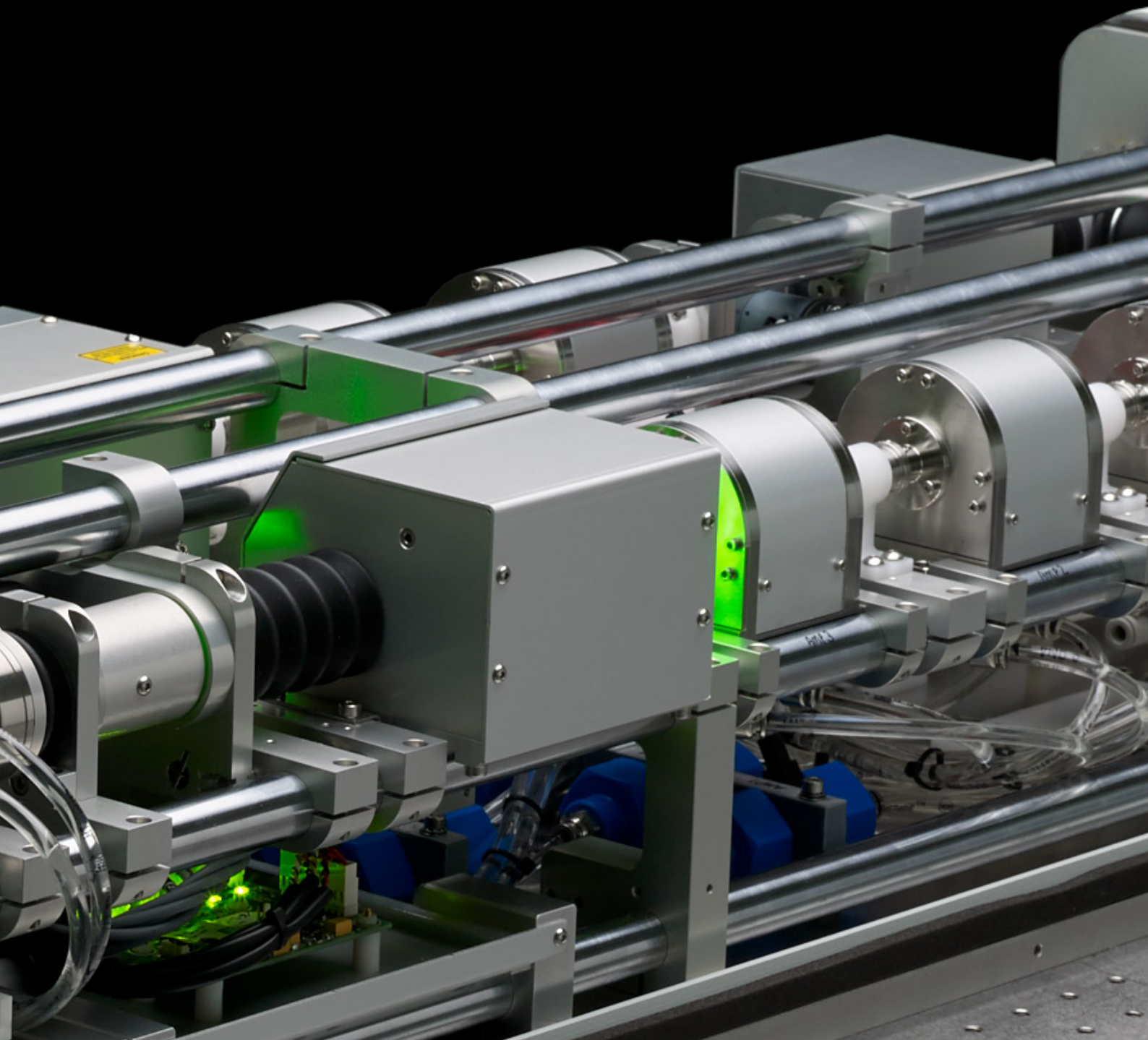




# PULSED DIODE PUMPED SOLID STATE LASERS

2 0 2 3



nanO DPSS PLASMA TRLi DPSS



# Nano DPSS Series

## Ultra-compact DPSS Q-switched pulsed Nd:YAG lasers

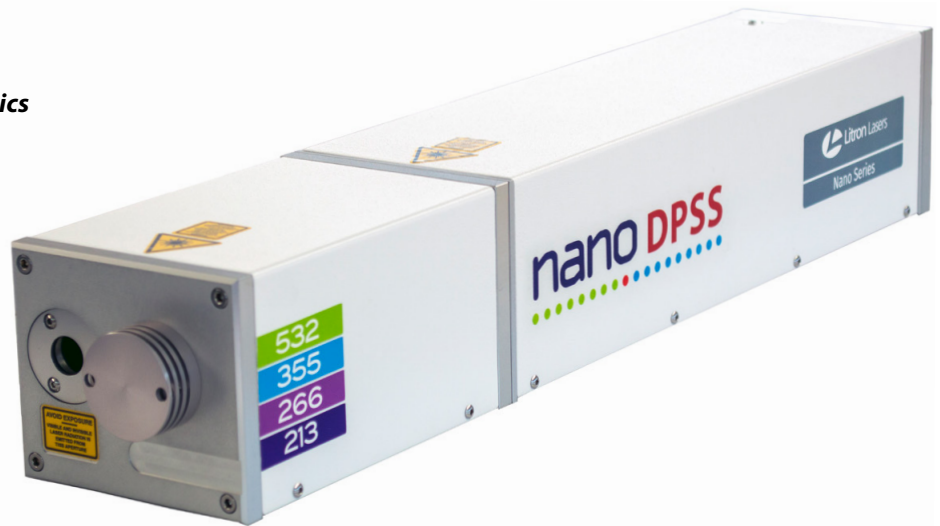
The Nano DPSS is an ultra-compact pulsed Q-switched Nd:YAG laser with output energies up to 80mJ and repetition rates of up to 300Hz. A fully sealed head provides protection from external contamination and a free-standing PSU with separate chiller completes this ultra-compact, high-performance and reliable laser system. With typical pump diode lifetime of greater than 2 billion pulses and field replaceable diode modules, the Nano DPSS offers excellent performance with the lowest cost of ownership.

