



# PIXIS-XO:2048B

2048 x 2048 imaging array | 13.5x 13.5  $\mu\text{m}$  pixels | Soft X-ray detection

The PIXIS-XO series of fully integrated imaging cameras utilizes back-illuminated (BI) CCDs without AR coating, for direct detection of the widest range of X-rays between  $\sim 10$  eV and 30 keV (AR coated devices are not useful for X-ray energies  $< 500\text{eV}$ ). With a 2048 x 2048 imaging array, 13.5  $\mu\text{m}$  pixels, 100% fill factor, low noise electronics and  $-50^\circ\text{C}$  to  $-70^\circ\text{C}$  thermoelectric cooling with either air or water, this system is ideal for worry-free operation in research and OEM environments. The rotatable conflat flange with high-vacuum-seal design, software selectable gains and readout speeds make these cameras well suited for ultra-high vacuum applications.

| FEATURES   | BENEFITS  |
|--|---|
| Back-illuminated CCD, with no AR coating   | Provides very low X-ray flux imaging, high sensitivity and high spatial resolution  |
| 2 Mhz / 16-bit readout<br>100 kHz / 16-bit readout   | High speed readout for rapid image acquisition; Slow speed readout for high sensitivity with wide dynamic range, high signal-to-noise ratio (SNR) and excellent energy resolution |
| Software selectable gains for each digitization speed  | Allows optimization of system performance for lowest noise to highest SNR   |
| 2048 x 2048 image area,<br>13.5 x 13.5 $\mu\text{m}$ pixels  | Wide field of view, highest resolution with 13.5 $\mu\text{m}$ pixel  |
| Ultra low noise electronics  | Best possible system performance  |
| Flexible user-selectable binning & readout   | Total flexibility to optimize experiments and SNR   |
| Kinetics   | Custom readout mode offers microsecond resolution   |
| Deep thermoelectric air cooling  | Maintenance-free operation - No need for a liquid circulator or additional power supply   |
| Deep thermoelectric water cooling  | Vibration-free operation  |
| Conflat vacuum interface   | Industry-standard, high-vacuum compatibility  |
| TTL input and output   | External Trigger input with programmable polarity;<br>TTL output with exposure or readout monitor   |
| USB 2.0 interface  | Seamless, plug-and-play connection to PC notebooks & desktops; Easy OEM integration   |
| <b>Optional: LightField®</b> (for Windows 10/8/7, 64-bit)<br><b>Or WinView/Spec</b> (for Windows 8/7/XP, 32-bit) | Flexible software packages for data acquisition, display and analysis with built in math engine; LightField offers intuitive, cutting edge user interface and more.               |
| PICAM (64-bit) / PVCAM (32-bit) software development kits (SDKs)   | Compatible with Windows 10/8/7 (64-bit), and Linux (contact factory for an update)<br>Universal programming interfaces for easy custom programming.                               |
| LabView® Scientific Imaging ToolKit (SITK™)  | Predefined VIs for easy integration of camera controls into large experiment  |

## Applications:

X-ray Imaging, X-ray Microscopy, EUV Lithography and X-ray Plasma Diagnostics

|   | <b>PIXIS-XO: 2048B</b>  | <b>PIXIS-XO: 2048BUV/BR*</b>   |
|---|---|--|
| CCD Image Sensor  | e2v CCD42-40; scientific grade 1; MPP; BI-basic process (B); no AR coating; for sensitivity between ~10 eV to 30 keV  | e2v CCD42-40; scientific grade 1; NIMO; BI-enhanced process (BUV), BI-deep depletion (BR); no AR coating; for sensitivity between ~10 eV to 30 keV |
| Dark current @ -60° C (with ambient air @ +20° C)                         | 0.002 e-/p/sec (typical)<br>0.006 e-/p/sec (max)  | 0.2 e-/p/sec (typical)<br>2 e-/p/sec (max)   |
| CCD format  | 2048 x 2048 imaging pixels; 13.5 x 13.5 μm pixels; 100% fill factor; 27.6 x 27.6 mm (optically centered)  |  |
| Deepest cooling temperature, TE air cooling** (with ambient air @ +20° C) | -70° C (typical); -60° C (guaranteed) with CoolCUBE II liquid circulator<br>-60° C (typical); -50° C (guaranteed) with air  |  |
| Thermostating precision   | ±0.05° C  |  |
| Cooling method  | Thermoelectric air or liquid cooling (CoolCUBE II required)   |  |
| Full well   | Single pixel: 100 ke- (typical), 80 ke- (minimum)<br>High Sensitivity node: 250 ke- (typical), 220 ke- (minimum)<br>High Capacity node: 1000 ke- (typical), 800 ke- (minimum) |  |
| ADC speed/bits  | 100 kHz/16-bit and 2 MHz/16-bit   |  |
| System read noise @100 kHz @2 MHz   | 3.5 e- rms (typical), 5 e- rms (max)<br>12 e- rms (typical), 16 e- rms (max)  |  |
| Vertical shift speed  | 32.2 μsec/row (programmable)  |  |
| Non-linearity   | <2% @ 100 kHz   |  |
| Software selectable gains   | 1, 2, 4 e-/ADU (low noise input); 3.5, 7, 14 e-/ADU (high capacity output)  |  |
| Operating systems supported   | Windows XP/Vista/7; Linux   |  |
| Data interface  | USB2.0 (5m interface cable provided); Optional Fiberoptic interface is available for remote operation   |  |
| I/O signals   | Two MCX connectors for programmable frame readout, shutter, trigger in  |  |
| Operating environment   | +5° C to +30° C non-condensing  |  |
| Bakeout temperature   | 70° C (maximum)   |  |
| Vacuum Compatibility  | 10 <sup>-8</sup> Torr   |  |
| Certification   | CE  |  |
| Dimensions / Weight   | 15.1 cm (5.95") x 15.24 cm (6.00") x 15.24 cm (6.00") (L x W x H) / 3.86 kg (8.5 lbs)†  |  |

