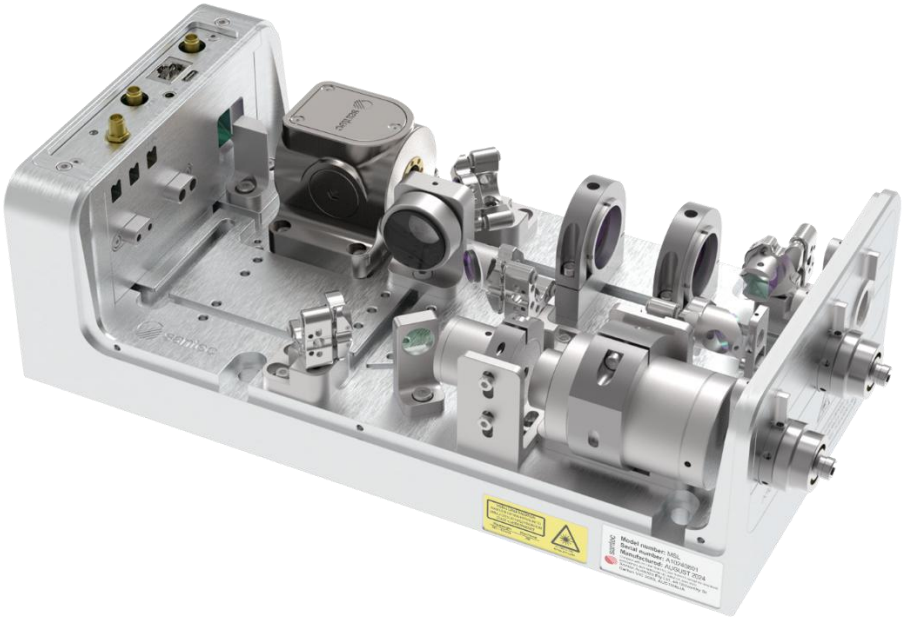
MSL linear cavity SHG system



The Santec MSL linear cavity SHG system allows highly efficient frequency doubling of laser light over a broad wavelength range, including 740/370, 798/399, 922/461, 960/480 and 1020/510 nm. Unlike bow-tie ring cavities, the linear design requires no alignment adjustment. SHG efficiency is typically 80 to 90 % for mid-power TA amplified systems (0.5 to 5 W), and can be optimised for low power direct ECDL (e.g. 100 mW) or high power fibre amplified systems. The cavity is monolithic, with temperature stabilisation and a high-bandwidth piezo actuator for locking. The MSL is available separately as a complete doubling system with input mode matching, HC (or PDH) locking, fibre input and optional fibre output, or combined with the Santec MSA or fibre amplified lasers, to provide stable and robust sources for new wavelengths.

Features

- Alignment-free linear cavity optical design
- Broad wavelength tunability, up to 75 nm
- No kinematic mounts: vibration inert
- Hermetically sealed; gas purge optional
- High bandwidth piezo actuator (>30 kHz)
- Low amplitude noise
- Self-contained, electronics included
- FM cavity locking built-in
- USB-C interface (provides power) + ethernet
- Precision temperature control
- Wide selection of wavelength bands (e.g. 370 – 445 nm, 445 – 520 nm, 510 – 560 nm)
- High efficiency, over 80 % at 1 watt
- Crystal displacement to increase lifetime
- User-changeable crystal
- Re-usable, re-configurable