The Nano DPSS offers the greatest flexibility to match each customer application without compromising performance. A full suite of accessories is available: harmonic modules, a fully motorised attenuator and an intra-cavity aperture for true TEM<sub>00</sub> output.

By miniaturising Litron's proven motorised harmonics, the Nano DPSS can be specified to the 5th harmonic with automated control. As standard, the harmonic module contains an integrated attenuator operated via the software to allow fast and precise control over the pulse energy. All harmonic generation crystals are automatically angled-tuned with high-precision linear actuators and a diode-based energy monitor feedback loop, making Litron's unique mechanical angle-tuning much faster than traditional thermal tuning. This feature has the option of single, on-demand tuning or continuous automatic tracking of the crystals for guaranteed long-term stability.

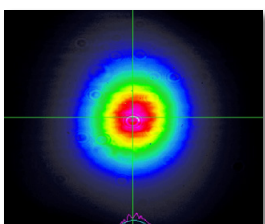
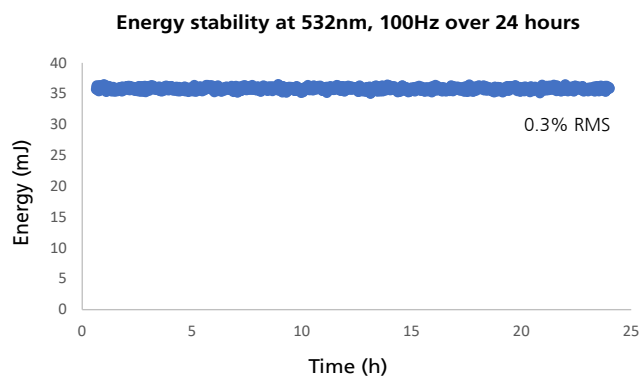
### FEATURES

- **Repetition rates up to 300Hz**
- **Fully motorised attenuator and harmonics**
- **Choice of resonator**
- **Ultra high stability**
- **Exceptional diode life**
- **Field replaceable diodes**
- **Excellent beam quality**
- **Compact PSU**
- **Detachable, compact chiller**
- **Diode pointer option**
- **TEM<sub>00</sub> – upon request**

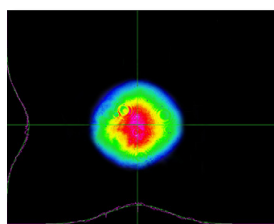


### APPLICATIONS

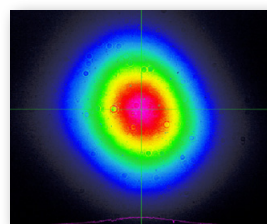
- **LIBS & Spectroscopy**
- **LIDAR & Remote sensing**
- **Dye, OPO and Ti:Sa pumping**
- **Laser flash photolysis**
- **MALDI**
- **Laser ultrasonics**
- **Microscopy**
- **Sample testing**
- **Ablation**
- **LCD repair**
- **Thomson Scattering**
- **PLD**



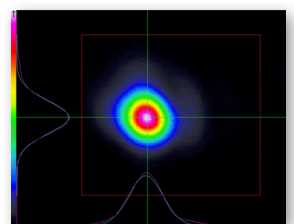
Stable beam profile,  
1064nm near field



