

3.1.5 YAG Focal Spot Analyzer

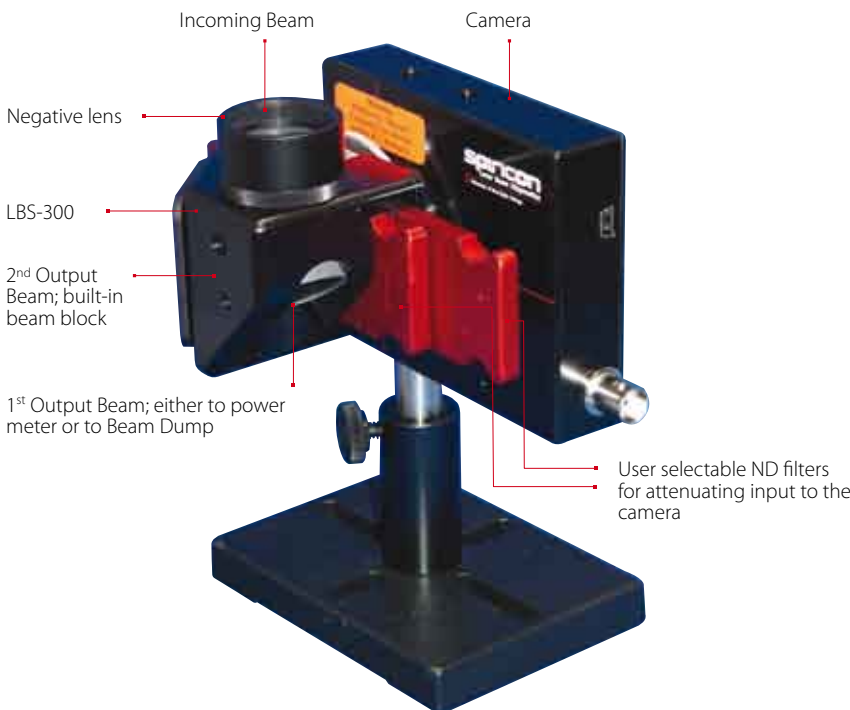
- Image focal spots down to 25µm in size
- For laser powers up to 400W (additional external ND filters required)
- Measure how focal distance shifts with power
- Can measure systems with focal length as short as 50mm
- Modular design allows flexibility in use
- C-mount, compact laser beam sampler/attenuator for camera based laser beam profiling systems
- High damage threshold optics for measuring energetic sources
- Produces undistorted sample of laser under test
- Adjustable attenuation maximizes system dynamic range
- Up to 1×10^{-10} attenuation available (without external filters)

Measure the focal spot of a relatively high power laser, in particular a YAG laser. The average power can be from <1 to 400 Watts and the focal spot can be as small as 25µm. The FSA can also be used to measure how the focal spot shifts with power.

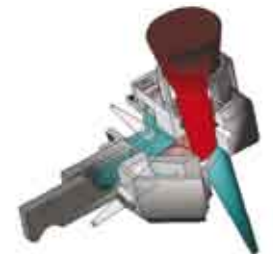
The lasers focal length from the lens to the focal spot is usually on the order of 70 to 120mm. The YAG FSA assembly adds a negative lens to the LBS-300 beam splitter assembly to increase the focal path and at the same time enlarge the image. Several focal length lenses are available to accommodate different host system focal paths. The FSA includes; user selectable negative lens, 2 beam splitters, a removable beam block on the 2nd splitter, and user selectable attenuation filters prior to the beam entering the camera. An excel spreadsheet is downloadable from our website that calculates which lenses are available to use for your application, how far to mount the FSA from your focusing lens in order to see the focal spot and what the magnification of the image will be.

Operation:

The FSA is mounted to the camera as shown. Then the assembly is placed below the final focusing lens of the laser at the recommended distance. The focal spot is found by moving the assembly closer and farther from the beam until the smallest spot size is seen. The exact magnification factor (usually 2-3 times) is calculated by moving the stage holding the FSA assembly a given lateral distance and seeing how far the centroid of the focal spot moves in the beam profiling software. This scaling factor is then entered into the software. In order to find focal spot shift with laser power, simply find focal spot at one power, change the power and measure how far the stage has to be moved up or down to get to the smallest beam size again.

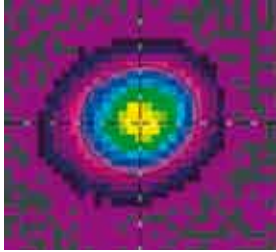


Focal Spot Assembly Looking from camera mounting position

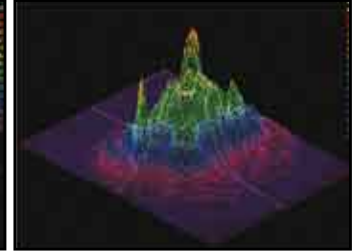
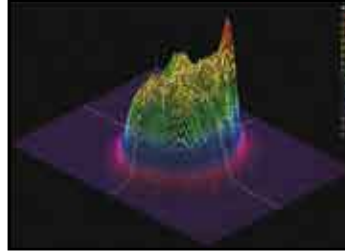
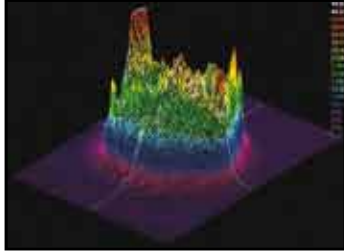


Focal Spot Assembly showing various beam paths

Examples of Usage



65µm diameter focal spot



Focal spot shape changing with laser power level

Specifications

Model	YAG Focal Spot Analyzer
Wavelength	1064nm
Wedge Material	BK7
Wedge Coating	AR ≤1%
Clear aperture	17.5mm
Wedge ND value, each	ND ≥2
ND Filters	Bulk ND
ND Values, nominal	0.3, .7, 1.0, 2.0, 3.0, 4.0 (Red holders)
Filter Slides	3
Filter Damage ⁽¹⁾	50 W/cm ² 1J/cm ² , 10ns pulse
Negative Lens	FSA-50Y
To add FSA capability	-50mm YAG
	FSA-100Y
	-100mm YAG
	FSA-125Y
	-125mm YAG
	FSA-150Y
	-150mm YAG
	FSA-200Y
	-200mm YAG
Accessories	
Variable Wedge ND Filter kit	WVF-300
Beam Dumps	BD-040-A, 40 Watts Max Power, Air Cooled BD-500-W, 500 Watts Max Power, Water Cooled

Note: (1) ND bulk absorbing filters damage threshold is 50W/cm² but should be used at <5W/cm² to avoid thermal lensing effects.

Ordering Information

Item	Description	P/N
YAG Focal Spot Analyzer		
YAG Focal Spot Analyzer assembly requires 1 each LBS-300-NIR and 1 each Negative Lens		
LBS-300-NIR	Beam splitter and attenuators; beam split 2 times	SP90185
FSA-50Y	Negative lens; -50 mm YAG	SP90187
FSA-100Y	Negative lens; -100 mm YAG	SP90188
FSA-125Y	Negative lens; -125 mm YAG	SP90189
FSA-150Y	Negative lens; -150 mm YAG	SP90190
FSA-200Y	Negative lens; -200 mm YAG	SP90191
Accessories		
WVF-300	ND filters; variable wedge. Replaces fixed value filter slides	SP90195
BD-040-A	Beam Dump; 40 Watts max. power, air cooled	SP90192
BD-500-W	Beam Dump; 500 Watts max. power, water cooled	SP90193