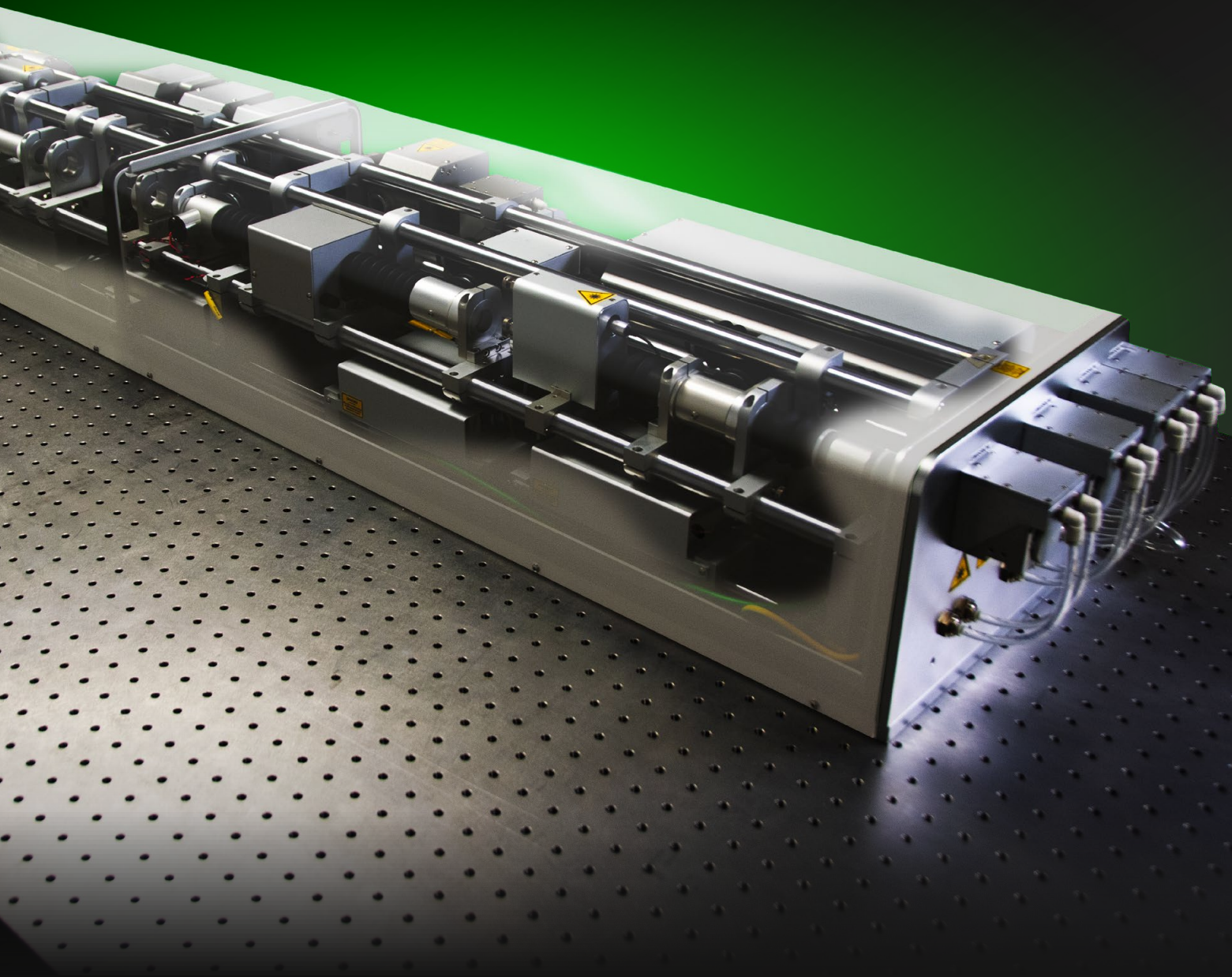




HIGH ENERGY PULSED DIODE PUMPED SOLID STATE LASERS



PLASMA PLASMA+

 Litron Lasers

PLASMA

PLASMA+

State of the art high performance diode pumped lasers require a multitude of complex parts working seamlessly together.

