



# LASER 2000

## ILS: INDUSTRIAL LASER SYSTEM

TEC High Power Direct Semiconductor pattern generators provide high reliability with superior beam shaping capabilities for the most demanding industrial applications requiring high signal to noise ratio

### Features

High Power in a Compact Size

Superior beam shaping

Externally focusable

High Pointing stability

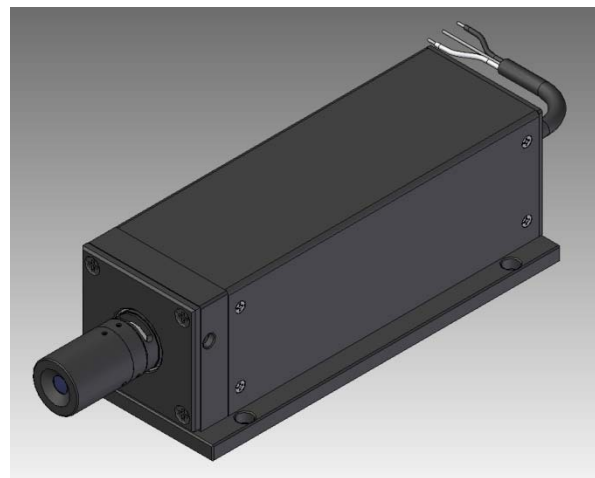
Integrated monitoring and modulation features

### Applications

Machine Vision

Industrial Inspection

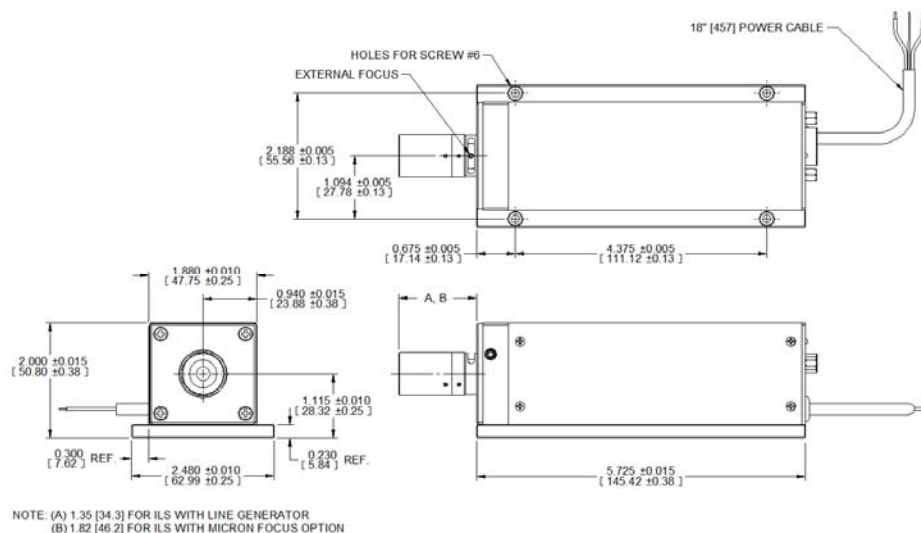
Bio-medical



### Beam Shaping Capabilities

- High uniformity
- Top Hat intensity profile
- Large Field of View Fall Off Compensated Profile
- Tele-centric focussing
- Micron focus
- Multiline/Multibeam

### Mechanical Specifications



## Beam Shaping

Osela specializes in efficiently transforming the raw diode beam into the desired beam shape that is required for Structured lighting and other industrial/medical applications.

## Uniform Laser Line Patterns

For machine vision structured lighting applications laser line beam uniformity is a highly desired feature. With our in-house refractive lens manufacturing facility we have full control of the process where we can precisely shape the lens to suit different types of beam modes providing the customer specified uniformity with full characterization. This refractive technology translates into very high efficiency (>95% transmission) with no high frequency noise.

SPECIFICATION		STANDARD	OPTION
<b>Fan angles (FA)</b>	Full fan angle specified at FWHM fall off intensity point in degrees	1,5,10,15,20,30,45,60,75,90 Custom available	Up to 120 degrees
<b>Uniformity</b>	Max intensity variation w.r.t mean	+/- 25% Typ.	Down to +/- 7.5% for multimode beams, Down to +/- 1% TEM00 beams
<b>Straightness</b>	Max centroid deviation w.r.t to line length	+/- 0.1% over 80% FA	Down to 0.03%

## Large Field of View Fall Off Compensated Line Patterns

For applications having large field of views, having a uniform line does not necessarily translate into a uniform illuminated image, this is mainly due to Cos to the 4<sup>th</sup> law phenomenon. Due to this phenomenon we have developed a line intensity pattern to compensate for this fall off by having more intensity at the edges with respect to the center thus providing uniformly illuminated image.

