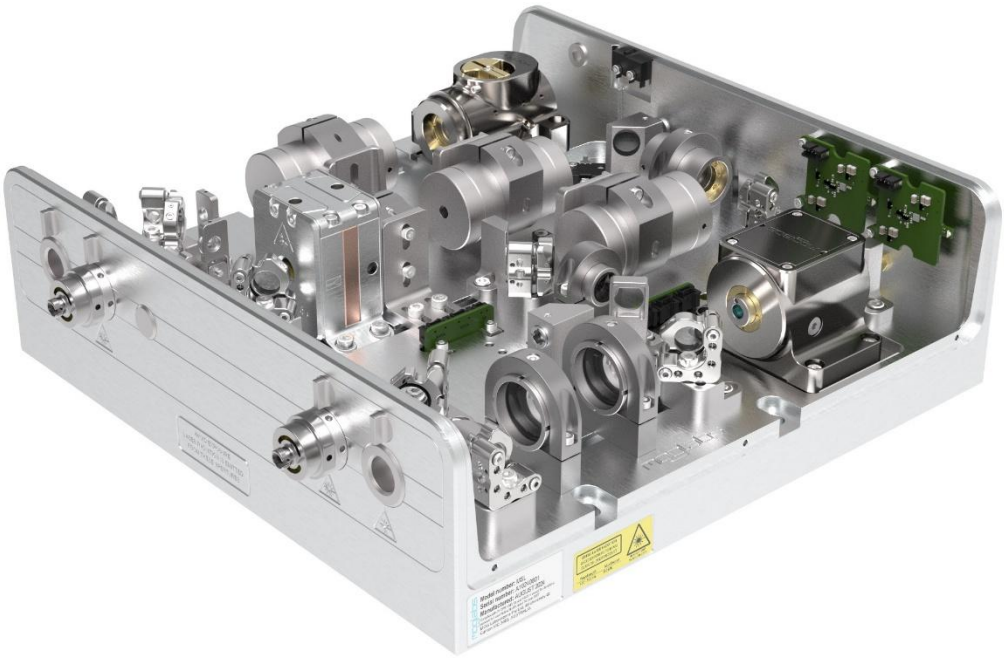
a santec company

MSHG: seed + amplifier + linear cavity SHG system



The MOGLabs MSHG seed + amplifier + linear cavity SHG system is a compact, higher power alternative to our standalone linear cavity SHG system with external seed + amplifier offering. The MSHG combines our unique cateye seed laser with a high power tapered amplifier and a linear enhancement cavity to generate ultra narrow linewidth, high power visible light from 370-665nm.

Unlike traditional bow-tie ring cavities, the linear design requires no user-adjustable cavity alignment. Instead there is a robust monolithic cavity with no kinematic mounts allowing it to achieve both outstanding passive stability and high-bandwidth piezo actuated locking. SHG output powers are up to 1.5W for a typical 3W TA input with options for optimising a low power direct ECDL input (e.g. 100mW) when TAs are not available.

Features

- Fully integrated and complete SHG system
- Alignment-free linear optical cavity design
- No kinematic mounts: vibration inert
- High power, over 1.5W output
- Low amplitude noise
- Broad wavelength tunability
- High bandwidth piezo actuator (>30kHz)
- FM cavity locking built-in
- Hermetically sealed; gas purge optional
- Self-contained, SHG electronics included
- Precision temperature control
- USB-C interface (provides power) + ethernet
- Crystal displacement to increase lifetime
- User-changeable crystal
- Re-usable, re-configurable

Options

- PDH locking
- Fibre input (external seed) or output (harmonic fibre coupling efficiency>70%)

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Seed, amplifier and cavity SHG

Specifications MSHG 1.0 (preliminary)

System	
Seed laser	Moglabs Cateye or Enhanced Littrow laser (CEL/LEL), can be configured for external seeds
Amplifier	Semiconductor tapered amplifier (3W typical, 5W available on request)
Doubling stage	Moglabs second harmonic linear enhancement cavity (MSL)
Input	FC/APC connector option for external seed, otherwise N/A
Output	Free-space, fibre coupled with FC/APC connector or dual, for both fundamental (low power for frequency stabilisation) and harmonic
Optical isolation	Four stages (dual stage on seed, dual stage on amplifier)
Locking technique	FM demodulation or optional PDH using diode modulation or EOM for low RIN
Control system	Fully self-contained digital controller for cavity. Laser and amplifier require external controllers
Cooling	Direct conduction to optical bench, quick-fit water cooling optional, ϕ 6mm
Dimensions	300 x 300 x 93mm (LxWxH); 15kg