At Litron, we engineer superior laser performance by designing, manufacturing and controlling every one of these critical elements in-house.

High energy diode pumped nanosecond lasers combined with high repetition rates are sought for an ever growing range of new applications. Very high stability and robust specifications are required, with easy maintenance to ensure minimal downtime as well as customisation with the ability to incorporate an extensive range of options.



Pump Diodes

Litron has invested heavily in an in-house ISO Class 6 cleanroom facility to assemble and test a wide range of laser diode packages. Our diode packages have excellent performance characteristics and a high degree of reliability. We have developed advanced manufacturing and test processes to ensure ongoing quality and integrity. We offer a warranty of 4 billion shots or 2 years (whichever is sooner) and expected lifetimes in excess of 10 billion shots.



Pumping Chamber

Our mechanical engineering team designs both the diode packaging and pumping chambers in tandem to provide the most efficient and uniform pumping of the Nd:YAG rods whilst also giving Litron the ability to scale pulse energies of both the laser oscillators and amplifiers.



Chillers

In a DPSS laser the chiller is a critical component in the system. The emission wavelength of the pump diodes is temperature dependent, to keep the pumping and laser performance optimised it is essential that the chiller is high performing, stable and reliable. Our chiller design and production is performed entirely in-house at Litron with $\pm 0.1^\circ\text{C}$ temperature stability. Free standing or rack mounted chillers with water-air-cooling or water-water options are available.



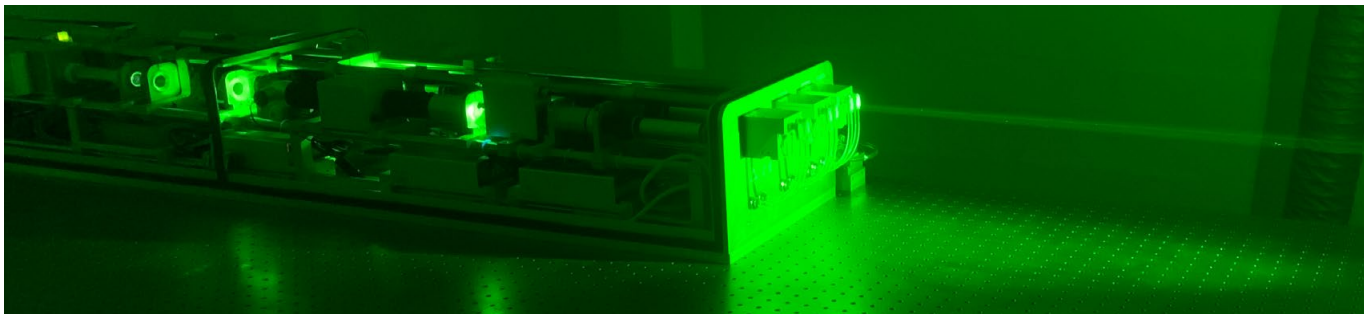
Electronics

Litron's advanced power electronics incorporates wide band-gap semiconductors, digitally optimised control and enhanced layout techniques maximising laser energy while boosting system efficiency. Our drive electronics are developed in tandem with the pump diodes to deliver peak stability and reliability. The development of in-house embedded electronics facilitates comprehensive monitoring for system diagnostics.



Software and Touchscreen GUI

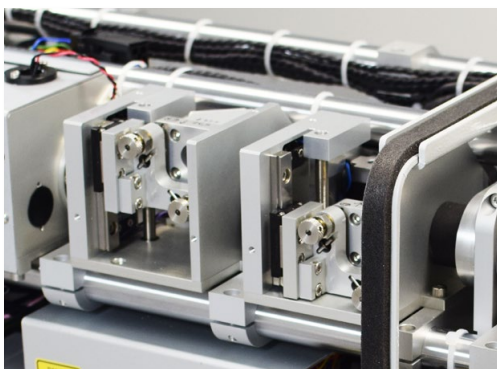
Every laser comes as standard with the touchscreen Litron Universal Controller (LUCi) which allows extensive control and parameter monitoring functions. Separate software is also supplied to control the laser from a PC. DLLs are available for integration into OEM front-end machine control software. All of the software is written by Litron, and full support is provided.



