

## 3.2.3 Cameras

### 3.2.3.1 190-1100nm USB Silicon CCD Cameras

#### SP Series

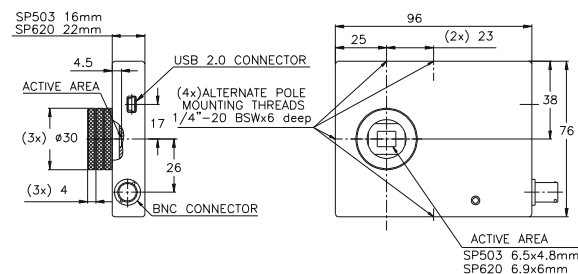
##### Features

- USB 2.0 compatible
- 64dB true system dynamic range - highest in the industry
- Programmable high speed electronic shutter
- Spectral range: 190 - 1100nm
- Gain adjustable to accommodate a wide range of input levels
- Built in optical trigger synchronizes with even the shortest laser pulses.
- Slim profile and multiple mounting options



Built-in photodiode trigger

##### SP503U/SP620U



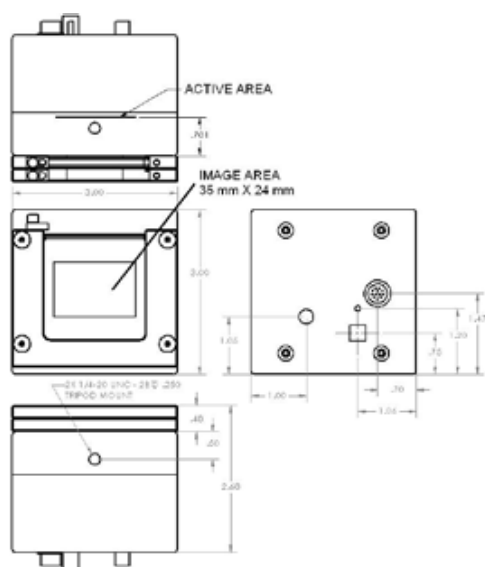
#### L-Series

##### Features

- 35mm format for large beams
- 59dB true system dynamic range
- Spectral range: 190 - 1100nm



##### USB L11059



## USB Cameras for use with Laptop or Desktop PC

| Item                                    | Specification   |   |   |
|---|---|---|---|
| Model                                   | SP503U  | SP620U  | USB L11059  |
| Application                             | ½" format, slim profile, wide dynamic range, CW & pulsed lasers, adjustable ROI   | 1/1.8" format, high resolution, wide dynamic range, pulsed lasers, CW YAG, adjustable ROI | 36mm x 24mm, 35mm format for large dia. beams, CW & pulsed lasers, ideal for CW YAG, Adjustable ROI |
| Spectral Response                       | 190 - 1100nm <sup>(2)</sup>   | 190 - 1100nm <sup>(2)</sup>   | 190 - 1100nm <sup>(2)</sup>   |
| Active Area                             | 6.3mm W x 4.7mm H   | 7.1mm W x 5.4mm H   | 35mm x 24mm   |
| Pixel spacing                           | 9.9µm x 9.9µm   | 4.40µm x 4.40µm   | 9.0µm x 9.0µm   |
| Number of effective pixels              | 640 x 480   | 1600 x 1200   | 4008 x 2672   |
| Minimum system dynamic range            | 64 dB   | 62 dB   | 59 dB   |
| Linearity with Power                    | ±1%   | ±1%   | ±1%   |
| Accuracy of beam width                  | ±2%   |   |   |
| Frame rates: In 12 bit mode             | 30 fps at full resolution<br>60 fps at 320x240  | 7.5 fps at full resolution<br>28 fps at 640x480<br>44 fps at 320x240                      | 3.1 fps at full resolution higher rates with binning and smaller region of interest                 |
| Shutter duration                        | 30µs to multiple frame times  |   | 10µs to multiple frame times  |
| Gain control                            | 43:1 automatic or manual control  | 29:1 automatic or manual control  |   |
| Trigger                                 | Supports both Trigger In and Strobe Out   |   |   |
|   | 1. BNC connector accepts positive or negative trigger. LED on camera indicates triggering. Will synchronize with laser repetition rates up to 1KHz. Built in pre-trigger allows synchronization to even sub-nanosecond pulses<br>2. Same connector can provide trigger out to synch laser. Supports programmable delay on Strobe Out<br>3. Same connector accepts photodiode trigger (see below)  |   |   |
| Photodiode trigger                      | Optional photodiode trigger available: P/N SPZ17005   |   |   |
| Saturation intensity <sup>(1)</sup>     | 1.3µW/cm² 2.2µW/cm²   | 2.2µW/cm²   | 0.15µW/cm²  |
| Lowest measurable signal <sup>(1)</sup> | 0.5nW/cm²   | 2.5nW/cm²   | 0.17nW/cm²  |
| Damage threshold                        | 50W/cm² / 0.1J/cm² with all filters installed   | for <100ns pulse width <sup>(3)</sup>   | 0.15mW/cm²  |
| Dimensions and CCD recess               | 96mm x 76mm x 16mm<br>CCD recess: 4.5mm below surface   | 96mm x 76mm x 23mm<br>CCD recess: 4.5mm below surface                                     | 83mm x 76mm x 128mm CCD recess:<br>18.8mm below bezel, 31.75 from ND filter holder                  |
| Image quality at 1064nm                 | Pulsed with trigger sync - excellent<br>Pulsed with video trigger - good<br>CW - poor   | Pulsed with trigger sync - excellent<br>Pulsed with video trigger - good<br>CW - good     | Pulsed with trigger sync - excellent<br>Pulsed with video trigger - good<br>CW - good               |
| Operation mode                          | Interline transfer progressive scan CCD   |   |   |
| Software supported                      | BeamGage  |   |   |
| PC interface                            | USB 2.0   |   |   |
| 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.<br>(2) 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 you the best measurements.<br>(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. |   |   |