Doubler cavity	
Wavelength range (harmonic)	380-520nm (with semiconductor amplifier), 370-380nm and 560-665nm (direct laser)
Coarse tuning	Typically ±10nm @ harmonic, larger range available upon request
Output power	Up to 1.5W, wavelength dependent
Continuous piezo scan	Scan rate dependent, Up to 50 GHz at 399nm
Spatial mode (Harmonic)	Near diffraction limited; $M^2 < 1.05$
Beam diameter ($1/e^2$)	Typically 1.8 x 3.0 mm, wavelength dependent
Beam divergence	<1.5 mrad (650 – 670nm: <2.5 mrad)
Polarisation	Linear > 100:1
Output power RIN	<0.4% rms (FM demod) <0.1% (PDH, EOM option)
Piezo bandwidth	First mechanical resonance over 30 kHz
Crystal	Non-hygroscopic, system-dependent, user-replaceable
Thermistor	±14V 3.3A *Q* = 34W standard
TEC	NTC 10kΩ

Cavity control electronics	
Communications	USB-C, 10/100 ethernet
Piezo control	150 V, digital + analogue PID servo
Locking	FM demod or optional external PDH using diode mod or EOM
Software	SCPI-like text-based command interpreter; Windows GUI app
Power	USB-C, 3.5 W typical

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Tapered amplifier electronics	
Protection	Relay, reverse diode, photodiode cutout
Indicator	Laser ON/OFF (LED)
Connectors	DE9 (temperature control) and DE15 (current control)

Seed laser electronics	
Protection	Relay, cover interlock connection, reverse diode
Indicator	Laser ON/OFF (LED)
Modulation input	SMA DC to 20MHz or AC 10kHz to 20MHz, ground isolated Option: RF bias tee, 16MHz – 2.5GHz (lower cutoff optional)
Connector	MOGLabs DLC Diode Laser Controller (single cable connect) DVI-D

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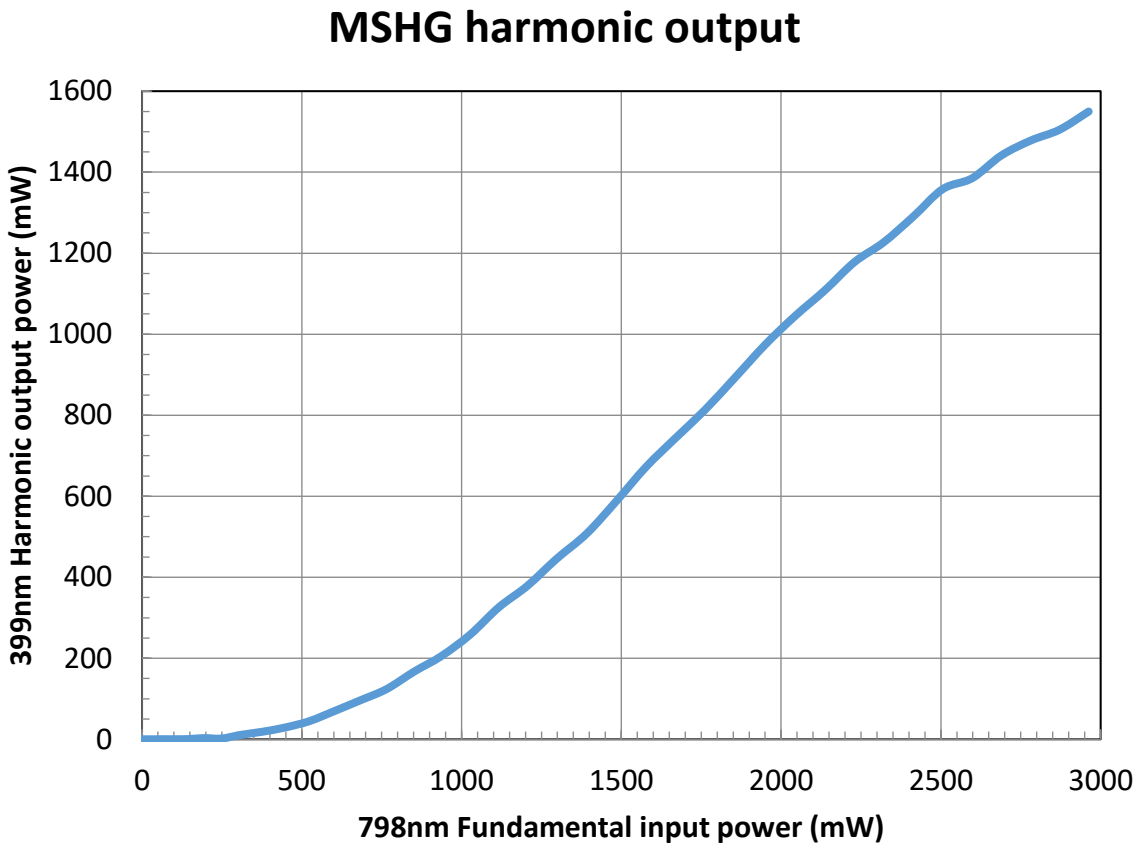
EXAMPLE TEST DATA 399NM



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