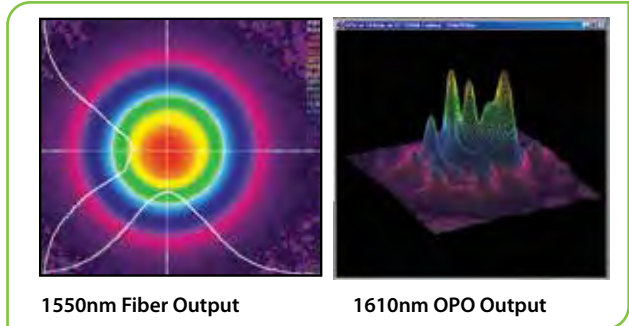


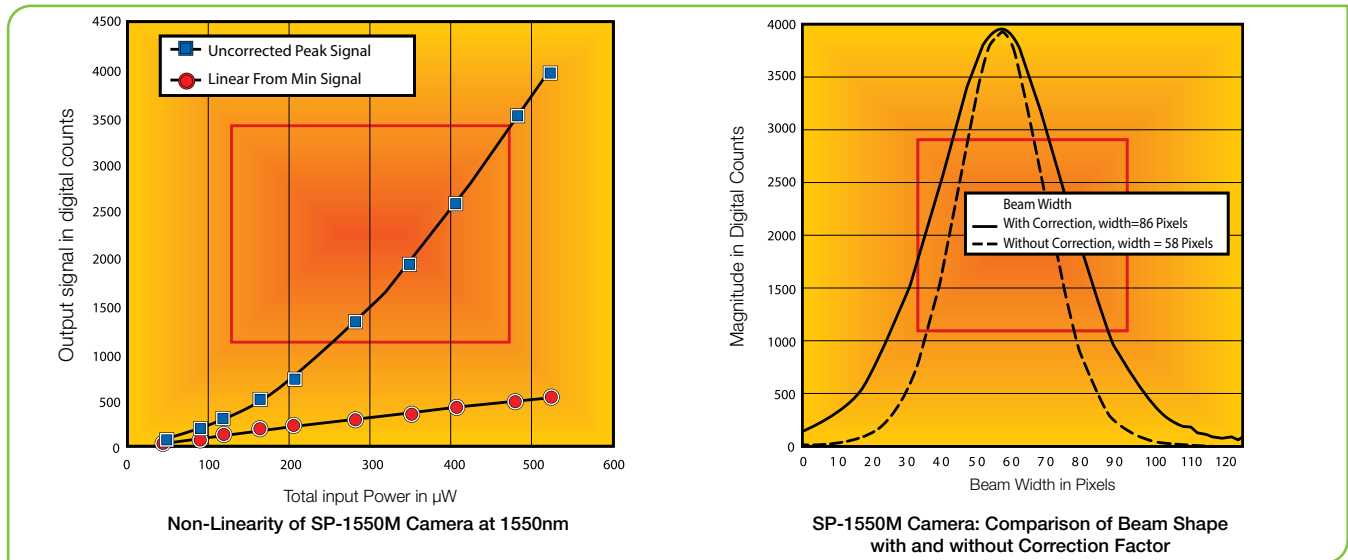
### 3.3.4.2 1440-1605nm Cameras

#### Phosphor Coating Technology

The up-conversion from NIR to visible light in the 1550 series cameras is nonlinear. The anti-Stokes phosphor coating produces visible photons at a rate roughly the square of the input signal. This is shown dramatically where the camera total output increases dramatically faster than a linear output shown in the bottom line. The CCD camera saturation in the center of a beam, the up-converted visible signal drops as the square of the input signal. Thus the lower signal wings of a beam are suppressed, resulting in the appearance and measurement of a beam width much smaller than actual.

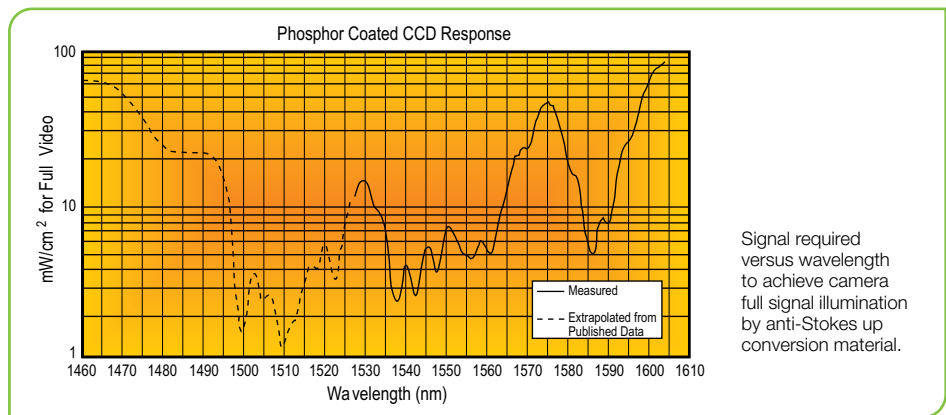


This illustration is a comparison of the cross-section of a beam with and without correction. As seen, the real width of the beam is much greater than would be observed without correction.



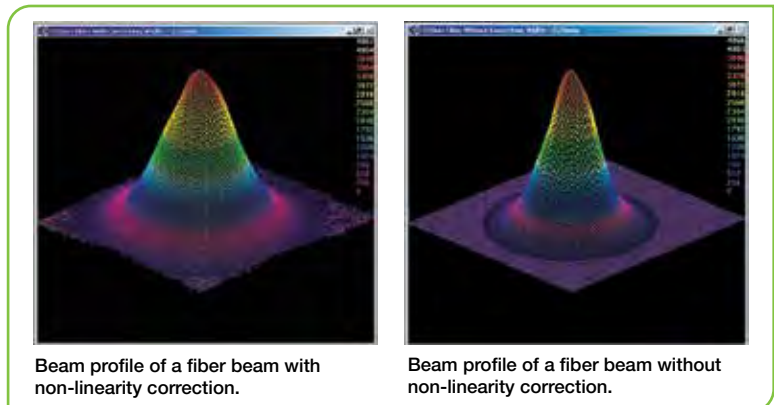
#### Wavelength Response

The anti-Stokes up-conversion efficiency is very wavelength dependent. This graph shows the typical spectral response curve of a new, high response coating. As seen, we have calibrated the response from 1527nm to 1605nm. We have extrapolated the shorter wavelength region by comparing our measured response to data published over the entire range.



#### Phosphor Coated Cameras with Spiricon's BeamGage software

Spiricon's engineers have carefully measured the non-linearity of the signal generated by the Phosphor Coated series cameras. The software in the BeamGage incorporates an algorithm to correct for the non-linearity. This illustration shows the linearity obtained, showing in the top line that the low level signals drop linearly, rather than at the square of the input, seen in the lower line. The two photos show the uncorrected and corrected camera beam shape in 3D. See the BeamGage section for additional information on the beam analyzer.



### 3.3.4.2.1 Phosphor Coated CCD Cameras For NIR Response

#### Features

- 1440-1605nm Wavelengths
- NIR Telecom mode field analysis
- NIR Laser beam analysis

#### Available Models

- USB models: SP920s-1550
- Large Format: LT665-1550

SP920s-1550



LT665-1550

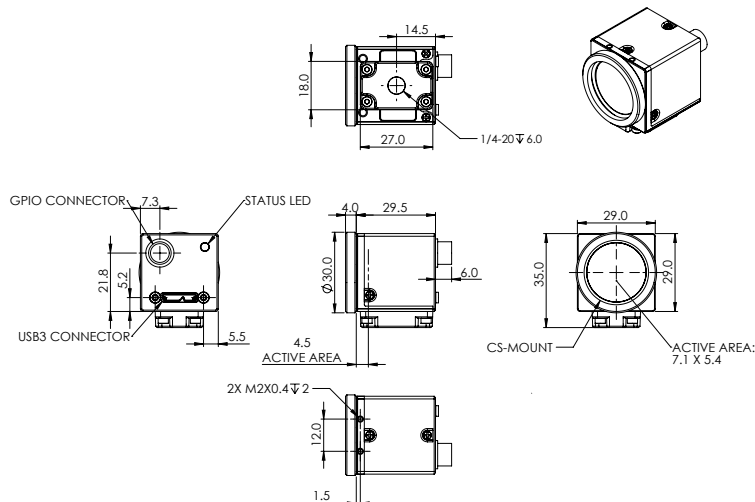


Model	SP920s-1550	LT665-1550		
Application	NIR wavelengths, 1/1.8" format, low resolution	NIR wavelengths, 1" format, higher resolution		
Wavelengths	1440 - 1605nm	1440 - 1605nm		
Active area	7.1mm x 5.3mm	12.5mm x 10mm		
Beam sizes	600µm - 5.3mm	600µm - 9.9mm		
Pixel spacing <sup>(1)</sup>	4.4µm x 4.4µm	4.54µm x 4.54µm		
Number of effective pixels	1624 x 1224	2752 x 2192		
Dynamic range <sup>(2)</sup>	~30 dB	~30 dB		
Linearity with power	±5%	±5%		
Accuracy of beam width	±5%	±5%		
Frame rates in 12 bit mode <sup>(3)</sup>	15 fps at full resolution	27 fps at full resolution		
Shutter duration	70µs to multiple frames	31µs to multiple frames		
Gain control	0 dB to 24 dB	0.8 dB to 56 dB		
Trigger	Supports both trigger and strobe out	Supports both trigger and strobe out		
Photodiode trigger (Optional) <sup>(4)</sup>	InGaAs response: SP90409	InGaAs response: SP90409		
Saturation intensity	7mW/cm <sup>2</sup> at 1550nm			
Lowest measurable signal	50µW/cm <sup>2</sup>			
Damage threshold	50W/cm <sup>2</sup> / 1J/cm <sup>2</sup> with all filters installed for < 100ns pulse width <sup>(5)</sup>			
Dimensions	29mm x 29mm x 29.5mm	43mm x 43mm x 65mm		
CCD recess	4.5mm	17.5mm		
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			
Compliance	CE, UKCA, China RoHS			
<b>Ordering Information</b>				
Supported software	Item	P/N	Item	P/N
BeamGage Professional	BGP-USB3-SP920s-1550	<b>SP90562</b> <sup>(6)</sup>	BGP-USB3-LT665-1550	<b>SP90385</b> <sup>(7)</sup>
BeamGage Standard	BGS-USB3-SP920s-1550	<b>SP90561</b> <sup>(6)</sup>	BGS-USB3-LT665-1550	<b>SP90384</b> <sup>(7)</sup>

Notes:

- (1) Despite the small pixel size, the spatial resolution will not exceed 50µm due to diffusion of the light by the phosphor coating.
- (2) Signal to noise ratio is degraded due to the gamma of the phosphor's response. Averaging or summing of up to 256 frames improves dynamic range by up to 16x = +24 dB.
- (3) In normal (non-shuttered) camera operation, the frame rate is the fastest rate at which the laser may pulse and the camera can still separate one pulse from the next. With electronic shutter operation, higher rate laser pulses can be split out by matching the laser repetition to the shutter speed.
- (4) For more information please see "Optical Camera Trigger" catalog page.
- (5) 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 of 5W/cm<sup>2</sup> for beam size 5mm, 10W/cm<sup>2</sup> for 2mm beam and >30W/cm<sup>2</sup> for 1mm beam.
- (6) Comes with USB 3.0 cable, Trigger cable and 3 ND filters.
- (7) Comes with USB 3.0 cable, Power with Trigger cable and 3 ND filters.

SP920s-1550



LT665 - 1550

