

# FireFly Green Laser

## Features

- Stable power without thermoelectric (TE) cooling
- Wide operating temperature range
- Powers up to 50 mW
- Linear modulation control or pulsed TTL control from DC to 50 KHz
- Fast warm up time
- Power stability better than 5% over full operating temperature range
- Power stability better than 1% at constant temperature
- Low noise version with better than 1% RMS noise
- Low operating current
- Low beam divergence
- High level of bore sight accuracy
- Compact size

## Applications

- Wafer inspection
- Micro-material processing
- Particle counting
- Metrology
- Interferometry
- Printing
- Medical
- Positioning & alignment
- Laser Projection
- Patient Alignment



**T**he new FireFly green range sets a new standard for industrial grade, green laser diode modules. A radically new design provides TE stabilised performance without TE cost and power consumption.

It is a self-contained laser that offers the user greater stability over a wider operating temperature and with much faster warm up time.

The inbuilt Laser Intelligent Control (LIC) electronics provide stable CW or modulated operation with automatic power control (APC), reverse polarity protection and over temperature protection. The LIC ensures a high level of reliability over time and temperature. The laser operates from a low voltage input 5 Vdc and a low operating current of 350 mA (Max).

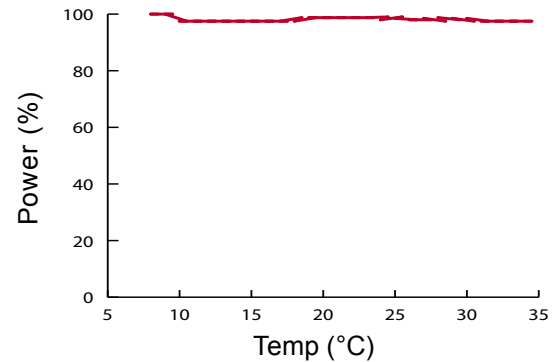
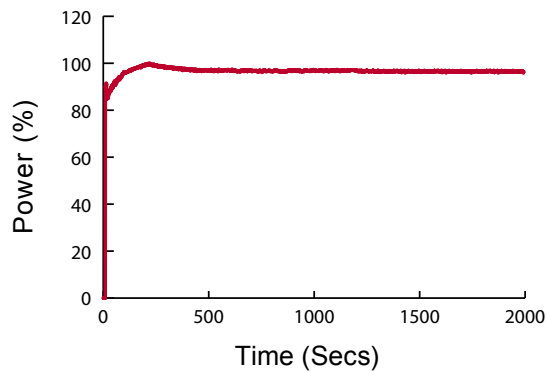
The diode pumped solid state laser produces a large circular beam with low divergence and an output wavelength of 532 nm with powers up to 50 mW. For applications that demand reduced noise such as scanning and projection, a lower noise version is available that provides a RMS noise < 1%.

The lens system includes a steering lens that ensures accurate alignment of the beam with the case and a focusing lens that produces a high quality spot over a wide range of distances. The laser has a range of internal driver boards that provide either CW operation, analogue control or TTL pulse width modulation.

Supplementary lenses are available that convert the spot to a line or a cross. The lines of the cross can be adjusted to be at exactly 90°, even when the laser is mounted at any angle to the surface.

## POWER STABILITY

The profiles opposite show the typical power stability vs time and the power stability vs temperature.