Stable telescopic beam profile,  
532nm near field



Stable telescopic beam profile,  
532nm far field



TEM<sub>00</sub> beam profile,  
1064nm far field

## TECHNICAL DATA

| Model  | Nano DPSS 80-100 | Nano DPSS 70-200 | Nano DPSS 55-300 | Nano DPSS G 60-100 | Nano DPSS ST 70-100 |
|--|------------------|------------------|------------------|--------------------|---------------------|
| <b>Type of Resonator</b>                     | Stable           | Stable           | Stable           | Super-Gaussian     | Stable Telescopic   |
| <b>Repetition Rate (Hz)</b>                  | 100              | 200              | 300              | 100                | 100                 |
| <b>Output Energy (mJ)</b>                    |                  |                  |                  |                    |                     |
| 1064nm                                       | 80               | 70               | 55               | 60                 | 70                  |
| 532nm  | 40               | 30               | 25               | 25                 | 35                  |
| 355nm  | 20               | 15               | 10               | 15                 |                     |
| 266nm  | 10               | 8                | 5                | 6                  |                     |
| 213nm <sup>(1)</sup>                         |                  |                  |                  |                    |                     |
| <b>Pulse Stability (%RMS) <sup>(2)</sup></b> |                  |                  |                  |                    |                     |
| 1064nm                                       | 0.2              | 0.2              | 0.2              | ≤0.9               | 0.4                 |
| 532nm  | 0.3              | 0.3              | 0.3              | ≤1.2               | 0.5                 |
| 355nm  | 1.0              | 1.0              | 1.0              | ≤2.8               |                     |
| 266nm  | 1.5              | 1.5              | 1.5              | ≤3.0               |                     |
| <b>Pulse Width (ns) <sup>(3)</sup></b>       |                  |                  |                  |                    |                     |
| 1064nm                                       | <12              | <12              | <12              | <12                | <11                 |
| 532nm  | <11              | <11              | <11              | <11                | <10                 |
| 355nm  | <11              | <11              | <11              | <11                |                     |
| 266nm  | <10              | <10              | <10              | <10                |                     |
| <b>Beam Parameter</b>                        |                  |                  |                  |                    |                     |
| Beam Diameter (mm) <sup>(4)</sup>            | 5                | 5                | 5                | 5                  | 5                   |
| Beam Divergence (mrad)                       | ≤2               | ≤2               | ≤2               | ≤0.5               | ≤0.8                |
| M <sup>2</sup>                               |                  |                  |                  | ≤2                 |                     |
| Pointing Stability (μrad) <sup>(5)</sup>     | <30              | <30              | <30              | <30                | <30                 |
| Timing Jitter (ns) <sup>(6)</sup>            | ≤0.5             | ≤0.5             | ≤0.5             | ≤0.5               | ≤0.5                |
| Polarisation                                 | Linear           | Linear           | Linear           | Linear             | Linear              |

| All Models   |                   |
|--|-------------------|
| <b>Operation Control <sup>(7)</sup></b><br>Q-switch Trigger and Sync | RS232<br>TTL      |
| <b>Services</b>  |                   |
| Voltage (VAC) <sup>(8)</sup>   | 200-250           |
| Frequency (Hz)   | 50 or 60          |
| Power  | Single Phase      |
| Ambient (°C) <sup>(9)</sup>  | 5-35              |
| External Cooling <sup>(10)</sup>                                     | Air               |
| Diode Warranty (shots)   | 2×10 <sup>9</sup> |

All specifications at maximum repetition rate unless otherwise stated.

- (1) Contact Litron for more information.
- (2) 99% of pulses.
- (3) FWHM – measured with a fast diode.
- (4) 100% beam diameter at laser exit port.
- (5) Half angle.
- (6) RMS with respect to Q-switch trigger input.
- (7) Full software suite and programming tools supplied.
- (8) 100-200VAC operation – contact Litron.
- (9) 0 to 80% non-condensing atmosphere.
- (10) Standard air-cooled chiller or optional water-cooled chiller.



Free standing PSU and chiller (separate units)

Photodiode for closed loop energy monitoring

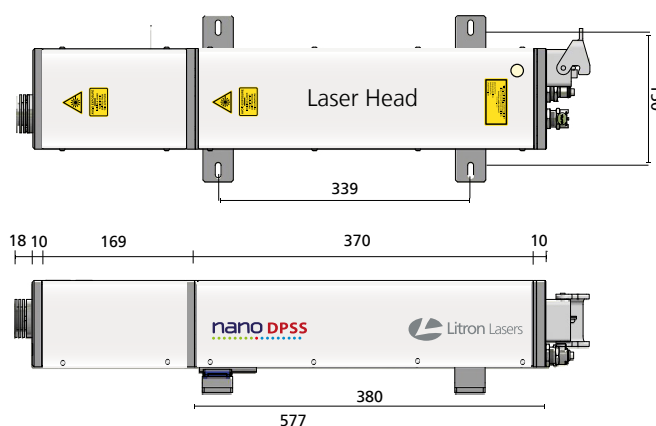
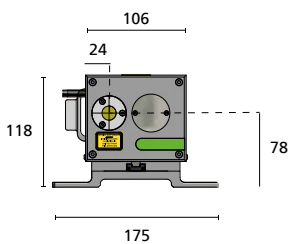
Motorised variable attenuator



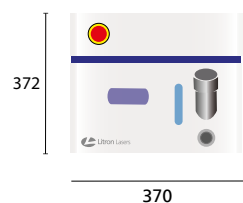
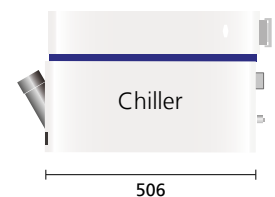
Intelligent harmonic units: 532nm, 355nm, 266nm and 213nm available

## MECHANICAL DATA

All dimensions shown in mm



Free standing PSU and chiller



## TRLi DPSS Series

Fully modular system designed for flexibility and enhanced performance



The **TRLi DPSS** series lasers are compact high energy, diode pumped, Q-switched Nd:YAG lasers with output energies of up to 280mJ and repetition rates of up to 300Hz. Based around Litron's birefringence compensating twin-rod resonator design gives highly homogeneous output beams. The laser resonator is housed in a body machined from solid aluminum to ensure high mechanical and optical integrity.

