

Single Frequency DPSS Lasers

**Any wavelength from NIR to UV using a single engineering platform
based on our proprietary patented BRaMMS DPSS Laser technology.**

We develop and produce Single Frequency DPSS lasers for demanding applications in:

- Leading edge research,
- Life Sciences, BioMed,
- Semicon,
- Environmental Metrology, etc.

We are the **only** company, whose Continuous Wave Single Frequency DPSS Lasers uniquely perform at any wavelength within the range from NIR to UV from just a single technology platform, using our proprietary patented BRaMMS DPSS Laser technology. Whereas conventional light can be dispersed by a prism into a spectrum of constituent colours, our lasers emit just one ultra pure colour.

Using the BRaMMS laser technology we can offer any wavelength within spectrum range

- from IR (around 2 μ m) to through deep UV (<200nm)
- from our range of DPSS lasers operating in the CW Single Frequency regime. This is unique for a single platform laser technology.

All products feature laser cavity feedback locked Single Longitudinal Mode CW performance with no lock loss and mode hops during 100s of hours of nonstop operation.

The excellent beam quality with M2 <1.05 emerges from the smallest footprint and at the lowest power consumption for given output, with noise figure as low as < 0.1%rms (10Hz-10MHz).

Benefits of our laser design include:

- Up to ten times higher conversion efficiency
- Power scalability without water cooling
- No mode beating & associated high frequency noise, which often limits applicability
- The longest coherence length of over 100m, effectively the path difference over which lasers can interfere.

BRaMMS DPSS Laser technology by us is the company's proprietary pioneering technology platform.

It utilises the spectrum discriminatory feature of a Michelson interferometer setup within a spectral range preselected by VBG (Volume Bragg Grating). This suppresses all but one lasing longitudinal mode within a laser cavity. Hence – **Bragg Range Michelson Mode Selector (BRaMMS)**.

Due to significantly lower power consumption for any required output and the resulting simplified thermal management, the BRaMMS laser technology provides up to 10 times wider range of output power scalability from the smallest footprint.

We advance this technology via three main engineering lines:

- 1. BRaMMS – Solo-XXXX/XXXX**,
covering spectrum range 700nm-2000nm by the generation at the fundamental wavelength;
- 2. BRaMMS – Duetto-XXX/XXXX**,
covering spectrum range 350nm -780nm by an intracavity second harmonic generation;
- 3. BRaMMS – Quartetto-XXX/XXXX**,
covering spectrum range 200nm – 380nm by an intracavity fourth harmonic generation.

**BRaMMS Laser Technology provides new wavelengths
previously unattainable
by DPSS lasers in UV, Visible and Near IR.**

Technology Feature	Benefit	Details
Ultra high efficiency for 2 nd harmonic conversion	Unique output power scalability	Upto 10 times higher conversion efficiency than leading designs
Feedback locked Single	Very low noise, free from mode	< 0.1% rms

Longitudinal Mode CW operation	hops	< 1MHz line width
Long coherence length, > 100m	A much broader range of applications	From light hungry Bio-Med to very large scale metrological applications
Gaussian beam profile	Diffraction limited spot size	TEM ₀₀ , < 1 mrad divergence
Stabilised thermal management at multiple points	Very high beam pointing stability	≤ 5μrad/ °C
Low power consumption	Reduced requirement for laser head heat dissipation; no fans required	From < 20W; lowest power consumption for given output
Compact laser head and separate controller communicating via GUI with a notebook	Greatly reduced real estate	Laser heads from 50mm x 50mm x 120mm; Controllers from 170mm x 53.5mm x 163mm

The BRaMMS laser technology is worldwide protected by:

- US 8,498,316 – Intra-Cavity Second Harmonic Generation (SHG) Laser Device
- EPO 10173991 – Intra-Cavity Second Harmonic Generation (SHG) Laser Device (pending)

Our technology is able to displace bulky and inefficient gas lasers like argon-ion or helium cadmium lasers, dinosaurs of the laser industry. Our Single Frequency DPSS lasers are compact, reliable and long life systems, in demand for many cutting edge research and industrial applications, for example:

- life sciences instrumentation,
- semiconductor wafer metrology,
- holographic imaging,
- particle trapping,
- wind turbine power generation,
- avionic technologies...

