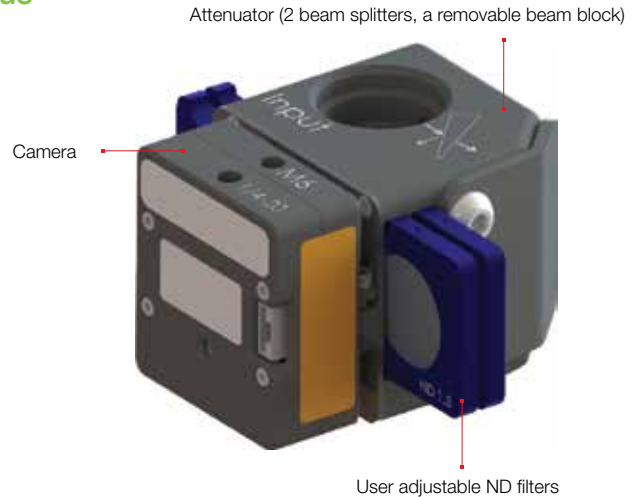


## 3.3.6 Focal Spot Analyzer

### Captures the beam size, shape and profile at focus

- Image focal spots down to  $37\mu\text{m}$  in size
- For laser powers up to 400W (additional external ND filters required)
- Can measure systems with focal length as short as 73mm (exact path length distance within the assembly will be NIST/National Lab calibrated and includes a calibration certificate  $\pm 50\mu\text{m}$ )
- Produces undistorted sample of laser under test
- Adjustable attenuation maximizes system dynamic range
- Up to  $1 \times 10^{-10}$  attenuation available (without external filters)
- Analyzer includes camera, attenuation, BeamGage software and calibration certificate



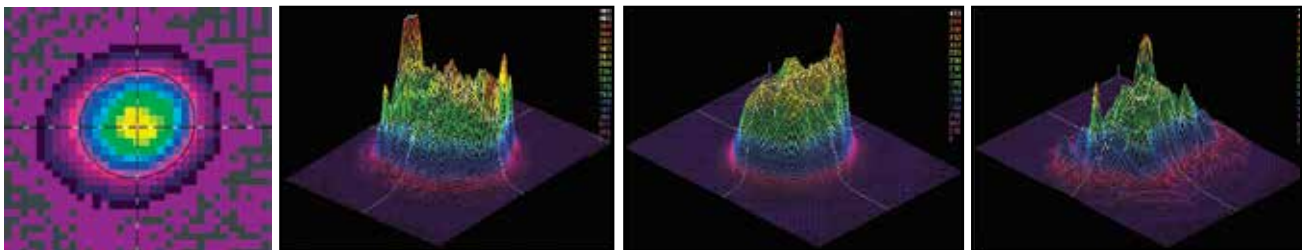
Measure your laser beam power distribution and focal spot size of wavelengths from 266 – 1100nm. The average power can be from  $<1$  to 400 Watts and the focal spot can be as small as  $37\mu\text{m}$ . The FSA can also be used to measure how the focal spot shifts with power during its critical start-up phase.

The FSA is a combination of a camera, Beam Splitter, natural density filters and a BeamGage software.

### Operation

The assembly is placed below the final focusing lens of the laser at a distance equal to the expected focal length less the  $\sim 73\text{mm}$  of the calibrated distance, so the beam will be focused on the camera layer. The focal spot is found by moving the assembly closer and farther from the beam until the smallest spot size is seen. The distance between the focusing lens and the datum point on the FSA assembly is added to the distance from the datum to the camera array (each FSA assembly will be factory calibrated to within  $\pm 50\mu\text{m}$ ). These two measurements will give you the exact distance of your lasers focal spot.