State-of-the-art diode pump modules and electronics give rise to outputs with industry leading stabilities of better than 0.2% RMS at 1064nm over a six-hour period. A choice of stable, stable telescopic or super-Gaussian resonator ensures the best configuration available to match each application. All accessories such as harmonics, beam expanding telescope or OPO are bolt-and-play and can be added and removed as required. The intelligent system controller automatically adapts to the pre-set configuration and allows seamless control in any application.

### Auto-tracking

Continuous auto-tracking is possible due to the fast response of the motorised mechanical angle tuning, as opposed to conventional thermal tuning. This feature maintains the set energy over long periods of continuous operation; effectively removing any long-term drift.

### Motorised automatic harmonic tuning

Stepper motor driven angular adjustment mechanics are used to tune the harmonic crystal relative to the incoming beam. Combined with the temperature-stabilised diode-based energy monitor, a complete scan is carried out in under 20 seconds. Auto-tuning is a start up or on demand function using a simple software command.

### Integrated motorised optical attenuator

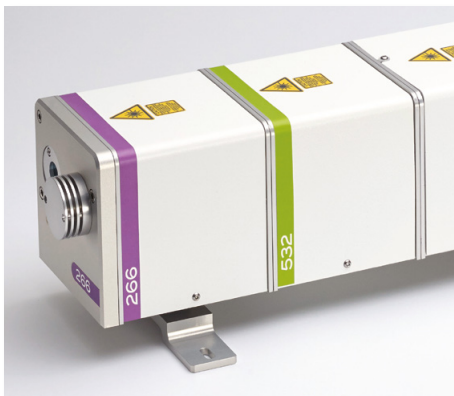
The second harmonic module contains a motorised half waveplate for precise control of the generation of 532nm and all subsequent harmonics. Attenuation of harmonic output does not cause the beam properties to be altered when the pulse energy is varied.

### FEATURES

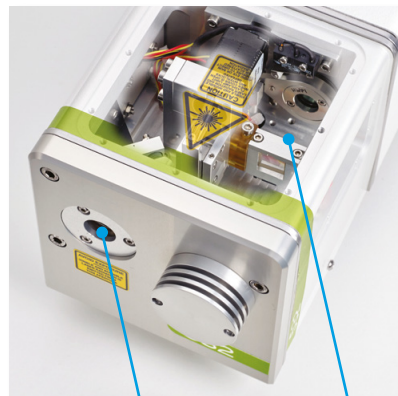
- **Choice of resonator options**
- **Ultra high stability**
- **Exceptional diode life**
- **Field replaceable diodes**
- **Homogeneous beam profile**
- **Compact PSU**
- **Detachable, compact chiller**
- **RS232 control**

### APPLICATIONS

- **LIDAR**
- **Remote Sensing**
- **Si wafer inspection**
- **LIBS & LIF**
- **Laser cleaning**
- **LCD repair**
- **Dye, OPO and Ti:Sa pumping**
- **Laser Lift-Off**
- **MALDI**
- **Thomson Scattering**
- **PLD**