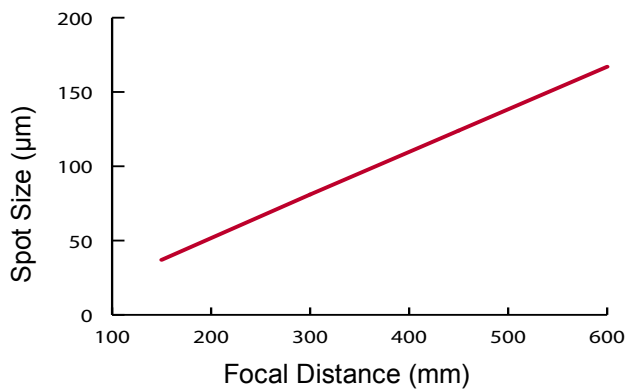


## FOCUSING AND DEPTH OF FIELD CHARACTERISTICS

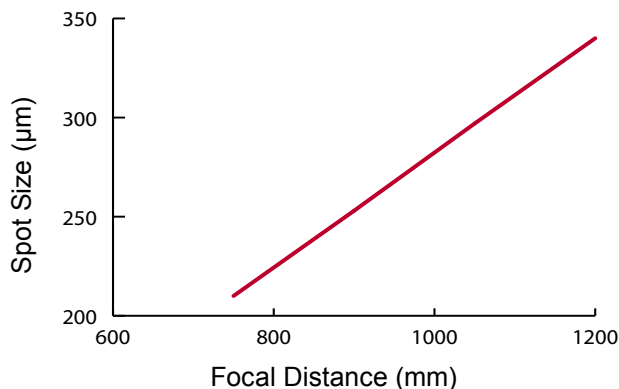
The following charts show the typical focusing and depth-of-field performance of the FireFly laser. The focus charts indicate the minimum spot size (at  $1/e^2$ ) achievable for a specific projection distance. The depth-of-field is defined as the distance between two points either side of the pre-set focus at which the spot size increases by a factor of  $\sqrt{2}$ .

### Focusing

#### Short range

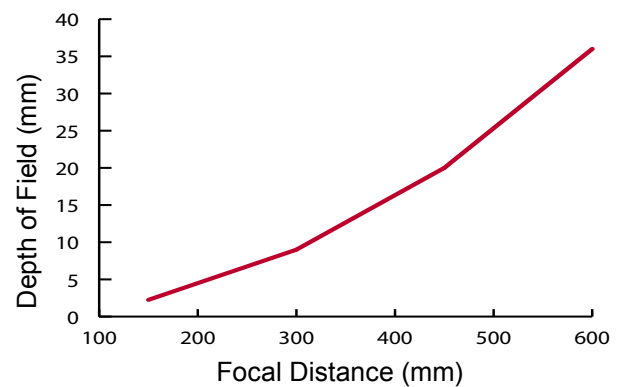


#### Long range

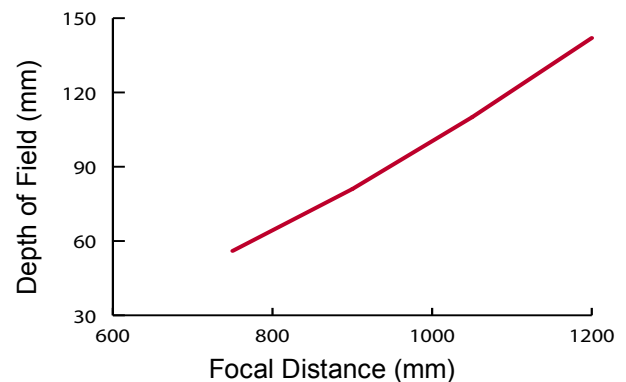


### Depth-of-field (Rayleigh range)

#### Short range



#### Long range



MODEL	FIREFLY	FIREFLY - RN
<b>MECHANICAL SPECIFICATIONS</b>		
Weight	39 grams	
Dimensions	17 mm dia x 94 mm (not including connector)	
Housing	Green anodized aluminium	
Isolated Body	Yes	
Input Leads	CW Version - 250 mm cable 2 wires, Red (+ve) Black (0 V)	
	Modulated version - 500 mm cable 4 wires, Red (+ve), Black (0 V), Yellow (Modulation) Blue (Enable)	
<b>OPTICAL SPECIFICATIONS</b>		
Beam Power	5, 10, 20, 35, 50 mW (custom powers available on request)	
Wavelength	532 nm	
Intensity distribution	TEM <sub>00</sub>	
Focus Range	500 mm to infinity (150 mm without line or cross optics)	
Warm up time to 75% of full power	< 30 seconds	
Power stability over operating range	< 5%	
Power stability over constant temperature	< 1%	
Noise (RMS, 20Hz - 20 MHz)	N/A	< 1%
Beam size at aperture	3 mm	
Minimum Beam Divergence	0.1 mrad	
Pointing stability	0.02 mrad	
M <sup>2</sup>	< 1.2	
Focus	User adjustable	
Bore sighting	< 2 mrad	
<b>ENVIRONMENTAL SPECIFICATIONS</b>		
Operating Case Temperature	+5°C to +35°C *	
Storage temp	-10°C to +85°C	
Operating Humidity (%RH)	90	
MTTF at 25°C	5,000 hours	
<b>ELECTRICAL SPECIFICATIONS</b>		
Input voltage	CW Version (3.3 Vdc to 6 Vdc)	
	Modulated version (5 Vdc $\pm$ 10%)	
Operating Current	350 mA max (diode dependant)	
Connector type	CW Version Flying leads	
	Modulated version JST 4 way connector or Binder connector	
Reverse - Polarity protection	Yes	
Over temperature protection	Yes	

