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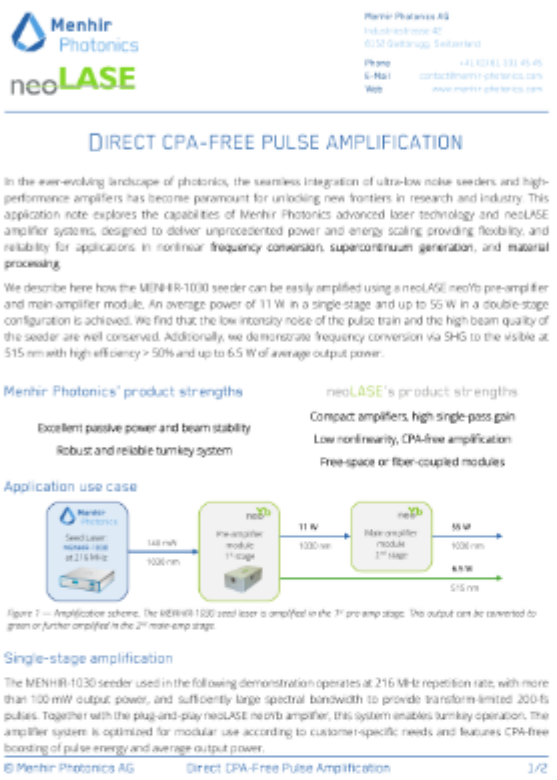
PHOTONICS spectra®

WHITE PAPERS & APPLICATION NOTES



Menhir Photonics

neoLASE

DIRECT CPA-FREE PULSE AMPLIFICATION

In the ever-evolving landscape of photonics, the seamless integration of ultra-low noise seeders and high-performance amplifiers has become paramount for unlocking new frontiers in research and industry. This application note explores the capabilities of Menhir Photonics advanced laser technology and neoLASE amplifier systems, designed to deliver unprecedented power and energy scaling providing flexibility, and reliability for applications in nonlinear **frequency conversion**, **supercontinuum generation**, and **material processing**.

We describe here how the MENHIR-1030 seeder can be easily amplified using a neoLASE neoYb pre-amplifier and main-amplifier module. An average power of 11 W in a single-stage and up to 55 W in a double-stage configuration is achieved. We find that the low intensity noise of the pulse train and the high beam quality of the seeder are well conserved. Additionally, we demonstrate frequency conversion via SHG to the visible at 515 nm with high efficiency > 50% and up to 6.5 W of average output power.

Menhir Photonics' product strengths

Excellent passive power and beam stability

Robust and reliable turnkey system

neoLASE's product strengths

Compact amplifiers, high single-pass gain

Low nonlinearity, CPA-free amplification

Free-space or fiber-coupled modules

Application use case

Figure 1 — Amplification scheme. The MENHIR-1030 seed laser is amplified in the 1st pre-amp stage. This output can be converted to green or further amplified in the 2nd main-amp stage.

Single-stage amplification

The MENHIR-1030 seeder used in the following demonstration operates at 216 MHz repetition rate, with more than 100 mW output power, and sufficiently large spectral bandwidth to provide transform-limited 200-fs pulses. Together with the plug-and-play neoLASE neoYb amplifier, this system enables turnkey operation. The amplifier system is optimized for modular use according to customer-specific needs and features CPA-free boosting of pulse energy and average output power.

Direct CPA-Free Pulse Amplification

The whitepaper describes how femtosecond pulses from a Menhir Photonics MENHIR-1030 seeder can easily be amplified using the modular neoYb amplifiers from neoLASE. The advantages of the presented approach lie in a direct amplification which does not require any chirp of the pulse and its plug-and-play modularity. Depending on the required output pulse energy, up to 250 nJ can be achieved using a two-stage geometry which allows for efficient nonlinear frequency conversion, supercontinuum generation or precise material processing. All applications benefit from the ultra-low amplitude between each pulse of the seed laser which is well maintained throughout the amplification scheme.

DOWNLOAD APPLICATION NOTE

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