Intelligent bolt-on harmonic unit



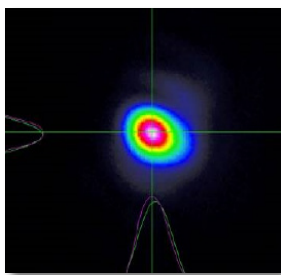
IP54 Sealed output window

Motorised variable attenuator

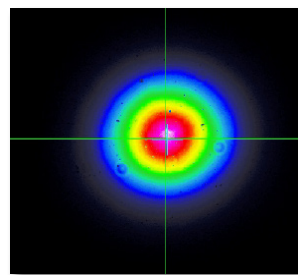


## TECHNICAL DATA

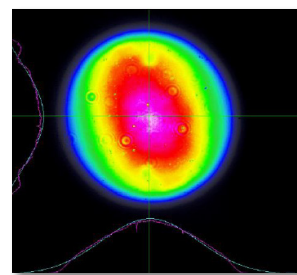
| Model  | TRLi DPSS 170-100                        | TRLi DPSS 130-200                        | TRLi DPSS 100-300                       | TRLi DPSS G170-100                       | TRLi DPSS G130-200                       | All Models   |   |
|--|--|--|---|--|--|--|---|
| <b>Type of Resonator</b>   | Stable                                   | Stable                                   | Stable                                  | Super-Gaussian                           | Super-Gaussian                           | <b>Operation</b><br>Control <sup>(7)</sup><br>Q-switch Trigger and Sync  | RS232<br>TTL  |
| <b>Repetition Rate (Hz)</b>  | 100                                      | 200                                      | 300                                     | 100                                      | 200                                      | <b>Services</b><br>Voltage (VAC) <sup>(8)</sup><br>Frequency (Hz)<br>Power<br>Ambient (°C) <sup>(9)</sup><br>External Cooling <sup>(10)</sup><br>Diode Warranty (shots)  | 200-250<br>50 or 60<br>Single Phase<br>5-35<br>Air<br>2×10 <sup>9</sup> |
| <b>Output Energy (mJ)</b><br>1064nm<br>532nm<br>355nm<br>266nm<br>213nm <sup>(1)</sup>   | 170<br>85<br>45/55 <sup>(11)</sup><br>15 | 130<br>65<br>25/40 <sup>(11)</sup><br>10 | 100<br>50<br>15/30 <sup>(11)</sup><br>5 | 170<br>85<br>45<br>15                    | 130<br>65<br>25<br>10                    | All specifications at maximum repetition rate unless otherwise stated.   |   |
| <b>Pulse Stability (%RMS) <sup>(2)</sup></b><br>1064nm<br>532nm<br>355nm<br>266nm  | 0.2<br>0.3<br>0.8<br>1.5                 | 0.2<br>0.3<br>0.8<br>1.5                 | 0.2<br>0.3<br>0.8<br>1.5                | ≤0.8<br>≤1.0<br>≤1.5<br>≤2.0             | ≤0.8<br>≤1.0<br>≤1.5<br>≤2.0             | (1) Contact Litron for more information.<br>(2) 99% of pulses.<br>(3) FWHM – measured with a fast photodiode.<br>(4) 100% beam diameter at laser exit port.<br>(5) Half angle.<br>(6) RMS with respect to Q-switch trigger input.<br>(7) Full software suite and programming tools supplied.<br>(8) 200V to be specified at order.<br>(9) 0 to 80% non-condensing atmosphere.<br>(10) Standard air-cooled chiller or optional water-cooled chiller.<br>(11) High energy 355nm version available. |   |
| <b>Pulse Width (ns) <sup>(3)</sup></b><br>1064nm<br>532nm<br>355nm<br>266nm  | 8-10<br>7-9<br>6-9<br>6-9                | 9-11<br>9-11<br>8-10<br>8-10             | 9-11<br>9-11<br>8-10<br>8-10            | 8-10<br>7-9<br>6-9<br>6-9                | 9-11<br>9-11<br>8-10<br>8-10             |  |   |
| <b>Beam Parameter</b><br>Beam Diameter (mm) <sup>(4)</sup><br>Beam Divergence (mrad)<br>M <sup>2</sup> @ 1064nm<br>Pointing Stability (μrad) <sup>(5)</sup><br>Timing Jitter (ns) <sup>(6)</sup><br>Polarisation | 5<br>≤2<br>≤8<br>≤15<br>≤0.5<br>Linear   | 5<br>≤2<br>≤8<br>≤15<br>≤0.5<br>Linear   | 5<br>≤2<br>≤8<br>≤15<br>≤0.5<br>Linear  | 5<br>≤0.5<br>≤2<br>≤20<br>≤0.5<br>Linear | 5<br>≤0.5<br>≤2<br>≤20<br>≤0.5<br>Linear |  |   |



Stable resonator beam profile, 1064nm far field



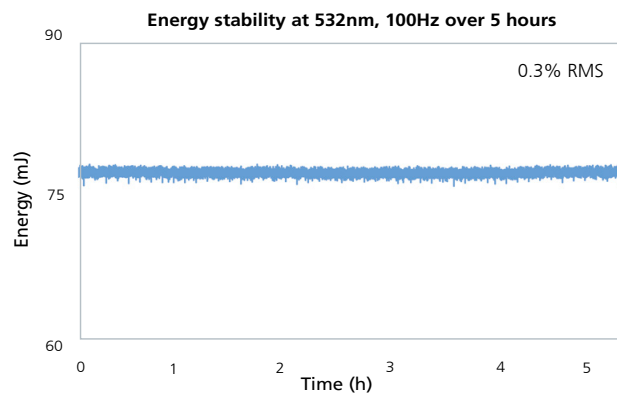
Stable resonator beam profile, 532nm far field