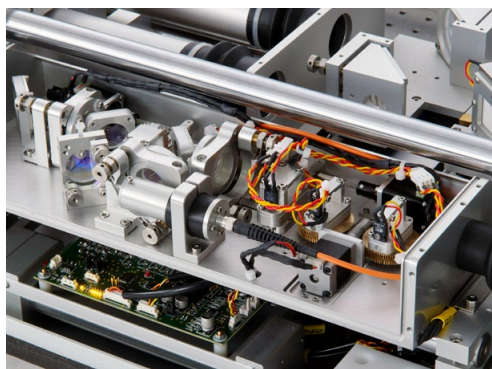
Customisation

Constructing the Plasma on an industrial grade Invar-rail design offers many advantages over conventional base-plate solid state laser designs. Most notably Invar provides excellent mechanical and thermal stability, which is critical to ensure constant and reliable alignment. Moreover, the rail-based modular design allows for complete customisation to fit each user's exacting requirements. The following extensive range of options are available.

- **Choice of Resonator: stable, telescopic and Gaussian-coupled**
- **Motorised harmonic generation with closed-loop diode feedback**
- **Motorised beam switching units for hands-free wavelength selection**
- **Tunable OPOs and extended range UV**
- **Diode pointer**
- **Motorised optical attenuators for hands-free energy control**
- **Injection seeder for SLM operation**
- **Beam expanding or collimating telescopes**
- **Process shutters and on-board energy monitoring**
- **Real time beam profile monitoring**