Using the BRaMMS laser technology we can offer any wavelength within the spectrum range from IR (around 2000nm) through deep UV (<200nm) from its range of DPSS lasers operating in the CW Single Frequency regime.

Additionally, due to the significantly lower power consumption for any required output and the resulting simplified thermal management, the BRaMMS laser technology provides up to a 10 times wider range of output power scalability from the smallest footprint. This opens up applications in portable and remotely controlled systems and devices which until our products were available have never before considered feasible.

The following products have been released for sale:

BRaMMS-Solo – 1064/XXXX from 50mW to 3W output power at 1064nm SLM

BRaMMS-Duetto – 532/XXXX from 50mW to 2W output power at 532nm SLM

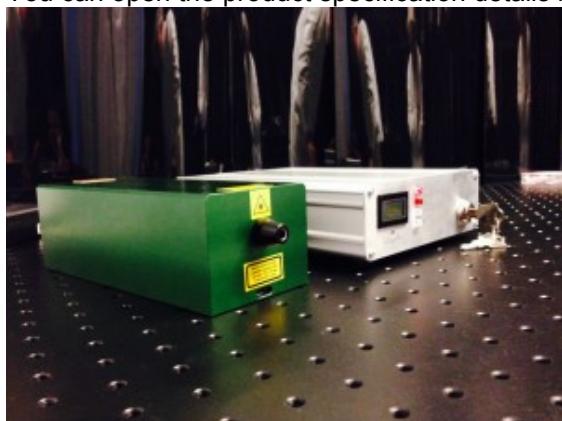
BRaMMS-Duetto – 515/XXXX from 50mW to 1W output power at 515nm SLM

BRaMMS-Duetto – 442/XXX from 10mW to 150mW output power at 442nm SLM

BRaMMS-Duetto – 355/XXX from 10mW to 100mW output power at 355nm SLM

BRaMMS-Customised – We can deliver any wavelength and adjust the power accordingly. Let's discuss your requirements and find the best solution.

You can open the product specification details by clicking on the relevant data sheet on the right hand side.



BRaMMS-Solo-1064/3000



BRaMMS-Duetto-442/50

Applications:

We are the only company to be able to configure Continuous Wave, Single Frequency Lasers to uniquely emit at any wavelength covering the spectral range from Near Infra-Red to Ultra-Violet from a single universal technology platform, using proprietary patented BRaMMS technology.

The potential applications range is vast:

- holographic art to large scale structural analysis;
- from pharmaceutical instrumentation to cutting edge particle trapping techniques;
- from semiconductor wafer micro-processing to wind turbine power generation and avionic technologies.

Our novel patented BRaMMS technology provides reliable, cost effective, compact all-solid-state and class leading solutions for both well established and currently unavailable, but demanded, wavelengths. This opens up applications in portable and remotely controlled systems and devices, which have been never before considered feasible.

The newest generation of ultra compact, air cooled all solid state products is a new choice on the current deep UV spectrum market and a strong competitor to the pulsed laser technologies traditionally offered by large excimer UV gas lasers and water cooled frequency tripled/quadrupled Nd:YAG systems.