Stable resonator beam profile, 532nm near field

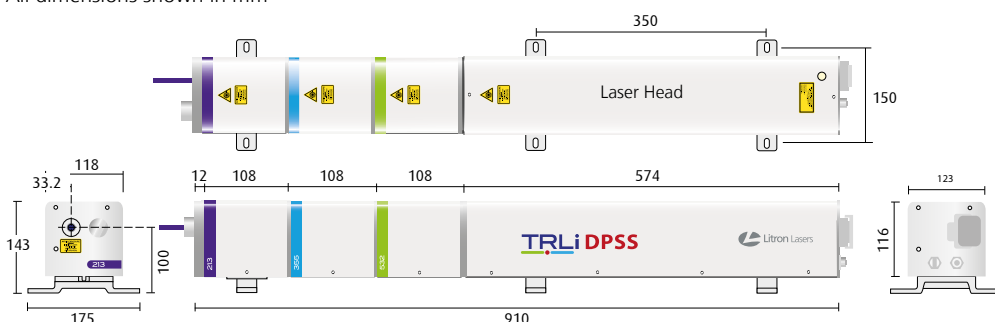


Diode pump modules

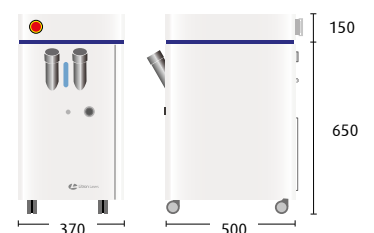


## MECHANICAL DATA

All dimensions shown in mm

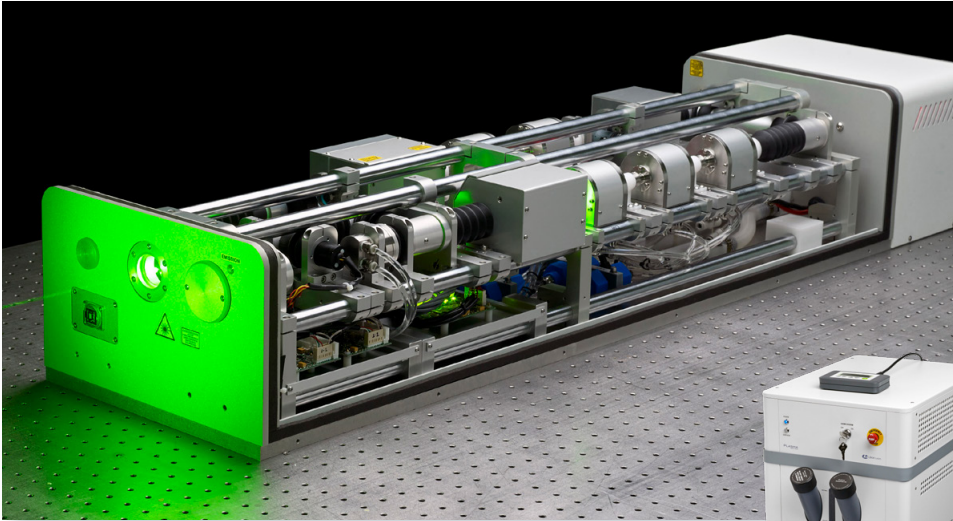


Free standing PSU and chiller



# Plasma Series

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



### 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

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 2 billion pulses.



LUCi touchscreen



### TECHNICAL DATA

| Model  | Plasma 450-100 | Plasma 400-200 | Plasma 1000-100 | Plasma G 400-100 | Plasma 100-100    |
|--|----------------|----------------|-----------------|------------------|-------------------|
| <b>Type of Resonator</b>                     | Stable         | Stable         | Stable          | Super-Gaussian   | TEM <sub>00</sub> |
| <b>Repetition Rate (Hz)</b>                  | 100            | 200            | 100             | 100              | 100               |
| <b>Output Energy (mJ)</b>                    |                |                |                 |                  |                   |
| 1064nm                                       | 450            | 400            | 1000            | 400              | 100               |
| 532nm  | 225            | 200            | 500             | 200              | 50                |
| 355nm  | 100            | 90             | 200             | 100              | 20                |
| 266nm  | 45             | 30             | 70              | 45               | 9                 |
| 213nm <sup>(1)</sup>                         |                |                |                 |                  |                   |
| <b>Pulse Stability (%RMS) <sup>(2)</sup></b> |                |                |                 |                  |                   |
| 1064nm                                       | 0.2            | 0.2            | 0.2             | ≤0.8             | ≤0.3              |
| 532nm  | 0.3            | 0.3            | 0.3             | ≤1.0             | ≤0.4              |
| 355nm  | 1.0            | 1.0            | 1.0             | ≤1.5             | ≤1.0              |
| 266nm  | 1.5            | 1.5            | 1.5             | ≤2.0             | ≤1.5              |
| <b>Pulse Width (ns) <sup>(3)</sup></b>       |                |                |                 |                  |                   |
| 1064nm                                       | 11-14          | 9-11           | 11-14           | 8-10             | 8-10              |
| 532nm  | 10-13          | 9-11           | 10-13           | 8-10             | 8-10              |
| 355nm  | 9-12           | 8-10           | 9-12            | 7-9              | 7-9               |
| 266nm  | 9-12           | 8-10           | 9-12            | 7-9              | 7-9               |
| <b>Beam Parameter</b>                        |                |                |                 |                  |                   |
| Beam Diameter (mm) <sup>(4)</sup>            | 9.5            | 9.5            | 9.5             | 9.5              | 5.0               |
| Beam Divergence (mrad) <sup>(5)</sup>        | ≤2             | ≤2             | ≤2              | ≤0.5             | ≤1                |
| M <sup>2</sup> @ 1064nm                      | ≤8             | ≤8             | ≤8              | ≤2               | ≤1.3              |
| Pointing Stability (μrad) <sup>(6)</sup>     | ≤15            | ≤15            | ≤15             | ≤20              | ≤20               |
| Timing Jitter (ns) <sup>(7)</sup>            | ≤0.5           | ≤0.5           | ≤0.5            | ≤0.5             | ≤0.5              |
| Polarisation                                 | Linear         | Linear         | Linear          | Linear           | Linear            |

| All Models                              |                   |
|---|-------------------|
| <b>Operation Control <sup>(8)</sup></b> | RS232             |
| Q-switch Trigger and Sync               | TTL               |
| <b>Services</b>                         |                   |
| Voltage (VAC) <sup>(9)</sup>            | 200-250           |
| Frequency (Hz)                          | 50 or 60          |
| Power                                   | Single Phase      |
| Ambient (°C) <sup>(10)</sup>            | 5-35              |
| External Cooling <sup>(11)</sup>        | Air               |
| Diode Warranty (shots)                  | 2×10 <sup>9</sup> |

All specifications at maximum repetition rate unless otherwise stated.