\* = Suitable heatsink recommended for use with powers above 10 mW

## OPTIONAL EXTRAS

Two optional driver boards are available for the FireFly either a Linear or TTL control.

### • LINEAR INTENSITY & ANALOGUE MODULATION CONTROL

#### User adjustable intensity control

Via the yellow control lead output power may be linearly controlled from the maximum factory set value to all lower values including off. This may be changed via a simple resistor or by a control voltage. 0 Vdc is off, +1 Vdc is on, all values in-between are linear.

#### Modulation & Synchronization

Using the yellow control lead the laser may be modulated or synchronised by using an external signal. Required voltage range is 0 to 1 Vdc (to set the maximum intensity), frequency bandwidth is DC to typically 50 KHz.

*Please note: Intensity control and modulation functions may be used together.*

### • TTL DIGITAL CONTROL

The FireFly is also available with a TTL driver board that allows the unit to be gated on and off, or pulse-width modulated at TTL voltage levels via the yellow control lead. The standard version offers non inverting TTL where an input signal of  $< 0.4\text{ V}$  = off and  $> 2\text{ V}$  = on and vice versa for the inverted model. Frequency bandwidth typically 250 kHz.

Rise Time: 2  $\mu\text{s}$  (typical)

## LINE AND CROSS OPTICS

Optical elements are available as accessories that convert the spot to a line or a variable intersection angle cross. The lines of the cross can be adjusted to be at exactly  $90^\circ$ , even when the laser is mounted at an angle to the surface.

The options are as follows:

- Cross optics
- Line Optics ( $60^\circ$  Fan angle)

The optics are designed to be screwed into the front of the FireFly barrel. (see diagrams on next page)

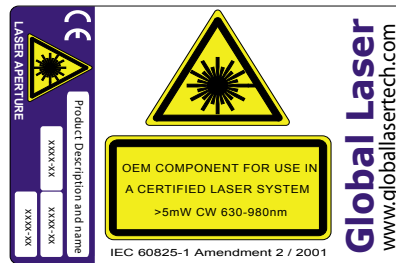
## MOUNTING CLAMPS

The optional heavy duty mounting clamp allows the FireFly to be securely fixed at any required direction or angle. The base plate has a series of threaded holes which allows the clamp to be fixed directly onto a machine or optical bench.



## LASER SAFETY

Our lasers are compliant to IEC 60825-1 standards. The lasers fall within one of the following classifications depending on power and wavelength. The examples of the labels supplied with the units are shown below.



OEM Laser Label

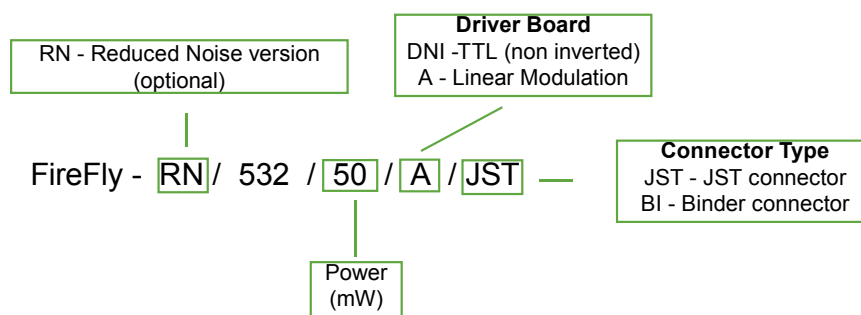
## QUALITY & WARRANTY

The FireFly is supplied with a 12 month parts and labour warranty. Our manufacturing operations are certified to ISO9001.