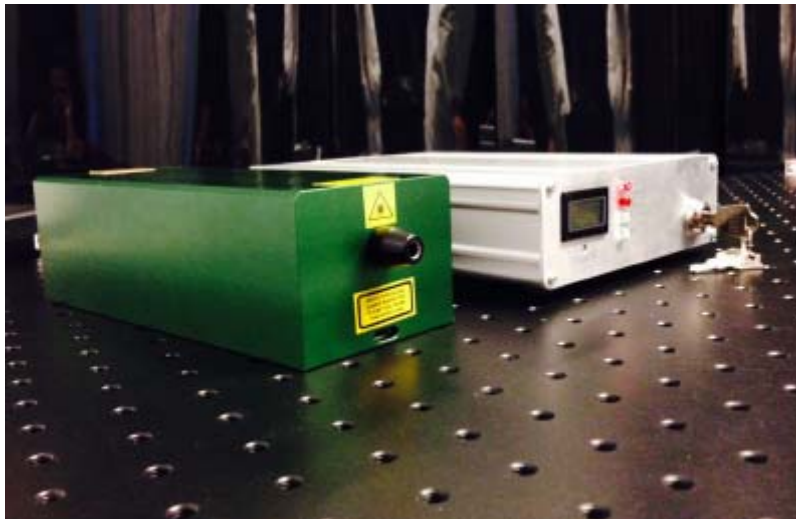
Let's look at our newer laser with wavelength of 515nm. This laser has a scalable output power up to several Watts, and is a compact, reliable and long life plug-and-play replacement for the bulky and inefficient argon-ion gas laser with the same green emission.

The new laser will feature optimised second harmonic generation of the diode pumped ytterbium doped YAG (Yb:YAG) laser at 1030nm using our novel patented BRaMMS technology.

Argon ion lasers have been around since the end of the 1960's and found broad applications in areas such as holography, printing, digital imaging, non-destructive testing including semiconductor inspection, spectroscopy, optical pumping, confocal microscopy, flow cytometry, DNA sequencers, compact disc and DVD mastering, photomask direct imaging, printed circuit board direct imaging, and precision optics inspection. However, they suffer disadvantages of being bulky (high power versions are several meters long) and inefficient (a 1W single frequency green laser has an efficiency of 0.01% requiring a large 10kW power supply with commensurate water cooling).

Benefits of our laser design include up to several orders of magnitude higher conversion efficiency, giving them unique output power scalability while eliminating the need for water cooling, a lack of mode beating and associated high frequency noise which often limits applicability, and the longest coherence length, over 100m, effectively the path difference over which lasers can interfere.

BRaMMSSolo 1064/XXXX



from 50mW to 3W output power at 1064nm SLM

- feedback locked Single Longitudinal Mode CW operation
- mode hops and lock loss free
- very low noise performance, < 0.1% rms
- excellent beam quality from smallest footprint
- lowest power consumption for given output

Output Power (CW)	mW	low power version: 5 - 200 high power version: 500-3000
Wavelength	nm	1064
Output Beam Diameter, TEM00	mm	low power version: 0.8 high power version: 1
Beam Divergence	mrad	< 1, diffraction limited
Beam Pointing Stability	μrad/°C	≤ 5
Longitudinal Mode Structure		SLM
Line Width	MHz	< 0.5
Line Spectral Position Stability	MHz (pm)	+/- 50 (+/- 0.2) within 4 hrs of CW operation
Coherence Length	m	> 100
Mode Hops Free Fine Tuning Range	GHz	25 - 30 (optional)
Polarisation		Linear, Vertical; ≥100:1
Output Power Noise	%	≤ 0.1rms, ≤ 1p - p (10Hz - 10MHz)
Output Power Stability	%	≤ 2, within any 4 hours of CW operation
Working Temperatures	°C	15 - 35, conductive cooling via mounting interface
Storage Temperatures	°C	- 20 to 75
Humidity	%	5 - 95, non - condensing
Warm up time	min	< 10
Dimensions and Electrical:		
Operating Voltage	VAC	90 to 240
Frequency	Hz	50 - 60
Power Consumption	W	< 20
Dimension	mm	Low power version: Laser Head 50x50x120; Controller 170x53.5x163 High power version: Laser Head 80x75x198; Controller 170x53.5x223

Fixed output power turnkey system, CW operation, factory aligned and sealed.

Specification may be subject to change without notice.