Options

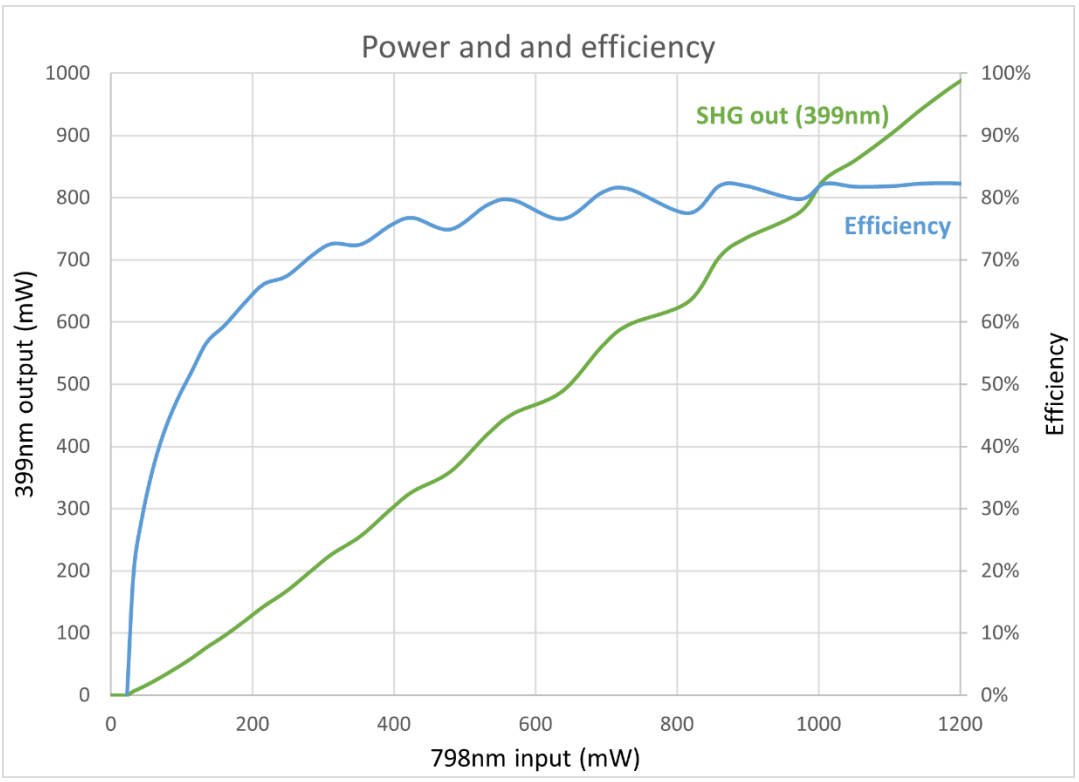
- PDH locking
- Hänsch-Couillaud (HC)
- Fibre output

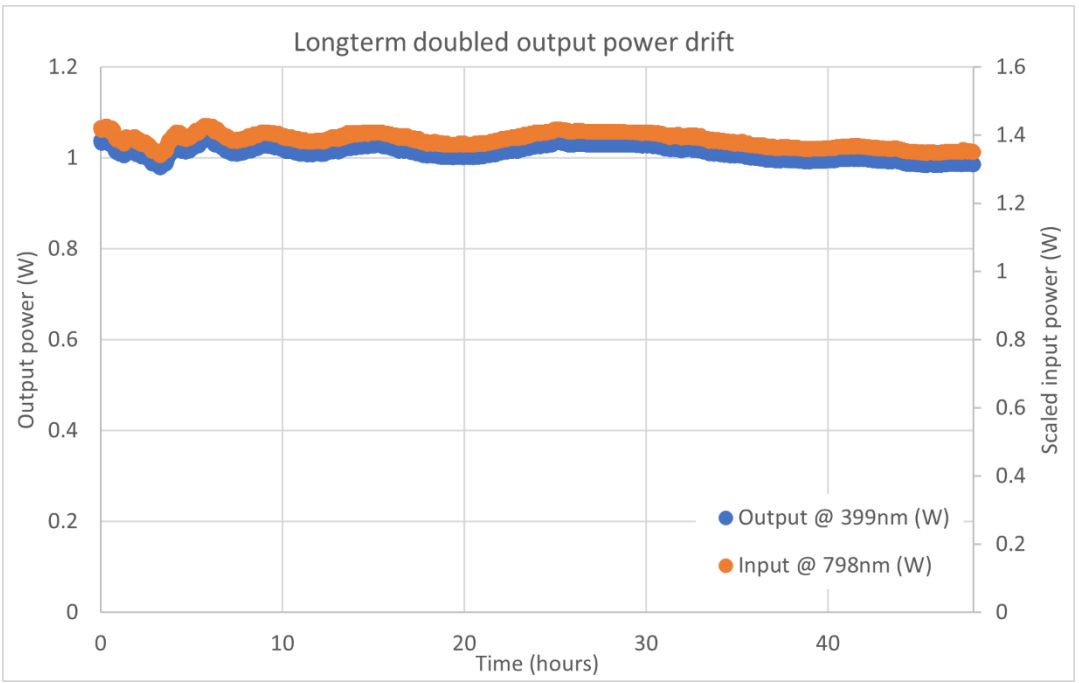
Cavity Second Harmonic Generator

Specifications MSL 1.0 (preliminary)

