0.1 dB (1260 nm – 1350 nm) typ. ±0.1 dB (1350 nm – 1375 nm)				
Power flatness versus wavelength	±0.2 dB, typ. ±0.1 dB (1260 nm – 1350 nm) typ. ±0.2 dB (1350 nm – 1375 nm)				
		Continuous sweep mode <sup>[3]</sup>			
		at 5 nm/s	at 40 nm/s	at 80 nm/s	
Dynamic power reproducibility (typ.)		±0.005 dB	±0.01 dB	±0.015 dB	
Dynamic relative power flatness (typ.)		±0.01 dB	±0.015 dB	±0.03 dB	
Side-mode suppression ratio (typ.) <sup>[2]</sup>	≥ 40 dB (1270 nm – 1375 nm)				
Signal to source spontaneous emission ratio <sup>[2]</sup>	≥ 45 dB/nm (1290 nm – 1370 nm) ≥ 55 dB/0.1 nm (typ., 1290 nm – 1370 nm) ≥ 40 dB/nm (1270 nm – 1375 nm) ≥ 35 dB/nm (typ., 1260 nm – 1375 nm)				
Signal to total source spontaneous emission ratio (typ.) <sup>[2]</sup>	≥ 28 dB (1290 nm – 1370 nm)				
Relative intensity noise (RIN) (0.1 – 6 GHz) (typ.) <sup>[2]</sup>	–145 dB/Hz (1270 nm – 1375 nm)				

[1] Valid for one month and within a ±4.4 K temperature range after automatic wavelength zeroing.

[2] At maximum output power as specified per wavelength range.

[3] Valid for absolute humidity of 11.5 g/m<sup>3</sup> (For example, equivalent to 50% relative humidity at 25°C).

[4] At constant temperature ±1 K

## Conditions

### Storage temperature:

–40°C to +70°C

### Operating temperature:

+10°C to +35°C

### Humidity:

< 80 % R.H. at +10°C to +35°C  
non-condensing.

**Specifications apply for wavelengths not equal to any water absorption line.**

### Warm-up time:

1 h

immediate operation after boot up

### Output power:

Specifications are valid at the following output power levels:

*81600B option 201/160 and 150:*

≥ –7 dBm (for Output 1)

≥ –1 dBm (for Output 2, –60 dB in attenuation mode).

*81600B option 140:*

≥ –13 dBm (for Output 1)

≥ –3 dBm (for Output 2, –60 dB in attenuation mode).

*81600B option 130:*

≥ –13 dBm (for Output 1)

≥ –3 dBm (for Output 2, –60 dB in attenuation mode).

*81600B option 142:*

≥ –3 dBm

≥ –4.5 dBm (with option 003: –60 dB in attenuation mode).

*81600B option 132:*

≥ 0 dBm

### Continuous sweep mode:

Specifications are valid for mode-hop free sweeping.

Maximum 50 nm at constant output power levels as follows:

*81600B option 201:*

1475 nm – 1620 nm

≥ –2 dBm (for Output 1)

≥ +4 dBm (for Output 2).

*81600B option 160:*

1510 nm – 1620 nm

≥ –6 dBm (for Output 1)

≥ +3 dBm (for Output 2).

*81600B option 150:*

1520 nm – 1570 nm

≥ –6 dBm (for Output 1)

≥ +3 dBm (for Output 2).

*81600B option 140:*

1430 nm – 1480 nm

≥ –9 dBm (for Output 1)

≥ 0 dBm (for Output 2).

*81600B option 130:*

1300 nm – 1350 nm

≥ –9 dBm (for Output 1)

≥ +1 dBm (for Output 2).

*81600B option 142:*

1430 nm – 1480 nm

≥ –3 dBm

≥ +1.5 dBm (with Option 003).

*81600B option 132:*

1300 nm – 1350 nm

≥ +3 dBm

Operating temperature within +20°C and +35°C

## Supplementary performance characteristics

### Internal digital modulation

50% duty cycle, 200 Hz to 300 kHz.

Displayed wavelength represents average wavelength.

### Modulation output:

TTL reference signal.

### External digital modulation

> 45% duty cycle, delay time

< 300 ns, 200 Hz to 1 MHz.

Displayed wavelength represents average wavelength.

### Modulation input:

TTL signal.

### External analog modulation

≥ ±15% modulation depth,

5 kHz to 20 MHz

### Modulation input:

5 V<sub>p-p</sub>

### External wavelength locking

> ±70 pm at 10 Hz

> ±7 pm at 100 Hz.

### Modulation input:

±5 V

### Coherence control:

For measurements on components with 2 m long patch cords and connectors with 14 dB return loss, the effective linewidth results in a typical power stability of < ±0.025 dB over 1 minute by drastically reducing interference effects in the test setup.

## General

### Output isolation (typ.):

50 dB.

### Return loss (typ.):

60 dB (options 072);

40 dB (options 071).

### Polarization maintaining fiber

(Option 071, 072)

### Fiber type:

Panda.

### Orientation:

TE mode in slow axis, in line with connector key.

### Polarization Extinction ratio:

16 dB typ.

14 dB typ. (Option 201)

### Recommended re-calibration period:

2 years.

## Ordering Information

### Lightwave Solution Mainframe: 8164B

### Tunable Laser Module: 81600B

One of the following is required:

**Option 210** All-band Tunable Laser Source  
1455 nm to 1640 nm, low SSE

**Option 160** Tunable Laser Source  
1495 nm to 1640 nm, low SSE

**Option 150** Tunable Laser Source  
1450 nm to 1590 nm, low SSE

**Option 140** Tunable Laser Source  
1370 nm to 1495 nm, low SSE

**Option 130** Tunable Laser Source  
1260 nm to 1375 nm, low SSE

**Option 142** Tunable Laser Source  
1370 nm to 1495 nm, high power

**Option 132** Tunable Laser Source  
1260 nm to 1375 nm, high power

### Connector Option:

One of the following is required:

**Option 071:** PMF, straight contact output connector.

**Option 072:** PMF, angled contact output connector.

### Other Option:

**Option 003:** Built-in optical attenuator,  
60 dB attenuation  
(for Option 142).

### Connector Interface:

One Agilent 81000xl-series connector interface is required for Options 142 and 132.

Two Agilent 81000xl-series connector interfaces are required for Options 201, 160, 150, 140, and 130.

### TLS Upgrade option:

Upgrade an Agilent tunable laser source to the latest 81600B Family product.

81600B #UG7 upgrades the products 81640A/B, 81680A/B, 81480A/B, 81642A/B, 81682A/B or 81482B to **81600B #201** tunable laser.

For details, please contact your local Agilent sales representative.

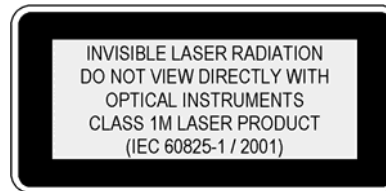
### Custom-made TLS:

A 1650 nm Tunable Laser Source is available on request. Please contact your local Agilent Sales Office.

## Laser Safety Information

All laser sources specified by this data sheet are classified as Class 1M 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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