BRaMMSDuetto 532/XXXX



- from 50mW to 2W output power at 532nm SLM
- feedback locked Single Longitudinal Mode CW operation
- mode hops and lock loss free
- very low noise performance, < 0.1% rms
- excellent beam quality from smallest footprint
- lowest power consumption for given output

	Units	Low Power Version	High Power Version
Output Power (CW)	mW	50 - 150	300 - 2000
Wavelength	nm	532	
Output Beam Diameter, TEM00	mm	0.8	1
Beam Divergence	mrاد	< 1, diffraction limited	
Beam Pointing Stability	μrad/°C	≤ 5	
Longitudinal Mode Structure		SLM	
Line Width	MHz	< 0.5	
Line Spectral Position Stability	MHz (pm)	+/- 50 (+/- 0.2) within 4 hrs of CW operation	
Coherence Length	m	> 100	
Mode Hops Free Fine Tuning Range	GHz	25 -30 (optional)	
Polarisation		Linear, Vertical; ≥100:1	
Output Power Noise	%	≤ 0.1rms, ≤ 1p - p (10Hz -10MHz)	
Output Power Stability	%	≤2, within any 4 hours of CW operation	
Working Temperatures	°C	15 -35, conductive cooling via mounting interface	
Storage Temperatures	°C	- 20 to 75	
Humidity	%	5 - 95, non - condensing	
Warm up time	min	<10	<15
Operating Voltage	VAC	90 to 240	
Frequency	Hz	50 - 60	
Power Consumption	W	<20	<60
Dimension	mm	Laser Head 50x50x120; Controller 170x53.5x163	Laser Head 80x75x198; Controller 170x53.5x223

Fixed output power turnkey system, CW operation, factory aligned and sealed.

Specification may be subject to change without notice.

BRaMMSDuetto 515/XXXX



- from 50mW to 1W output power at 515nm SLM
- feedback locked Single Longitudinal Mode CW operation
- mode hops and lock loss free
- very low noise performance, < 0.1% rms
- excellent beam quality from smallest footprint
- lowest power consumption for given output

Output Beam Diameter, TEM00	mm	1
Beam Divergence	mrاد	< 1, diffraction limited
Beam Pointing Stability	μrad/°C	≤ 5
Longitudinal Mode Structure		SLM
Line Width	MHz	< 0.5
Line Spectral Position Stability	MHz (pm)	+/- 50 (+/- 0.2) within 4 hrs of CW operation
Coherence Length	m	> 100
Mode Hops Free Fine Tuning Range	GHz	25 –30 (optional)
Polarisation		Linear, Vertical; ≥100:1
Output Power Noise	%	≤ 0.1rms, ≤ 1p - p (10Hz –10MHz)
Output Power Stability	%	≤2, within any 4 hours of CW operation
Working Temperatures	°C	15 –35, conductive cooling via mounting interface
Storage Temperatures	°C	- 20 to 75
Humidity	%	5 - 95, non - condensing
Warm up time	min	<15
Operating Voltage	VAC	90 to 240
Frequency	Hz	50 - 60
Power Consumption	W	<60
Dimension	mm	Laser Head 80x75x198; Controller 170x53.5x223