Motorised beam switching



Tunable OPOs



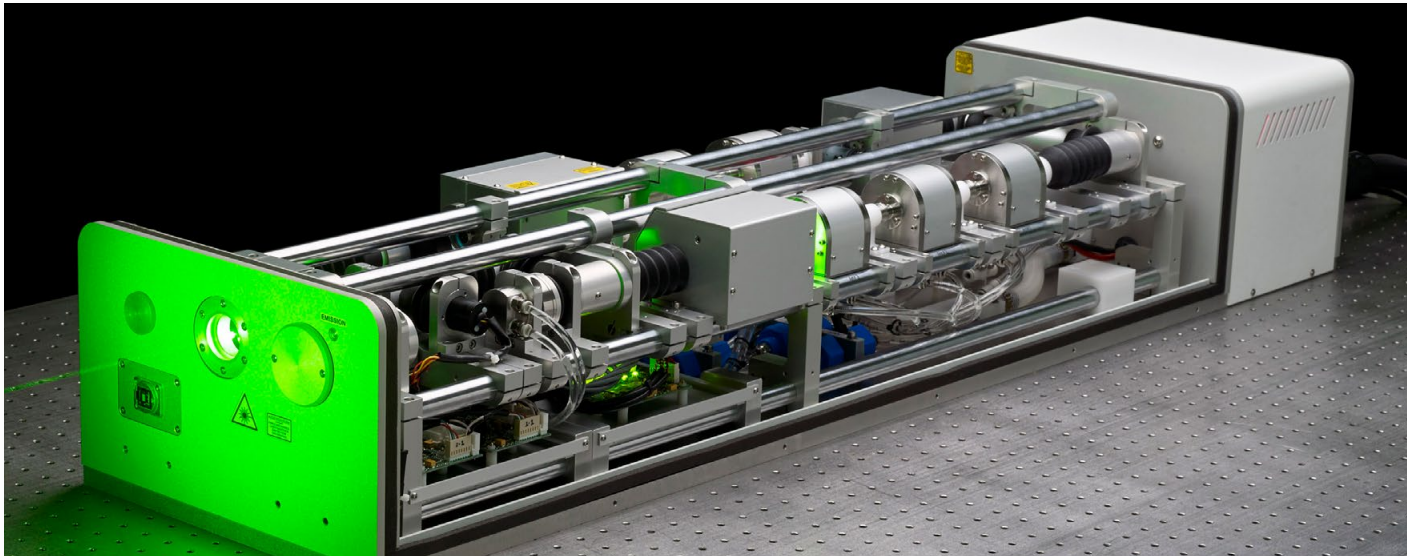
Diode pointer



Beam profile monitoring

Plasma Series

High Energy Pulsed DPSS Nd:YAG Lasers at up to 200Hz



PLASMA

The Plasma DPSS series lasers are pulsed diode pumped, Q-switched Nd:YAG lasers which use the very latest in high-efficiency fully diode pumped technology to replace traditional flashlamp pumping.

The Plasma series DPSS lasers use Litron's sealed, mechanically robust diode pump module to ensure stable output, high reliability, easy diode replacement and diode warranty of 4 billion pulses.

APPLICATIONS

- Semiconductor annealing
- LIDAR & Remote Sensing
- Thomson Scattering
- Laser Shock Peening
- Si wafer inspection
- Dye, OPO and Ti:Sa pumping
- Space debris ablation
- Laser cleaning
- Spectroscopy & LIBS
- Laser Lift-Off
- LIFT
- LCD repair
- LIF
- LIDT

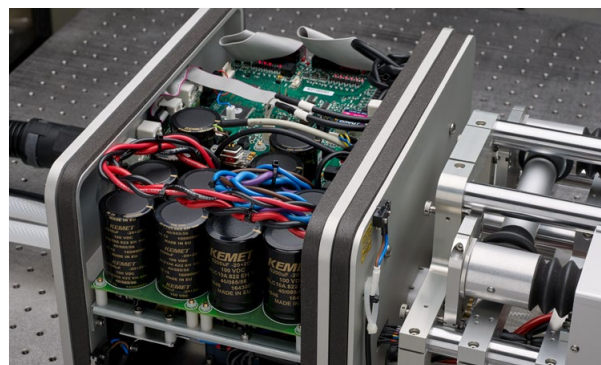
All Plasma models employ a true birefringence-compensating twin-rod resonator that gives a circular and highly homogeneous beam profile with a low M^2 .

A super-Gaussian coupled twin-rod birefringence compensating resonator is also available ($M^2 \leq 2$) for applications requiring a highly focusable beam.

The Plasma series options include motorised auto-tuning and auto-tracking of the harmonics modules. Litron has developed industrially proven, hands-free tuning to obtain the maximum energy output from a given harmonic module in <20 seconds. The additional auto-tracking function significantly reduces long term energy drift, often prevalent at UV wavelengths.

FEATURES

- Output energies up to 1J
- Repetition rates up to 200Hz
- Fully diode pumped lasers
- Super-Gaussian resonator $M^2 \leq 2$
- Stable resonator $M^2 \leq 8$
- Ultra high stability
- Exceptional diode life
- Homogeneous beam profile
- Compact PSU
- Detachable chiller
- Field replaceable diodes
- RS232 control
- Optional injection seeding



