

# VisIR High Power Picosecond Laser

- Center emission wavelength 766, 1064 and 1532 nm
- Pulse width typically 70 ps (FWHM) or 0.5 ns (FWHM)
- Average output power between >400 mW and >1.5 W (Depending on wavelength)
- Repetition rates from single shot up to 80 MHz, external or internal triggering
- Collimated output

## Applications

- Time-resolved fluorescence spectroscopy/microscopy (FLIM, FRET, FCS)
- Stimulated Emission Depletion Microscopy (STED)
- Biochemical analytics
- Diffuse Optical Tomography (DOT)
- Quantum optics
- LIDAR, ranging
- 3D polymerization





Beam profile VisIR-765 "STED

The VisIR laser is a versatile and flexible platform based on a Master Oscillator Fiber Amplifier (MOFA) concept with frequency conversion. The master oscillator generates infrared picosecond pulses at 1064 nm or 1530 nm with variable repetition rates up to 80 MHz using the proven gain-switching techniques from PicoQuant. The output of this seed laser is directly connected to a multi-stage fiber amplifier, which boosts the output from the seed laser by several dB while maintaining the other characteristics of the seed laser beam like the emission wavelength, polarization and the pulse width.

#### Average output power > 1.5 W

The high pulse energies of the amplified 1530 nm infrared laser permit an efficient wavelength conversion using single pass second harmonic generation (SHG). In that way it is possible to generate picosecond pulses at 766 nm with an average output power of more than 1.5 W (VisIR-765 "STED"). The VisIR can be operated at 12 different internally selectable repetition rates between 31.25 kHz and 80 MHz and can also be triggered externally by TTL or NIM signals at any repetition rate between single shot and 80 MHz. This feature is extremely useful for a perfect synchronization of excitation and depletion laser in a stimulated emission depletion (STED) set-up.



These tables are updated on a regular basis based on data of recently manufactured laser heads. Other specifications such as shorter pulse widths or higher powers than listed might be possible depening on the performance of diodes on stock. Please contact us for more information. All measurements shown may be subject to a 10 % callibration error. Each laser head undergoes an extensive burn-in test to ensure long-term stability and is shipped with a comprehensive set of test data. This test data is kept in our database, which already holds records of more than 18 years.

#### Flexible pulse duration

The laser can be configured with a short pulse of 70 ps or an extended pulse duration of 0.5 ns (FWHM). The extended pulse duration of 0.5 ns is found to be ideal for e.g. STED microscopy since longer pulses or even continuous-wave excitation can expose the sample to an unnecessary amount of radiation that can lead to increased photobleaching.

#### **Excellent beam quality**

The VisIR features a nearly perfectly circular and gaussian shaped beam profile (TEM00) which can be specified as a value of  $M^2 < 1.1$ , with a typical figure of about  $M^2 \sim 1.02$ . That is an important parameter for further accurate beam shaping (e.g. "STED donut").

#### Compact stand alone device

The VisIR is a stand alone device with a special design optimized for maximum heat dissipation. It includes all driving functions of the established PDL series laser driver such as choice of repetition rate and trigger source. An optional remote control for the VisIR allows to set the trigger source, the repetition rate, and the general output power of the laser.

### **Specifications**

	VisIR-765	VisIR-765-HP "STED"			
Optical output					
Center wavelength	766 ± 3 nm	766 ± 3 nm			
Maximum average output power	> 400 mW	> 1.5 W			
Pulse width (FWHM)	typ. 70 ps	typ. 0.5 ns			
Spectral width	<< 1 nm	<< 1 nm			
Output	collimated beam	collimated beam			
Beam diameter	2.2 mm ± 0.2 mm	2.2 mm ± 0.2 mm			
Beam quality	M <sup>2</sup> < 1.1 (typical ~ 1.02), TEM <sub>00</sub>	M² < 1.1 (typical ~ 1.02), TEM <sub>00</sub>			
PER	> 1:1000 (> 30 dB)	> 1:1000 (> 30 dB)			
Power stability (12 hours, $\Delta T_{ambient}$ < 0.5 K)	< 3 % rms	< 3 % rms			

	VisIR-1064	VisIR-1530	VisIR-1530-HP	
Optical output				
Center wavelength	1064 ± 2 nm	1531 ± 3 nm	1531 ± 3 nm	
Maximum average output power	> 1000 mW	> 750 mW	> 1.3 W	
Pulse width (FWHM)	< 80 ps	typ. 70 ps	typ. 0.5 ns	
Spectral width	<< 1 nm	<< 1 nm	<< 1 nm	
Output	collimated beam	collimated beam	collimated beam	
Beam diameter	1.1 mm ± 0.1 mm	0.5 mm ± 0.1 mm	2.2 mm ± 0.2 mm	
Beam quality	M <sup>2</sup> < 1.3, TEM <sub>00</sub>	M <sup>2</sup> < 1.1, TEM <sub>00</sub>	M <sup>2</sup> < 1.1, TEM <sub>00</sub>	
PER	> 1:60 (> 18 dB)	> 1:100 (> 20 dB)	> 1:100 (> 20 dB)v	
Power stability (12 hours, $\Delta T_{ambient} < 0.5 \text{ K}$ )	< 3 % rms	< 3 % rms	< 3 % rms	

## **General Specifications**

(valid for all wavelengths)

Repetition rates		
Internal		
Range	user selectable:	
	80, 40, 20, 10, 5 or 2.5 MHz (80 MHz base frequency)	
	1000, 500, 250, 125, 62.5 or 31.25 kHz (1 MHz base frequency)	
External via NIM input		
Range	< 10 Hz to 80 MHz	
Trigger level	fixed trigger level at -400 mV	
Connector	NIM-CAMAC	
External via TTL input		
Range	< 10 Hz to 80 MHz	
Amplitude	- 5 V to + 5 V (maximum limits)	
Trigger level	adjustable between -1 V and +1 V	
Connector	BNC	
Synchronization output		
Amplitude	< -800 mV into 50 Ohms (NIM)	
Connector	SMA	
Delays		
Trigger in (NIM) to sync out	typ. 9 ± 1 ns	
Trigger in (NIM) to optical out	typ. 80 ns	
Sync out to optical out	typ. 70 ns	
Dimensions		
Size (I × w × h)	352 × 336 × 82.5 mm	
Weight	7.5 kg	
Operation		
Temperature range	10 °C - 30 °C	
Maximum power consumption	115 W	



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