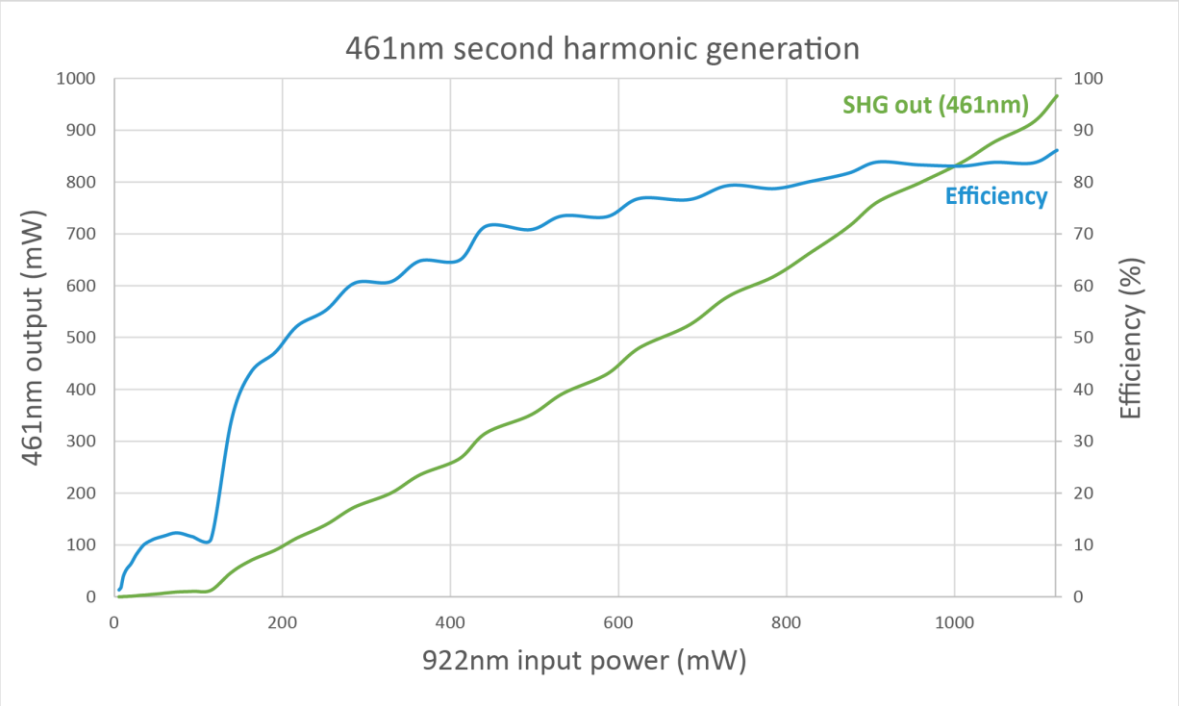
System	
Wavelengths available	370 – 445 nm, 445 – 510 nm, 510 – 560 nm; others on request
Wavelength range	Typically ±20 nm @ harmonic
Coarse tuning (crystal)	Typically ±10 nm @ harmonic, larger range available upon request
Conversion efficiency	Over 90 % demonstrated (1.1 W at 399 nm from 1.22 W at 798 nm)
Continuous piezo scan range	Typically 3 GHz at 399 nm
Input	FC/APC connector default, free-space on request
Output	Free-space or FC/APC connector
Beam quality (doubled output)	Near diffraction limited; $M^2 < 1.05$
Isolation	Single-stage Faraday isolator
Piezo bandwidth	First resonance over 30 kHz
Crystal	Non-hygroscopic, system-dependent, user-replaceable
Polarisation	Linear > 100:1
Residual infrared	TBD
Locking	FM demod or HC or optional PDH using diode modulation or EOM
Output power noise	<0.2% rms
Dimensions	300 x 155 x 93 mm (LxWxH); 7 kg