- (1) Contact Litron for more information.
- (2) 99% of pulses.
- (3) FWHM – measured with a fast photodiode.
- (4) 100% beam diameter at laser exit port.
- (5) Full angle at specified beam diameter.
- (6) Half angle.
- (7) RMS with respect to Q-switch trigger input.
- (8) Full software suite and programming tools supplied.
- (9) 200V to be specified at order.
- (10) 0 to 80% non-condensing atmosphere.
- (11) Standard air-cooled chiller or optional water-cooled chiller.

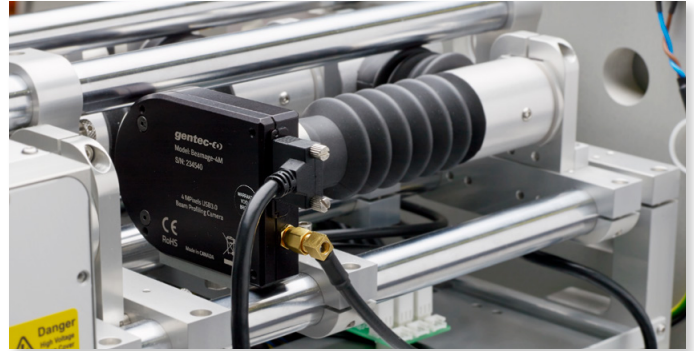
## APPLICATIONS

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

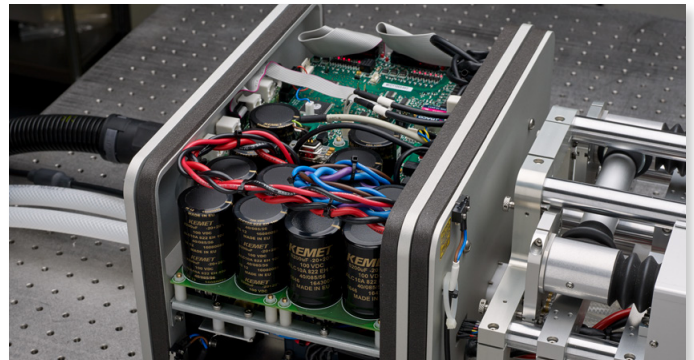
All Plasma models employ a true birefringence-compensating twin-rod resonator that gives a circular and highly homogeneous beam profile with a low  $M^2$ .

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

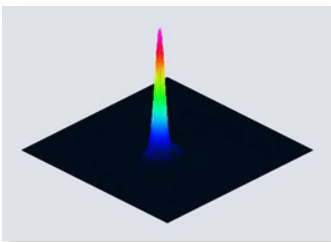
The Plasma series options include motorised auto-tuning and auto-tracking of the harmonics modules. Litron has developed industrially proven, hands-free tuning to obtain the maximum energy output from a given harmonic module in <20 seconds. The additional auto-tracking function significantly reduces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



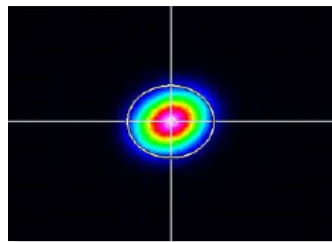
Real time beam profile monitoring option



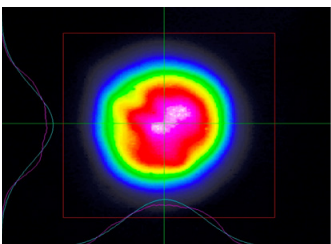
Power supply for pump diodes located inside laser head



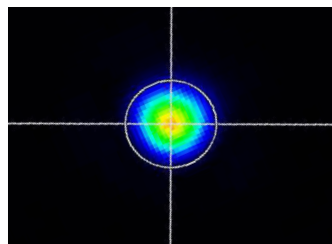
Stable resonator beam profile, 1064nm near field



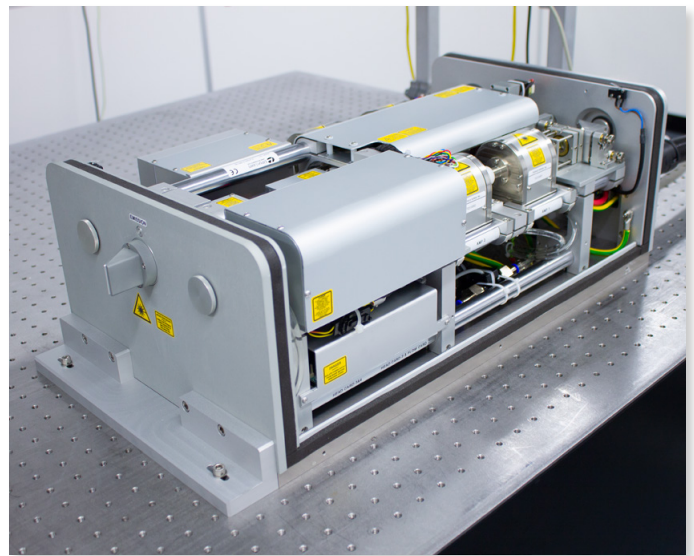
Stable resonator beam profile, 1064nm far field



