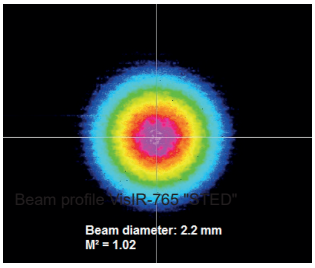
VisIR

High Power Picosecond Laser

- NEW any wavelength between 765 and 780 nm, 1064 nm, 1532 nm
- Pulse width typically 70 ps FWHM (short pulse) or 0.5 ns FWHM (high power)
- NEW option tunable pulse duration from 0.15 to 0.5 ns for the high power versions
- 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



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.

Flexible pulse duration

The laser can be configured to generate either short pulses of 70 ps or extended pulses of 0.5 ns (FWHM).
The extended pulse duration of 0.5 ns is ideal for e.g., STED microscopy as longer pulses or even continuous-wave excitation can expose the sample to an unnecessary amount of radiation, leading to increased photobleaching.

By combining the VisIR with our programmable pulse generator PPG 512, the pulse duration can be configured to any length from 0.15 to 0.5 ns. This permits fine control of not only the pulse parameter but also the coherence length of the laser. This is of great help for diffusion measurements in medical application.

Excellent beam quality
The VisIR features a nearly perfectly circular and gaussian shaped beam profile (TEM_{00}) 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.

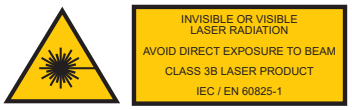
Wavelengths

Type (VisIR-)	**Wavelength** [nm]	**Pulse** (FWHM)	**Max. avg. Power** [W]	**Divergence** [mrad]	**Beam diameter** [mm]	**Beam quality**
765	766 (± 1)	typ. 70 ps	> 0.4	< 0.5	2.2 ± 0.2	$M^2 < 1.1$ (Typ. ~ 1.02), TEM_{00}
765-HP „STED“	766 (± 1)	typ. 0.5 ns[1]	> 1.5	< 0.5	2.2 ± 0.2	$M^2 < 1.1$ (Typ. ~ 1.02), TEM_{00}
775	775 (± 1)[2]	typ. 70 ps	> 0.4	< 0.5	2.2 ± 0.2	$M^2 < 1.1$ (Typ. ~ 1.02), TEM_{00}
775-HP	775 (± 1)[2]	typ. 0.5 ns[1]	> 1.5	< 0.5	2.2 ± 0.2	$M^2 < 1.1$ (Typ. ~ 1.02), TEM_{00}
1064	1064 (± 2)	< 80 ps	> 1	< 1.5	1.1 ± 0.1	$M^2 < 1.3$ TEM_{00}
1530	1531 (± 3)	typ. 70 ps	> 0.75	< 1.5	2.2 ± 0.2	$M^2 < 1.1$, TEM_{00}
1530-HP	1531 (± 3)	typ. 0.5 ns[1]	> 1.3	< 1.5	2.2 ± 0.2	$M^2 < 1.1$, TEM_{00}

[1] tunable pulse duration from 0.15 ns to 0.5 ns can be offered along with our Programmable Pulse Generator (PPG 512)
[2] any other wavelength between 765 and 780 nm can be provided upon request (may result in longer delivery times)

Specifications

Optical output	
Available Wavelength	765 to 1560 nm
Spectral Width	<< 1 nm
Polarization Extinction Ratio (PER)	VisIR-765(-HP) > 1:1000 (> 30 dB) VisIR-1064 > 1:60 (> 18 dB) VisIR 1530(-HP) > 1:100 (> 20 dB)
Power stability (12 hours) (ΔT (ambient) < 0.5 K)	< 3 % rms
Other optical specs (power, pulse, beam shape)	see wavelengths



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.

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 (l × 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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