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


Power and and efficiency
SHG out (399nm)
Efficiency
399nm output (mW)
Efficiency
798nm input (mW)
1000
900
800
700
600
500
400
300
200
100
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
200
400
600
800
1000
1200

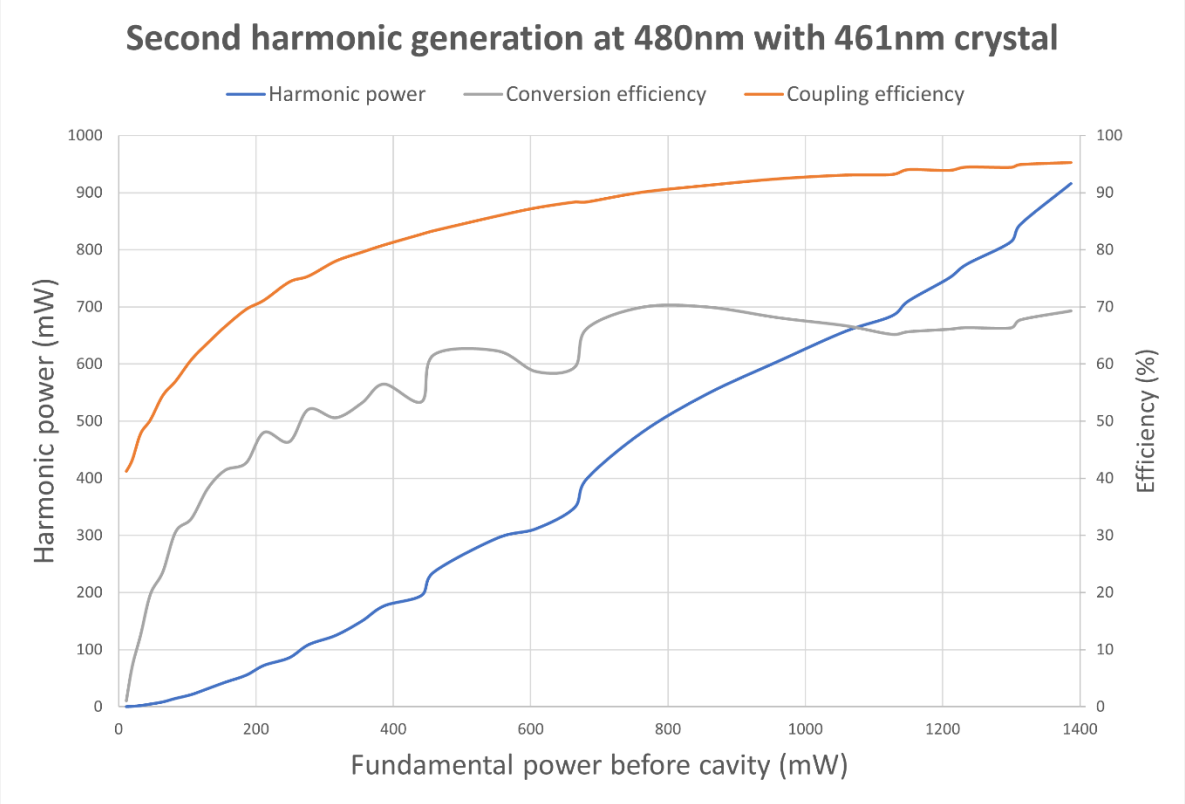

Longterm doubled output power drift
Output power (W)
Scaled input power (W)
Time (hours)
Output @ 399nm (W)
Input @ 798nm (W)
1.2
1
0.8
0.6
0.4
0.2
0
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40

EXAMPLE TEST DATA 461 NM



EXAMPLE TEST DATA 480 NM

Please note: using 461 nm crystals and optics. New crystals will be tested in the last week of November 2024 and should give significant increases in efficiency and power.



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MSL-C-E/Ver.1.0 CODE-202606-TM-PP-CPY