Power supply for pump diodes located inside laser head

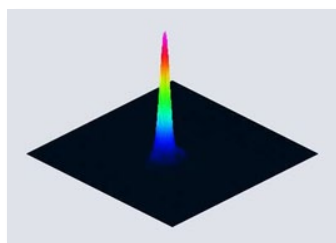
TECHNICAL DATA

Model	Plasma 450-100	Plasma 400-200	Plasma 1000-100	Plasma G 400-100	Plasma 600-100
Type of Resonator	Stable	Stable	Stable	Super-Gaussian	Telescopic
Repetition Rate (Hz)	100	200	100	100	100
Output Energy (mJ)					
1064nm	450	400	1000	400	600
532nm	225	200	500	200	320
355nm	100	90	200	100	220
266nm	45	30	⁽¹⁾	45	100
213nm ⁽¹⁾					
Pulse Stability (%RMS)					
1064nm	0.2	0.2	0.2	≤0.8	≤0.3
532nm	0.3	0.3	0.3	≤1.0	≤1.1
355nm	1.0	1.0	1.0	≤1.5	≤2.0
266nm	1.5	1.5	1.5	≤2.0	≤2.5
Pulse Width (ns) ⁽²⁾					
1064nm	11-14	9-11	11-14	8-10	8-12
532nm	10-13	9-11	10-13	8-10	8-11
355nm	9-12	8-10	9-12	7-9	7-10
266nm	9-12	8-10	9-12	7-9	7-9
Beam Parameter					
Beam Diameter (mm) ⁽³⁾	9.5	9.5	9.5	9.5	9.5
Beam Divergence (mrad) ⁽⁴⁾	≤2	≤2	≤2	≤0.5	≤1
Pointing Stability (μrad) ⁽⁵⁾	≤15	≤15	≤15	≤20	≤20
Timing Jitter (ns) ⁽⁶⁾	≤0.5	≤0.5	≤0.5	≤0.5	≤0.5
Polarisation	Linear	Linear	Linear	Linear	Linear

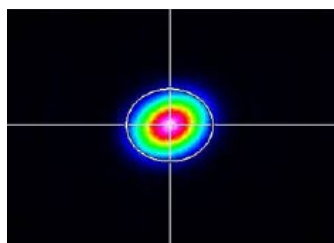
All Models	
Operation	
Control ⁽⁷⁾	RS232
Q-switch Trigger and Sync	TTL
Services	
Voltage (VAC) ⁽⁸⁾	200-250
Frequency (Hz)	50 or 60
Power	Single Phase
Ambient (°C) ⁽⁹⁾	5-35
External Cooling ⁽¹⁰⁾	Air
Diode Warranty (shots)	4×10 ⁹

All specifications at maximum repetition rate unless otherwise stated.

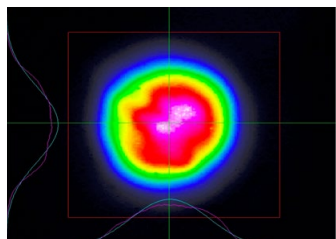
- (1) Contact Litron for more information.
- (2) FWHM – measured with a fast photodiode.
- (3) 100% beam diameter at laser exit port.
- (4) Full angle at specified beam diameter.
- (5) Half angle.
- (6) RMS with respect to Q-switch trigger input.
- (7) Full software suite and programming tools supplied.
- (8) 200V to be specified at order.
- (9) 0 to 80% non-condensing atmosphere.
- (10) Standard air-cooled chiller or optional water-cooled chiller.



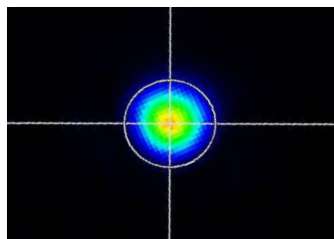
Stable resonator beam profile, 1064nm near field



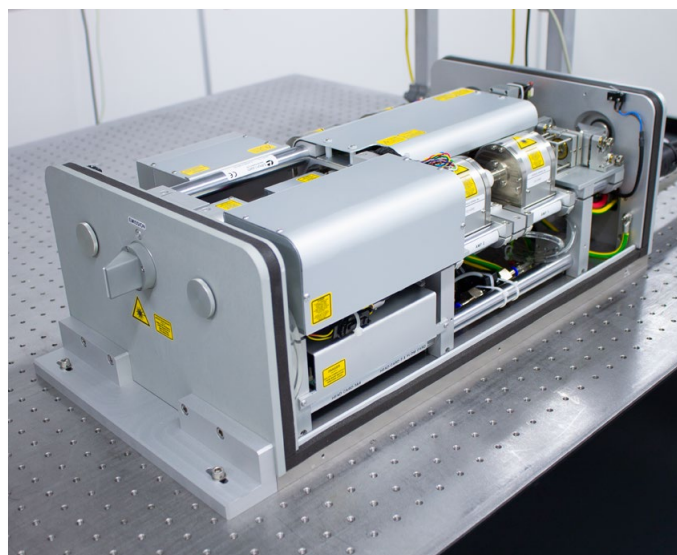
Stable resonator beam profile, 1064nm far field



Stable resonator beam profile, 532nm far field



TEM₀₀ beam profile, 1064nm far field

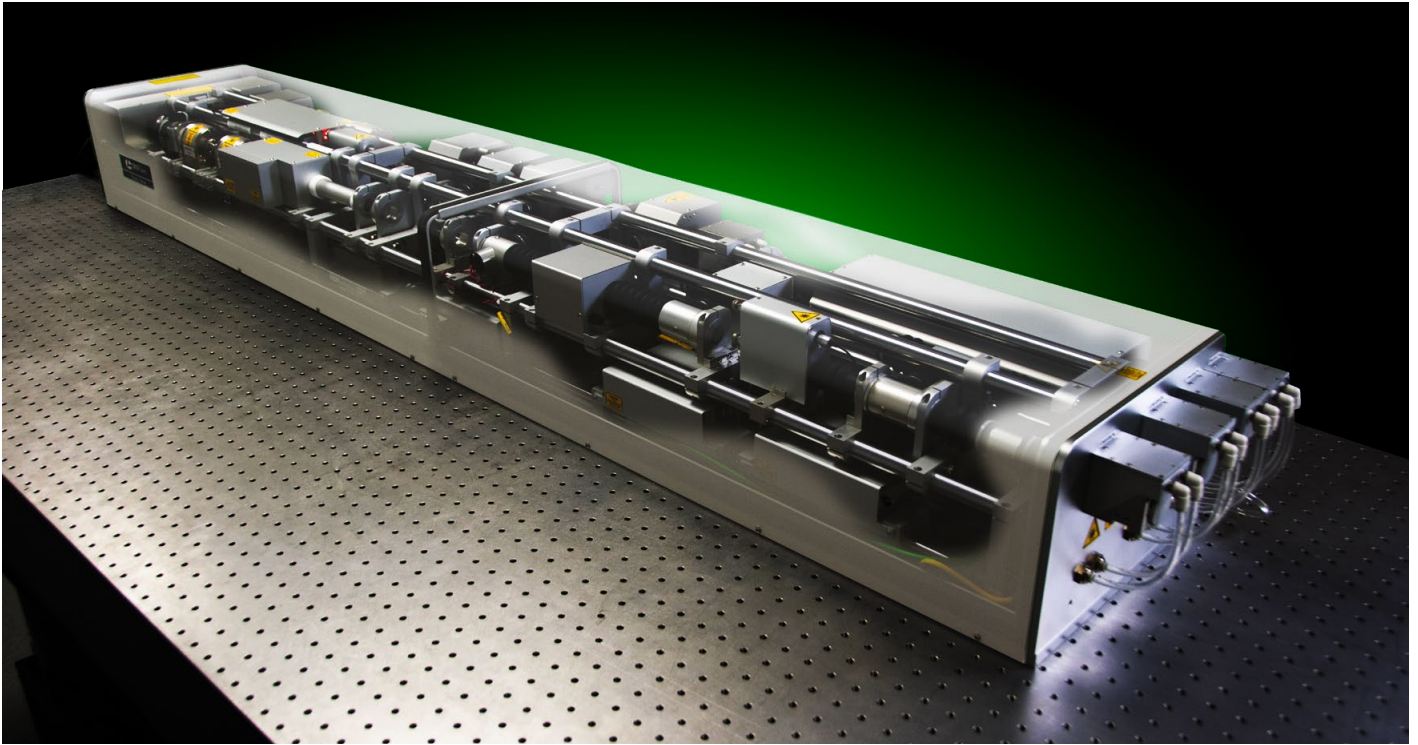


Compact Plasma G 400-100, 30mJ 266nm

DPSS Nd:YAG lasers

Pulse energies 1J to 5J

Repetition rates up to 200Hz



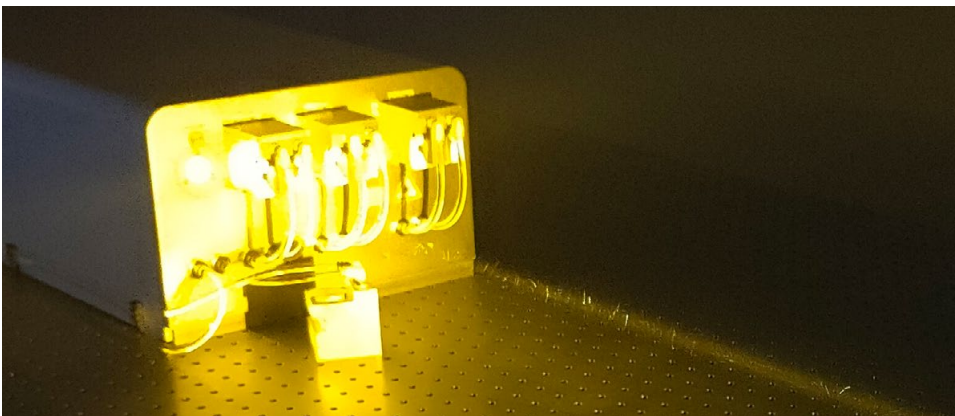
PLASMA+

APPLICATIONS

- *Military & Defence*
- *Plasma Science*
- *LiDAR & Remote Sensing*
- *Thomson Scattering*
- *Laser Shock Peening*
- *Ablation including Space Debris Ablation*
- *Spectroscopy*
- *Fusion Technology*
- *Laser Lift Off*

FEATURES

- *Output energies 1J to 5J*
- *Repetition rates up to 200Hz*
- *Fully diode pumped lasers*
- *Super-Gaussian resonator $M^2 \leq 2$*
- *Stable telescopic resonator $M^2 \leq 8$*
- *Ultra high stability*
- *Exceptional diode life*
- *Homogeneous beam profile*