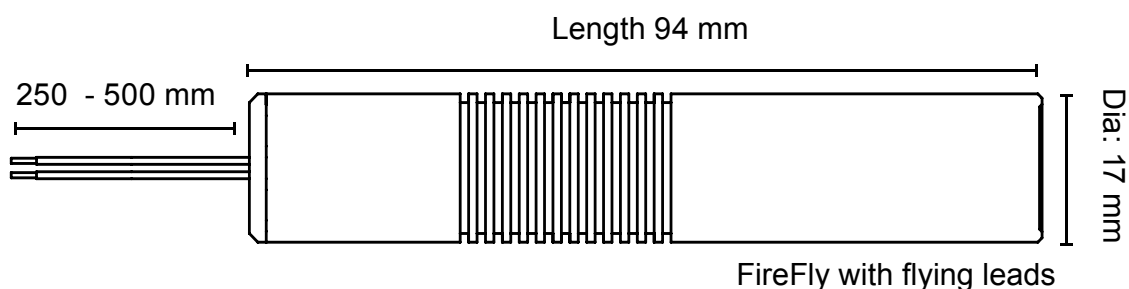
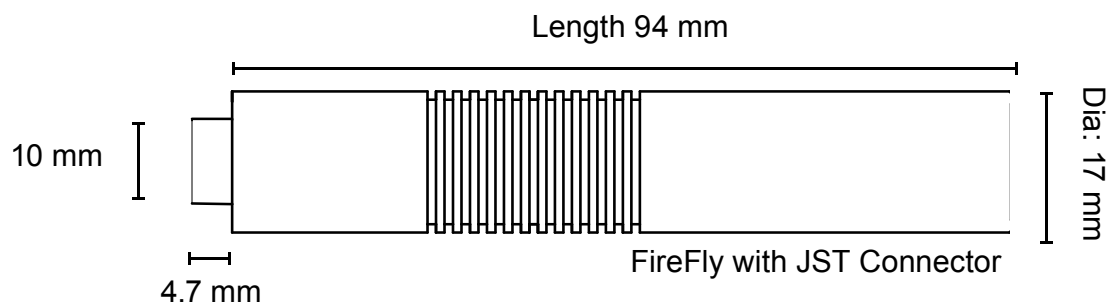
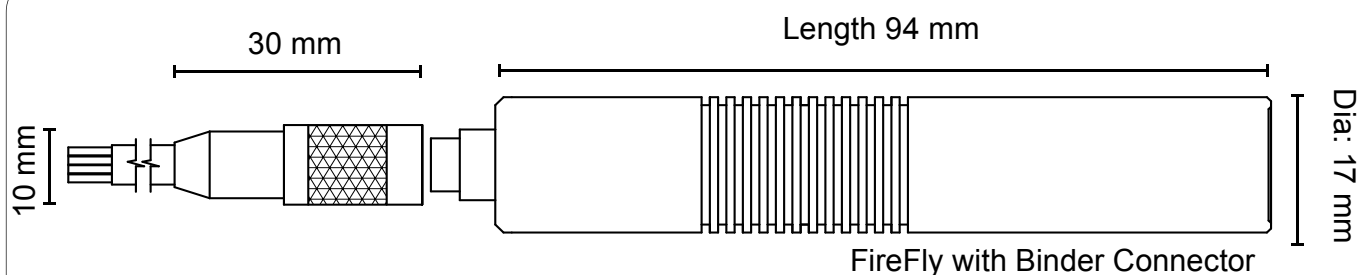


## ORDERING GUIDE

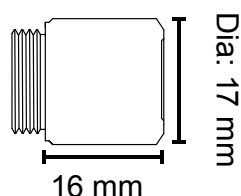
To order the correct FireFly green laser module please follow the guidelines below:



# FireFly - Green Laser



Line & cross lens assembly



Please note: Global Laser reserve the right to change descriptions and specifications without notice  
Specifications are typical at 25°C unless otherwise stated



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For further information about the FireFly you can contact your local distributor or you can contact Global Laser in the UK.

Your Local Distributor Is: