3.3.3 Focal Spot Analyzer

Measure how focal distance shifts with power

- Image focal spots down to 37µm 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 calibrated and includes a calibration certificate +/-50µm)
- Produces undistorted sample of laser under test
- Adjustable attenuation maximizes system dynamic range
- Up to 1 x 10^{-10} attenuation available (without external filters)
- Analyzer includes camera, attenuation, BeamGage software and calibration certificate

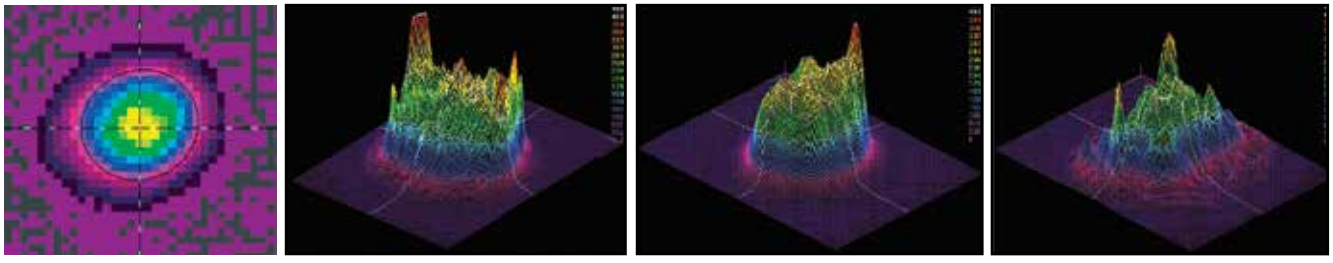
Measure your laser beam power distribution and focal spot size of wavelengths from 266 – 1100nm. The average power can be from <1 to 400 Watts and the focal spot can be as small as 37µm. The FSA can also be used to measure how the focal spot shifts with power during its critical start-up phase.

The FSA includes; choice of high resolution camera, 2 beam splitters, a removable beam block on the 2nd splitter, and user selectable attenuation filters prior to the beam entering the camera.

Operation

The assembly is placed below the final focusing lens of the laser at a distance equal to the expected focal length. 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 +/- 50 µm). These two measurements will give you the exact distance of your lasers focal spot.

Examples of Usage



65µm diameter focal spot

Focal spot spatial power density changing with laser power level

Specifications

Model	SP928	LT665
Application	1/1.8" format	1" format
Spectral Response	190 - 1100nm (2)	190 - 1100nm (2)
Active Area	7.1mm x 5.3mm	12.5mm x 10mm
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 (4)	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 (1)	0.97µW/cm²	1.3µW/cm²
Lowest measurable signal (1)	1.2nW/cm²	0.3nW/cm²
Damage threshold	50W/cm² / 0.1J/cm² with all filters installed for < 100ns pulse width(3)	50W/cm² / 0.1J/cm² with all filters installed for < 100ns pulse width(3)
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
Software supported	BeamGage STD or PRO	BeamGage STD and PRO
PC interface	USB 3.0	USB 3.0
OS Supported	Windows 7 (64) and Windows 10	Windows 7 (64) and Windows 10

Notes:

(1) Camera set to full resolution at maximum frame rate and exposure times, running CW at 632.8nm wavelength. Camera set to minimum useful gain for saturation test and maximum useful gain for lowest signal test.
(2) Camera may be useable for wavelengths below 350nm but sensitivity is low and detector deterioration may occur. Therefore UV image converter is recommended. Although our silicon cameras have shown response out to 1320nm it can cause significant blooming which could lead to significant errors of beam width measurement. We would suggest our XC130 InGaAs camera for these wavelengths to give the best measurements.
(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/cm².
(4) Highly dependent on PC processor and graphics adapter performance.

Ordering Information

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 (1)	100 W/cm² CW 20mJ/cm², 10ns pulse	50 W/cm² 1J/cm², 10ns pulse	50 W/cm² 1J/cm², 10ns pulse	See adjacent specifications
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
BGS-LBS-300s-UV-CAL	LBS-300s-UV beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90456
BGS-LBS-300s-UV-CAL-LT665	LBS-300s-UV beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90477
BGS-LBS-300s-VIS-CAL	LBS-300s-VIS beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90457
BGS-LBS-300s-VIS-CAL-LT665	LBS-300s-VIS beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90478
BGS-LBS-300s-NIR-CAL	LBS-300s-NIR beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90458
BGS-LBS-300s-NIR-CAL-LT665	LBS-300s-NIR beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90479
BGS-LBS-300s-BB-CAL	LBS-300s-BB beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90459
BGS-LBS-300s-BB-CAL-LT665	LBS-300s-BB beam splitter & neutral density filters combo + BeamGage Standard software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90480
BGP-LBS-300s-UV-CAL	LBS-300s-UV beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90460
BGP-LBS-300s-UV-CAL-LT665	LBS-300s-UV beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1" format 2752X2192 pixel camera pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90481
BGP-LBS-300s-VIS-CAL	LBS-300s-VIS beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90461
BGP-LBS-300s-VIS-CAL-LT665	LBS-300s-VIS beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90482
BGP-LBS-300s-NIR-CAL	LBS-300s-NIR beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90462
BGP-LBS-300s-NIR-CAL-LT665	LBS-300s-NIR beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90483
BGP-LBS-300s-BB-CAL	LBS-300s-BB beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1/1.8" format 1928X1448 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90463
BGP-LBS-300s-BB-CAL-LT665	LBS-300s-BB beam splitter & neutral density filters combo + BeamGage Professional software, software license, 1" format 2752X2192 pixel camera + NIST traceable calibrated path length from top of unit to CCD array. Comes with USB cable and 3 ND filters.	SP90484