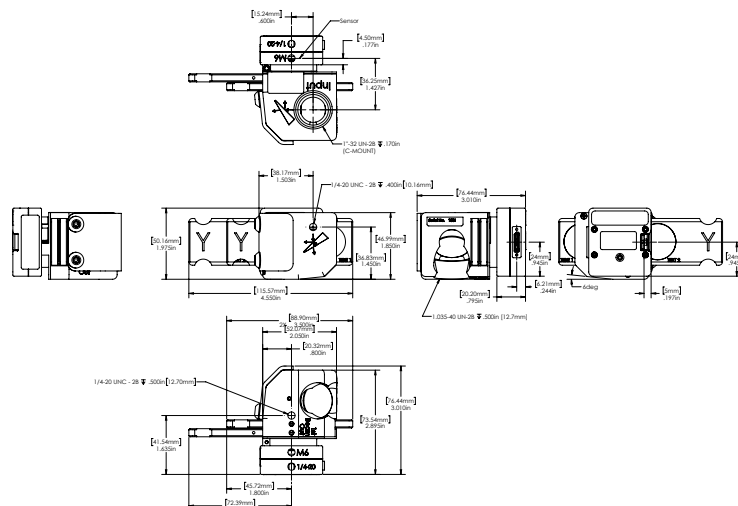
### Examples of Usage



65 $\mu\text{m}$  diameter focal spot

Focal spot spatial power density changing with laser power level

### Focal Spot Analyzer



## Cameras Specifications

Model	SP928	LT665
Application	1/1.8" format	1" format
Spectral Response <sup>(2)</sup>	190 - 1100nm	190 - 1100nm
Active Area	7.1mm x 5.3mm	12.5mm x 10mm
Beam sizes	37µm - 5.3mm	46µm - 9.9mm
Pixel spacing	3.69µm	4.54µm x 4.54µm
Number of effective pixels	1928 x 1448	2752 x 2192
Minimum system dynamic range	56 dB	54 dB
Linearity with Power	±1%	±1%
Accuracy of beam width	±2%	±2%
Frame rates in 12 bit mode <sup>(4)</sup>	13 fps at full resolution	27 fps at full resolution
Shutter duration	30µs to multiple frames	31µs to multiple frames
Gain control	0 dB to 24 dB	0.8 dB to 56 dB
Trigger	Hardware/Software trigger & strobe out	Hardware/Software trigger & strobe out
Photodiode trigger	N/A	Si response: SP90408
Saturation intensity <sup>(1)</sup>	0.97µW/cm <sup>2</sup>	1.3µW/cm <sup>2</sup>
Lowest measurable signal <sup>(1)</sup>	1.2nW/cm <sup>2</sup>	0.3nW/cm <sup>2</sup>
Damage threshold <sup>(3)</sup>	50W/cm <sup>2</sup> / 0.1J/cm <sup>2</sup> with all filters installed for < 100ns pulse width	50W/cm <sup>2</sup> / 0.1J/cm <sup>2</sup> with all filters installed for < 100ns pulse width
Dimensions	48 mm x 44 mm x 20.2 mm	43 mm x 43 mm x 65 mm
CCD recess	4.5 mm	17.5mm
Image quality at 1064nm	Pulsed with trigger sync - excellent Pulsed with video trigger - good CW - good	Pulsed with trigger sync - excellent Pulsed with video trigger - good CW - good
Operation mode	Interline transfer CCD	Quad Tap interline transfer CCD
PC interface	USB 3.0	USB 3.0
OS Supported	Windows 7 (64) and Windows 10	Windows 7 (64) and Windows 10
Notes:	<p>(1) Camera set to full resolution at maximum frame rate and exposure times, running CW at 633nm wavelength. Camera set to minimum useful gain for saturation test and maximum useful gain for lowest signal test.</p> <p>(2) The camera's natural response is from 350nm through 1100nm. To measure effectively below 350nm, please make use of one of our UV converters. Otherwise the sensitivity is too low and the measurement accuracy may degrade.</p> <p>(3) This is the damage threshold of the filter glass of the filters. Assuming all filters mounted with ND1 (red housing) filter in the front. Distortion of the beam may occur with average power densities as low as 5W/cm<sup>2</sup>.</p> <p>(4) Highly dependent on PC processor and graphics adapter performance.</p>	

## LBS -300s Specifications

Model	LBS-300s-UV	LBS-300s-VIS	LBS-300s-NIR	LBS-300s-BB
Wavelength	266-355nm	400-700nm	1064nm	190-1550nm
Wedge Material	UVFS	UVFS	UVFS	UVFS
Wedge Coating	A/R ≤1%	AR ≤1%	AR ≤1%	No coating, 4% reflection
Clear aperture	17.5mm	17.5mm	17.5mm	17.5mm
Reflection	0.01%	0.01%	0.01%	0.16%
Wedge ND value, each	ND ≥2	ND ≥2	ND ≥2	ND ~1.3
ND Filters	Inconel	Bulk ND	Bulk ND	One each of the UV, VIS & NIR sets
ND Values, nominal	0.3, 0.7, 1.0, 2.0, 3.0, 4.0 (Blu holders)	0.3, 0.7, 1.0, 2.0, 3.0, 4.0 (Grn holders)	0.3, 0.7, 1.0, 2.0, 3.0, 4.0 (Red holders)	See UV, VIS and NIR descriptions
Filter Slides	3	3	3	9
Maximum allowable input to filter <sup>(1)</sup>	100 W/cm <sup>2</sup> CW 20mJ/cm <sup>2</sup> , 10ns pulse	50 W/cm <sup>2</sup> 1J/cm <sup>2</sup> , 10ns pulse	50 W/cm <sup>2</sup> 1J/cm <sup>2</sup> , 10ns pulse	See adjacent specifications
Note:	(1) ND bulk absorbing filters damage threshold is 50W/cm <sup>2</sup> but should be used at <5W/cm <sup>2</sup> to avoid thermal lensing effects.			

## Ordering Information

Model	SP928		LT665		
	Item	P/N	Item	P/N	
LBS-300s-UV	BeamGage Professional	BGP-LBS-300s-UV-CAL	SP90460	BGP-LBS-300s-UV-CAL-LT665	SP90481
	BeamGage Standard	BGS-LBS-300s-UV-CAL	SP90456	BGS-LBS-300s-UV-CAL-LT665	SP90477
LBS-300s-VIS	BeamGage Professional	BGP-LBS-300s-VIS-CAL	SP90461	BGP-LBS-300s-VIS-CAL-LT665	SP90482
	BeamGage Standard	BGS-LBS-300s-VIS-CAL	SP90457	BGS-LBS-300s-VIS-CAL-LT665	SP90478
LBS-300s-NIR	BeamGage Professional	BGP-LBS-300s-NIR-CAL	SP90462	BGP-LBS-300s-NIR-CAL-LT665	SP90483
	BeamGage Standard	BGS-LBS-300s-NIR-CAL	SP90458	BGS-LBS-300s-NIR-CAL-LT665	SP90479
LBS-300s-BB	BeamGage Professional	BGP-LBS-300s-BB-CAL	SP90463	BGP-LBS-300s-BB-CAL-LT665	SP90484
	BeamGage Standard	BGS-LBS-300s-BB-CAL	SP90459	BGS-LBS-300s-BB-CAL-LT665	SP90480
Note:	Comes with BeamGage software license, NIST/ National Lab traceable calibrated path length from top of unit to CCD array, USB cable and 3 ND filters.				