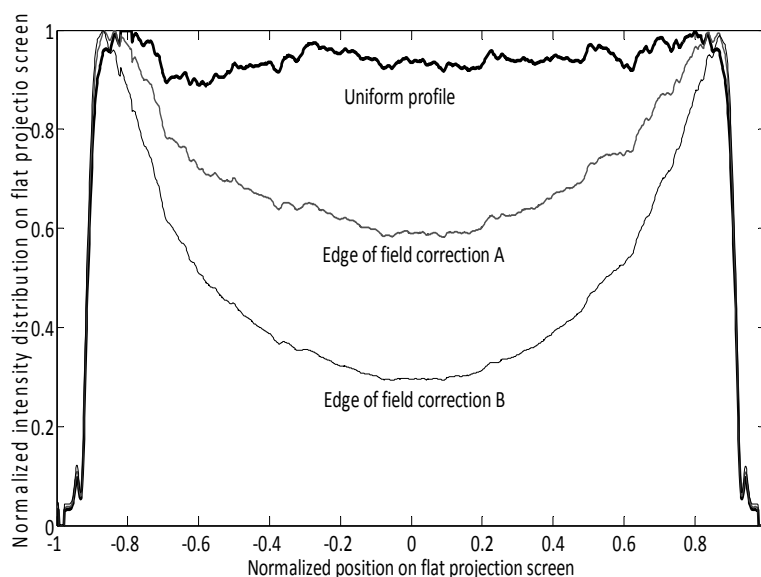


Figure 1 Intensity profile options

As shown on Figure 1, uniform profiles down to a few percent as well as edge fall off compensated intensity profiles of 30% and 70% (center to edge compensation) are readily available as a standard offering.

## Focusing Options

The focusing of the light pattern is very important parameter as it is directly proportional to the resolution one can attain for structured lighting applications. It is important to note the relationship between focus and depth of focus (i.e. Range where the thickness is smaller than  $\sqrt{2}$  time beam size at working distance note (1)), the tighter the focus that can be attained the smaller the depth of focus. At Osela we provide many different focusing options giving you the flexibility to choose the one that best suits your application.

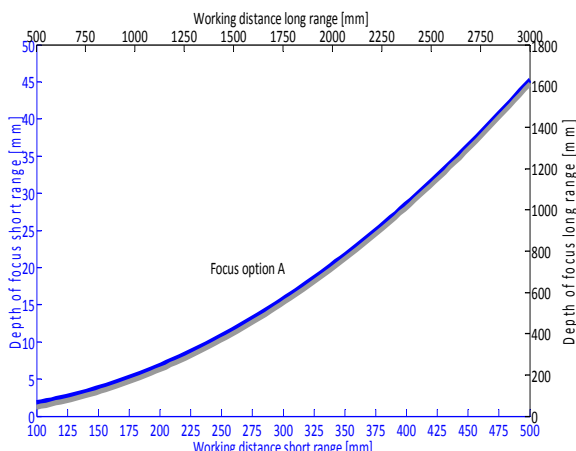


Figure 2 Depth of focus vs working distance option A

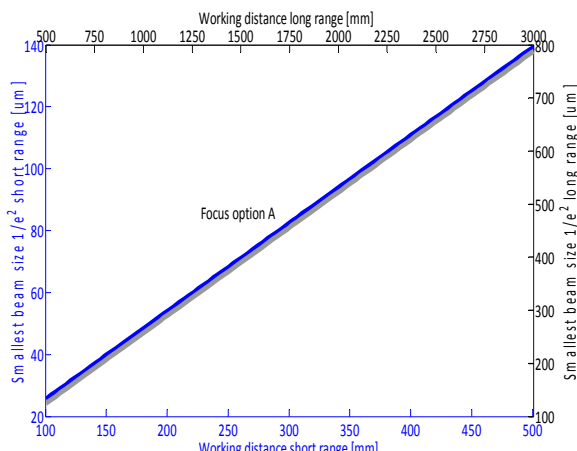


Figure 3 Smallest beam size vs working distance option A

Focus Option	Smallest beam size	Depth Of Field	Focus axis beam size (1/e <sup>2</sup> ) At exit of laser (mm)
A	1	1	3.5
B	1.4x option A	2x Option A	2.5
C	0.56x option A	0.3x Option A	6.5