Stable resonator beam profile, 532nm far field



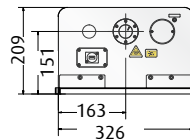
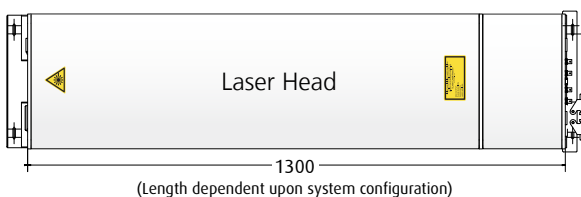
TEM<sub>00</sub> beam profile, 1064nm far field



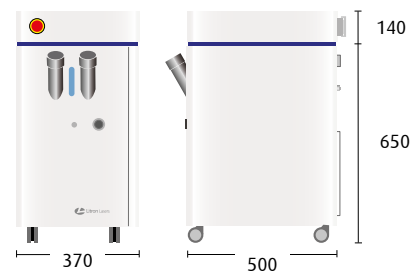
Compact Plasma G 400-100, 30mJ 266nm

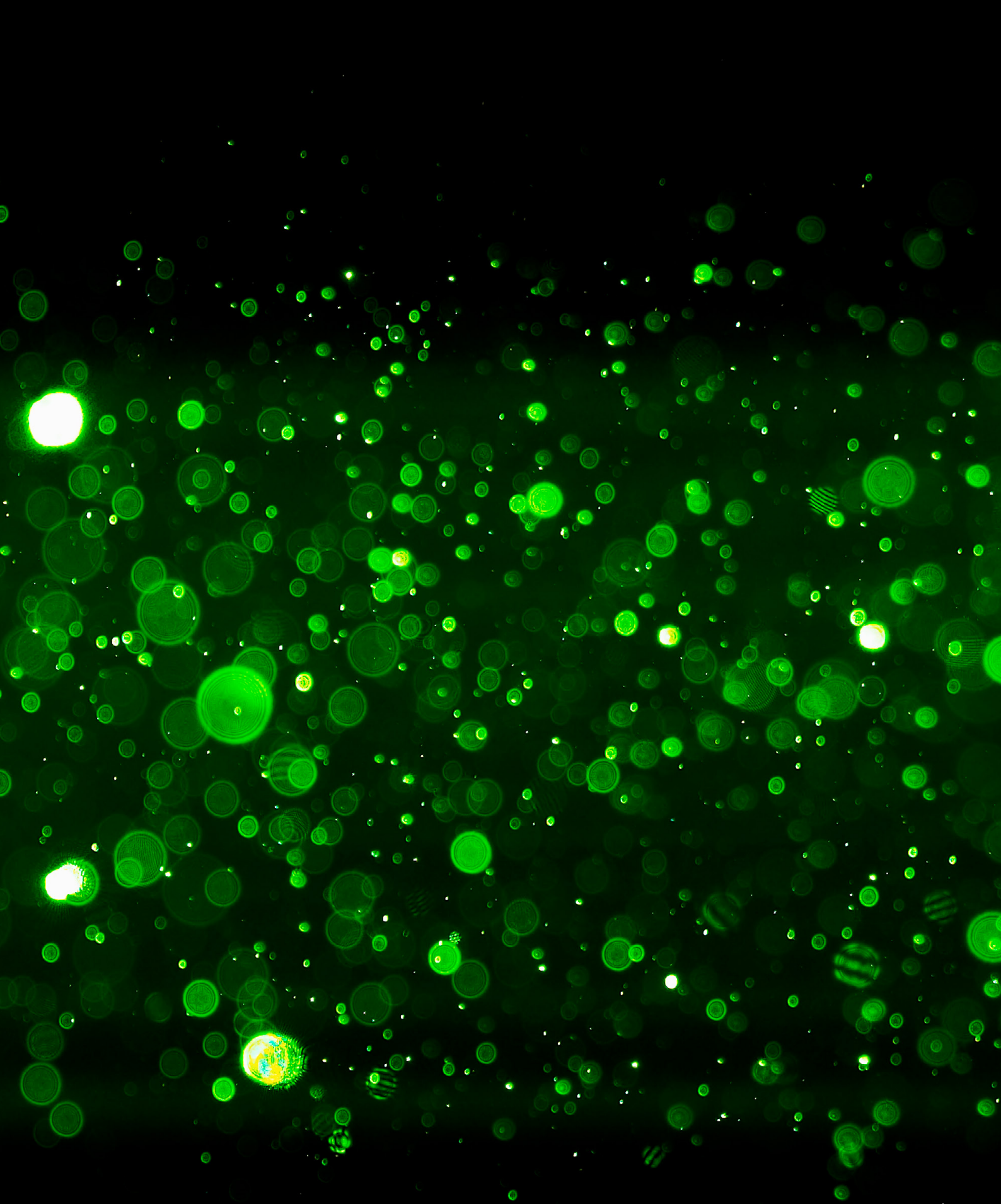
## MECHANICAL DATA

All dimensions shown in mm



Free standing PSU and chiller





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 Ltd**  
8 Consul Road, Rugby,  
Warwickshire CV21 1PB England.

T +44 (0)1788 574444  
F +44 (0)1788 574888  
E sales@litron.co.uk



**Litron Lasers**

www.litronlasers.com