BRaMMSDuetto 442/XXX

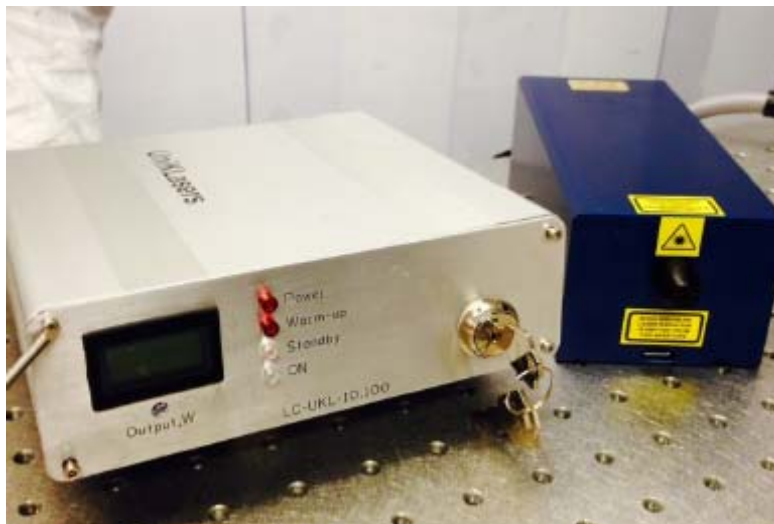


- from 10mW to 150mW output power at 442nm SLM
- feedback locked Single Longitudinal Mode CW operation
- mode hops and lock loss free
- very low noise performance, < 0.1% rms
- excellent beam quality from smallest footprint
- lowest power consumption for given output

	Units	Low Power Version	High Power Version
Output Power (CW)	mW	10 - 80	100 - 150
Wavelength	nm	442	
Output Beam Diameter, TEM00	mm	0.8	1
Beam Divergence	mrad	< 1, diffraction limited	
Beam Pointing Stability	μrad/°C	≤ 5	
Longitudinal Mode Structure		SLM	
Line Width	MHz	< 0.5	
Line Spectral Position Stability	MHz (pm)	+/- 50 (+/- 0.2) within 4 hrs of CW operation	
Coherence Length	m	> 100	
Mode Hops Free Fine Tuning Range	GHz	25 - 30 (optional)	
Polarisation		Linear, Vertical; ≥100:1	
Output Power Noise	%	≤ 0.1rms, ≤ 1p - p (10Hz - 10MHz)	
Output Power Stability	%	≤ 2, within any 4 hours of CW operation	
Working Temperatures	°C	15 - 35, conductive cooling via mounting interface	
Storage Temperatures	°C	- 20 to 75	
Humidity	%	5 - 95, non - condensing	
Warm up time	min	< 10	< 15
Operating Voltage	VAC	90 to 240	
Frequency	Hz	50 - 60	
Power Consumption	W	< 20	< 60
Dimension	mm	Laser Head 50x50x120; Controller 170x53.5x163	Laser Head 80x75x198; Controller 170x53.5x223

Fixed output power turnkey system, CW operation, factory aligned and sealed.
Specification may be subject to change without notice.

BRaMMSDuetto 355/XXX



- from 10mW to 100mW output power at 355nm SLM
- feedback locked Single Longitudinal Mode CW operation
- mode hops and lock loss free
- very low noise performance, < 0.1% rms
- excellent beam quality from smallest footprint
- lowest power consumption for given output

Output Power (CW)	mW	10 - 100
Wavelength	nm	355
Output Beam Diameter, TEM00	mm	0.8
Beam Divergence	mrاد	< 1, diffraction limited
Beam Pointing Stability	μrad/°C	≤ 5
Longitudinal Mode Structure		SLM
Line Width	MHz	< 0.5
Line Spectral Position Stability	MHz (pm)	+/- 50 (+/- 0.2) within 4 hrs of CW operation
Coherence Length	m	> 100
Mode Hops Free Fine Tuning Range	GHz	25 -30 (optional)
Polarisation		Linear, Vertical; ≥100:1
Output Power Noise	%	≤ 0.1rms, ≤ 1p - p (10Hz -10MHz)
Output Power Stability	%	≤2, within any 4 hours of CW operation
Working Temperatures	°C	15 -35, conductive cooling via mounting interface
Storage Temperatures	°C	- 20 to 75
Humidity	%	5 - 95, non - condensing
Warm up time	min	<15
Operating Voltage	VAC	90 to 240
Frequency	Hz	50 - 60
Power Consumption	W	<50
Dimension	mm	Laser Head 80x75x198; Controller 170x53.5x223

Fixed output power turnkey system, CW operation, factory aligned and sealed.
Specification may be subject to change without notice.