*Note on depth of focus: using the definition of depth of focus: range of positions where the spot size is smaller than  $\sqrt{2}$  times the smallest beam size at working distance and removing the range behind the laser, there is a point where the function become linear and all focus options have the same slope. limit of validity of figure 2 Option D: 2500mm  
Option B: 750mm. Behind this points the depth of field is  $\sim 1.33 \times$  working distance for all options.*

## Micron Focusing Option

For applications that require very precise focusing at close working ranges, our micron focus option can yield very fine line thickness' down to 5  $\mu\text{m}$ . This option is an add to the standard CLS laser and comes with a factory set focus at predefined working distances.

Working Distance (mm)	Line Thickness ( $\mu\text{m}$ )	Depth Of Field ( $\mu\text{m}$ )	Maximum Fan angle (deg)	Line Thickness At max field ( $\mu\text{m}$ )
25	5	50	5	7
50	9	150	5	11
75	12	350	7.1	17
100	15	600	7.1	21

Line thickness is primarily a function of working distance, due to this the line thickness along the line length will widen. For this reason we limit the maximum fan angle (i.e. Limit the maximum line length) so that the ends of the line are within the lasers depth of focus.

## Beam splitters: multiple lines/ multi beams

Additional beam manipulation can be accomplished by adding our high uniformity and high efficiency beam splitters using both refractive and diffractive technology. Off the shelf standards are available, call an application engineer to discuss the number beams needed splitting and the angle between each beam that is required.

SPECIFICATIONS		375	405	440	670	810
OPTICAL	Wavelength (nm)	375 +/- 10	405 +/- 10	440 +/-15-15	670 +/-5	810 +/-10
	Diode Output Power (mW)	20/200	120/200/600	60/600/1000	500/1000	1000/2000
	Power output after collimation Lens (mW)	15/150	90/150/450	40/500/800	350/750	750/1500
	Fan Angles (degrees)	5,10,15,20,30,45,60,75,90,120				
	Focusing Options (user adjustable)	A,B,C				
	Bore sight (mrad)	<3 mrad (collimated)				
	Long term Power stability (8 hours)	<+/- 2%				
	Polarization Ratio	typical >50:1 parallel slow axis (+/- 5 deg)				
	Wavelength Drift	+/- 1nm over 0 to + 55 deg C temp range				
ELECTRICAL/ENVIRONMENTAL	Beam Shape Options	. High uniformity, Large FOV Fall off Compensated, Micron Focus, Beam splitters, Tele-Centric (call Applications Engineer)				
	Modulation ( on DB9)	10				
	Max Bandwidth (kHz)	<10				
	Rise/Fall time (usec)	100%				
	Depth (%)	>10				
	Input Impedance (Kohm)	Trim Potentiometer				
	Power Adjustment	Linear (≈1.4-3.5VDC),OPTION:TTL (0-1.4V ON, 2.7-5VDC Off)				
	Electrical Intensity Modulation Option (onDB9)	Temperature, Current, an Power (for diodes with PD only)				
	Laser Diode Monitoring (on DB9)	ESD, Over voltage (up to 25 VDC), Over-temp Shutoff (<-10, >45 deg C)				
	Protections (Built in)	< 5				
	Warm up time (min)	< 10				
	Pointing Stability (urad/degC)	5+/- 0.5 VDC ,Options: 12VDC, 24VDC				
	Operating Voltage	<3A				
	Operating Current	-10 to +55 deg C				
	Working Temp Range	<0.75 Kg				
	Weight	Alphawire PN: 5610B2001, 18 inches with flying leads				
	Power Supply Cable	1 year				
	Warranty					

## Ordering Code:

ILS	-	XXX	-	XXX	-	X	-	XX	-	XXXXX
		Wavelength		Diode Power		Focusing Option		Fan Angle		Option
		375		20,200		A		5°		High Uniformity:
		404		120,200,600		B		10°		Micron Focus
		440		60,600,1000		C		15°		Tele-centric
		670		500,1000		D		20°		Multiline/Multibeam
		810		100,200				30°		Fall Off Compensated
								45°		
								60°		
								75°		
								90°		

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