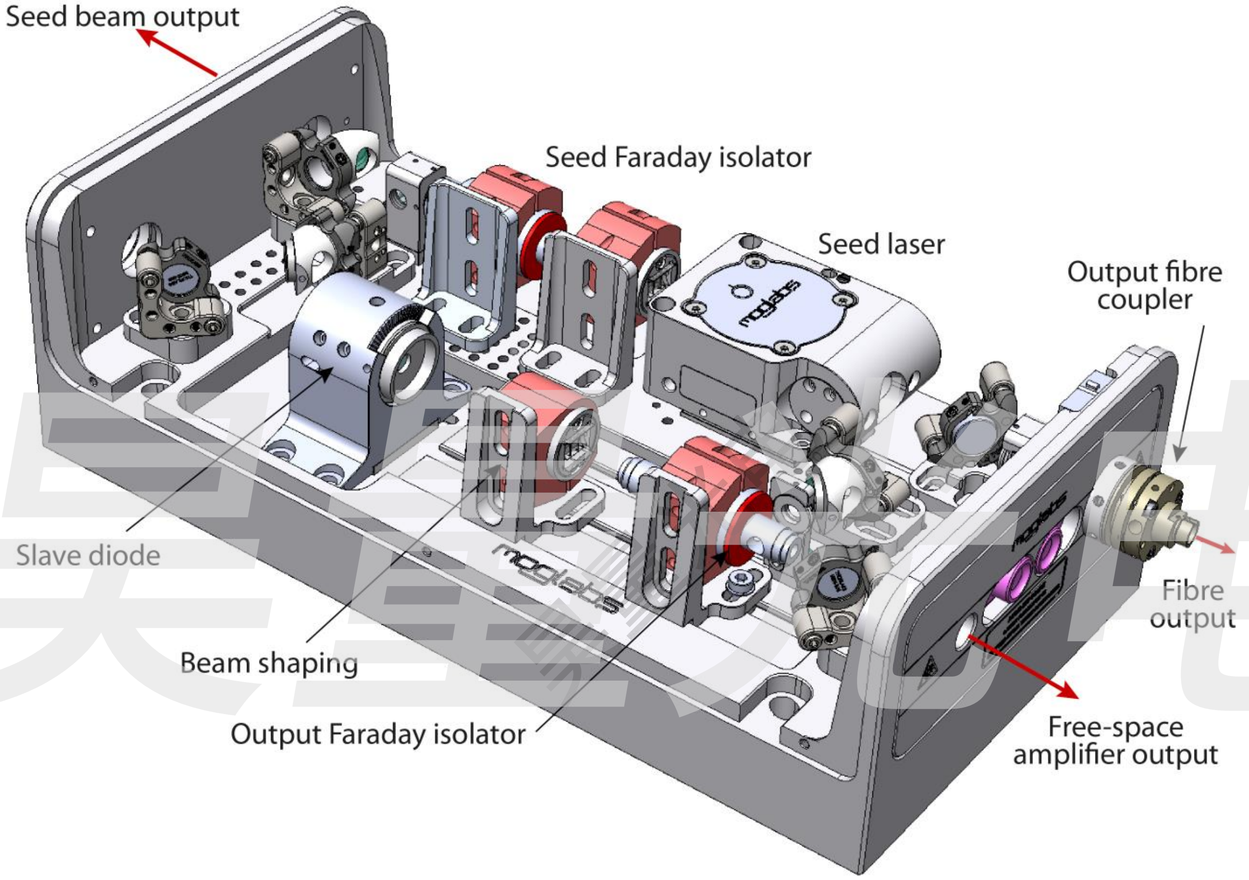
MOGLabs injection-locking amplified lasers

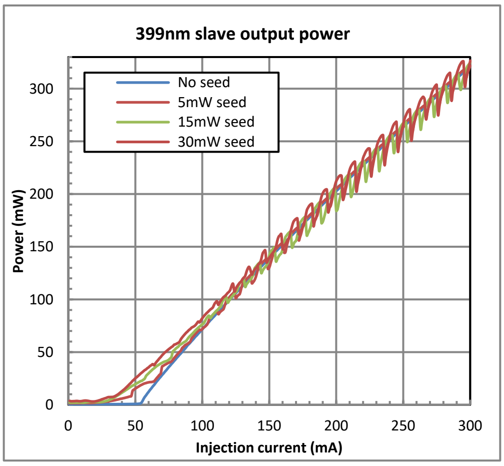
The MOGLabs injection-locking amplified laser systems provide cost-effective solutions to obtain higher power where good tapered amplifiers are not available, for example offering over 1W total output at 461nm, with high beam quality.

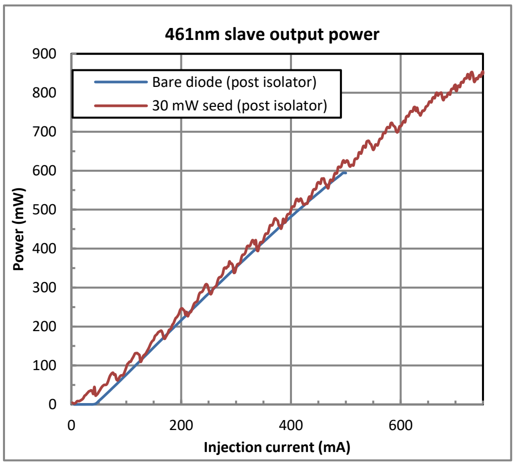
MSA-IL: combined seed and amplifier

The drawing below shows a typical configuration, with a MOGLabs "desmo" Littrow seed laser driving a standard non-AR Fabry-Perot slave diode. The MOGLabs cateye laser can also be used as seed, particularly for wavelengths longer than 500nm.



Two outputs are available: the main amplified beam, and a secondary beam of unused output from the seed laser. The plots at right show the main free-space output for 399nm and 461nm: 300mW and 800mW, after isolator. An additional 100 and 200mW are available from the secondary seed beams, which might be used for frequency-locking, or imaging.





moglabs

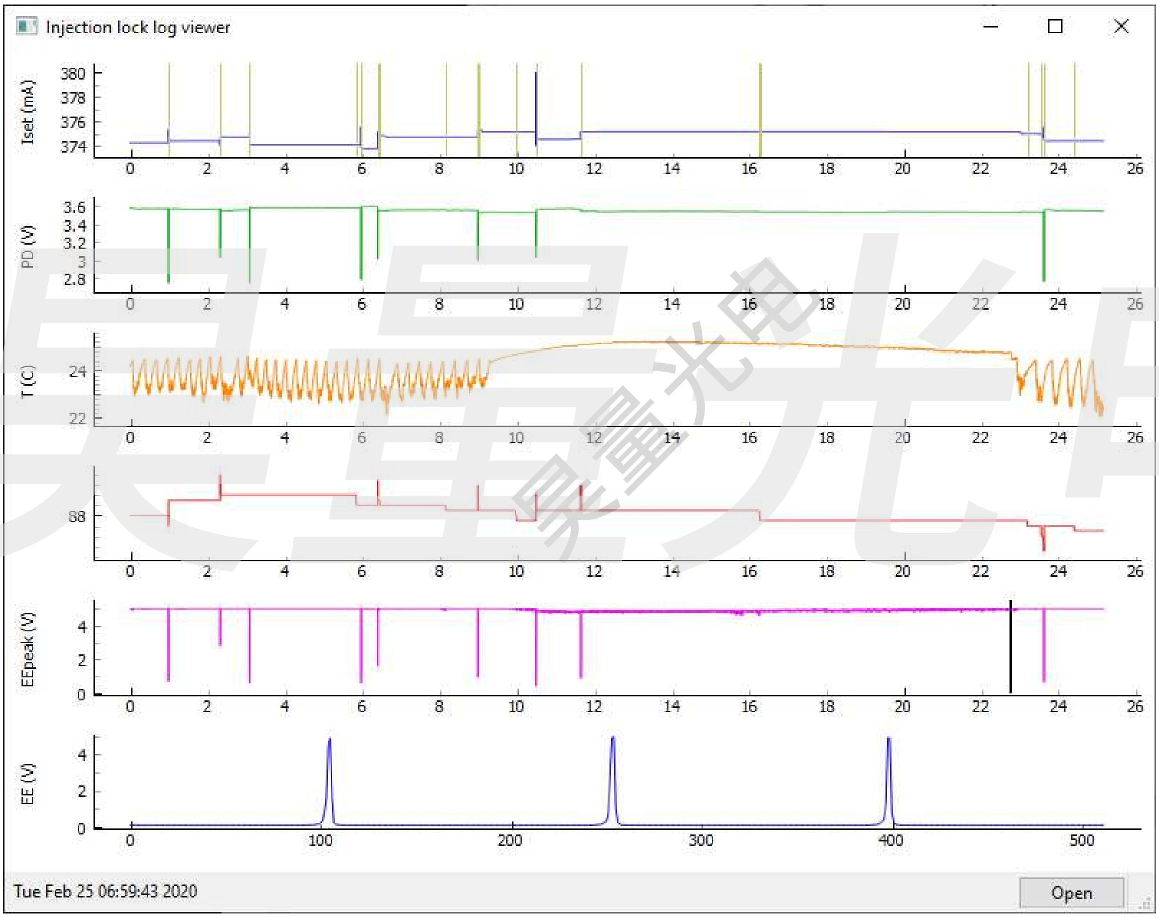
MOG Laboratories Pty Ltd
49 University St
Carlton VIC 3053 Australia
Tel: +61 3 9939 0677
info@moglabs.com

MOGLabs USA
419 14th St
Huntingdon, PA 16652 USA
Tel: (814) 251-4363
info@moglabsusa.com

Auto-track: maintaining optimum slave current

Injection locking is notoriously unstable because the slave diode current must be very precisely controlled so that it stays locked to the master. Based on literature, the current tolerance is typically only a few hundred microamps. At MOGLabs we have extended that range to several milliamps, and more importantly, we have developed instrumentation to monitor the lock and automatically adjust the slave current to maintain lock, even to the extent that lock is maintained if the master laser mode-hops.

The data below show 25 hours of operation for a 461nm injection-locked system. The top trace shows the slave diode current, automatically adjusting as environmental variations induce small changes that would otherwise cause the slave laser to jump to its free running wavelength (about 457nm). The second plot shows the main power output, with small jumps when the slave unlocks and automatically relocks. The unlabelled red data shows current in the master laser, automatically being adjusted to restore singlemode operation using a separate scanning FabryPerot (EE trace); note that the FabryPerot is not part of the auto-track slave current control. The room temperature shows substantial temperature swings during the daytime hours but the master laser is stable overnight when the temperature is stable.



Wavelengths available

The MOGLabs injection-locked laser has attracted considerable interest at wavelengths where an SHG system, at typically three times the price, would otherwise be needed. For example, 461nm (1W total) for Sr clocks, 399nm (400mW) for Yb clocks, 405nm (500mW) for holography, 509nm for Cs Rydberg excitation and photoionisation, 435nm and 445nm for industrial applications. It is also gaining interest for 657nm, 689nm, and 698nm where tapered amplifier diodes have been unreliable; please ask for further information if interested.