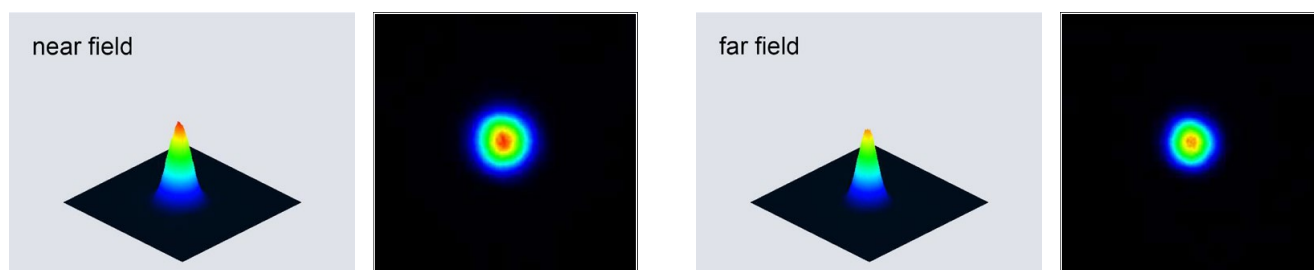
TECHNICAL DATA

Model	Plasma+ 1000	Plasma+ 2000	Plasma+ 3000	Plasma+ 4000	Plasma+ 5000	All Models	
Repetition Rate (Hz)	100/200	100/200	100/200	100/200	10-100	Operation Control ⁽⁶⁾ Q-switch Trigger and Sync	RS232 TTL
Output Energy (mJ) 1064nm 532nm 355nm	1000 500 230	2000 1000 460	3000 1500 690	4000 2000 920	5000 2500 1150	Services Voltage (VAC) Frequency (Hz) Power Ambient (°C) ⁽⁷⁾ Diode Warranty (shots)	230-250 50 or 60 Single/3 Phase 5-35 4x10 ⁹
Pulse Stability (%RMS) 1064nm 532nm 355nm	0.3 0.5 1.0	0.3 0.5 1.0	0.3 0.5 1.0	0.3 0.5 1.0	0.3 0.5 1.0		
Pulse Width (ns) ⁽¹⁾ 1064nm	<15	<15	<15	<15	<15		
Beam Parameter Beam Diameter (mm) ⁽²⁾ Beam Divergence (mrad) ⁽³⁾ Pointing Stability (μrad) ⁽⁴⁾ Timing Jitter (ns) ⁽⁵⁾	9.5 ≤0.8 ≤15 ≤0.5	12.5 ≤0.8 ≤15 ≤0.5	18.0 ≤0.8 ≤15 ≤0.5	18.0 ≤0.8 ≤15 ≤0.5	18.0 ≤0.8 ≤15 ≤0.5		
External Cooling	Air or Water	Water	Water	Water	Water		

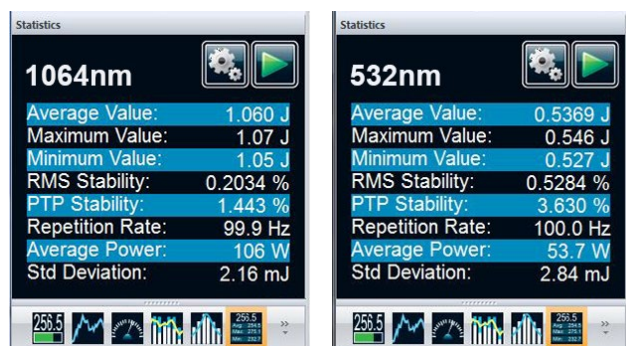
All specifications at 100Hz unless otherwise stated.

- (1) FWHM.
- (2) 100% beam diameter at laser exit port.
- (3) Full angle at specified beam diameter.
- (4) Half angle.
- (5) RMS with respect to Q-switch trigger input.
- (6) Full software suite and programming tools supplied.
- (7) 0 to 80% non-condensing atmosphere.

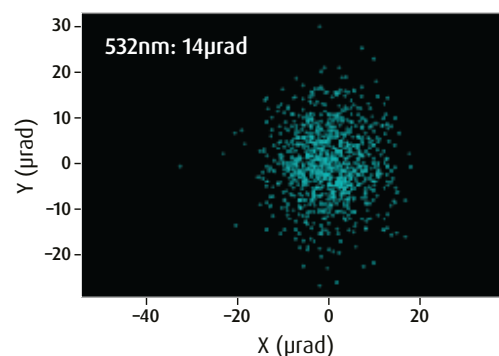
BEAM PROFILES



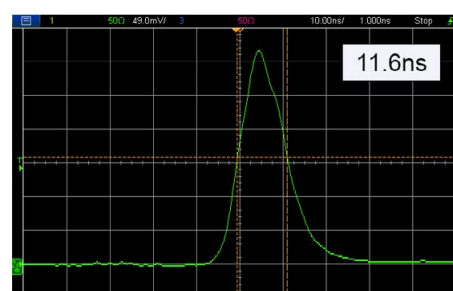
PULSE STABILITY



POINTING STABILITY



PULSE WIDTH



Litron Lasers Ltd
8 Consul Road, Rugby,
Warwickshire CV21 1PB England.
T +44 (0)1788 574444
F +44 (0)1788 574888
E sales@litron.co.uk



Our policy is to improve the design and specification of our products. The details given in this document are not to be regarded as binding.

Litron Lasers
www.litronlasers.com