**NOTES:** All specifications subject to change

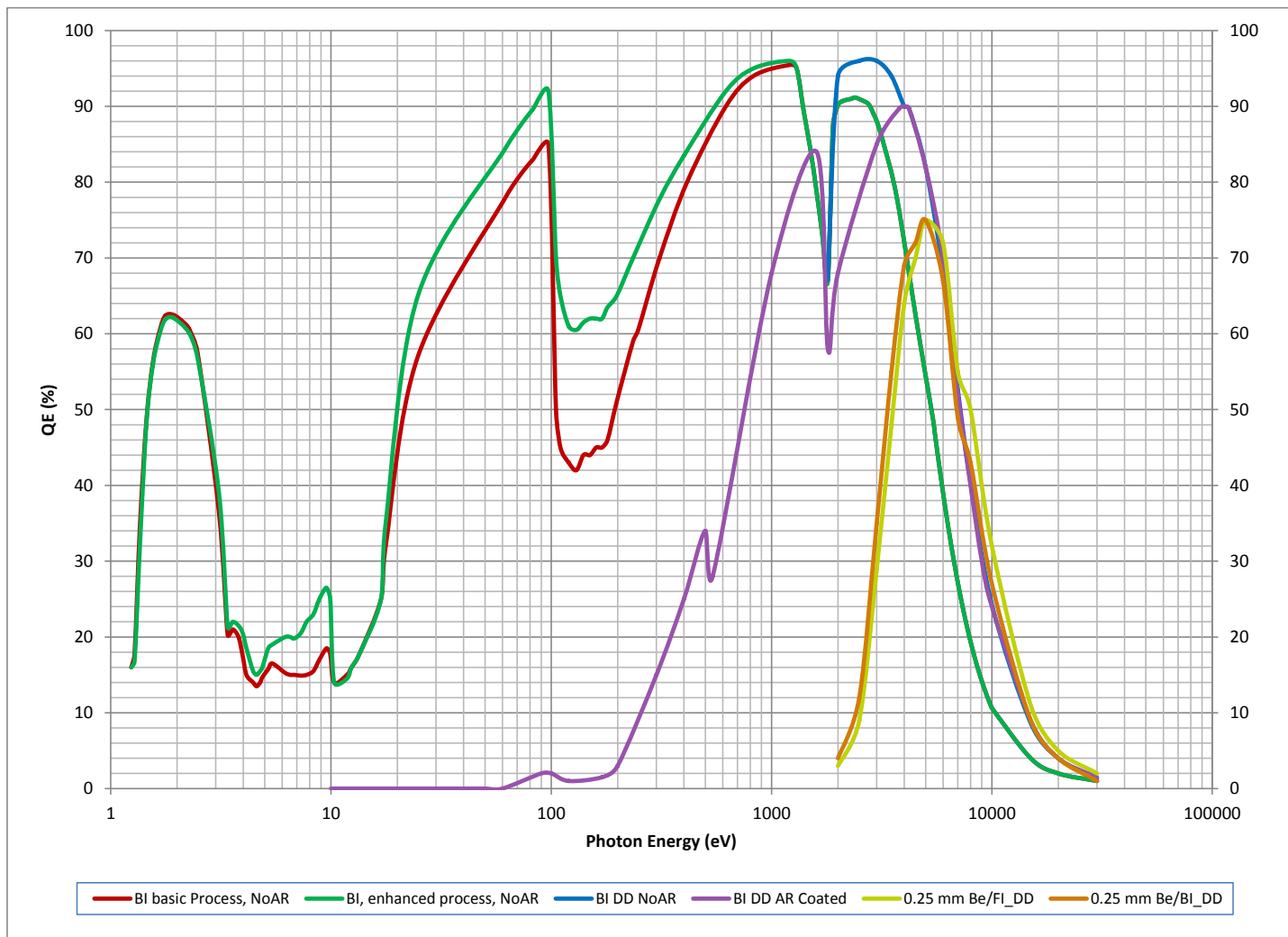
\* Contact your local sales representative for information on the availability of the BUV / BR model.

\*\* The minimum temperature attainable is dependent on the vacuum condition - temperature can be lowered w/lower vacuum.

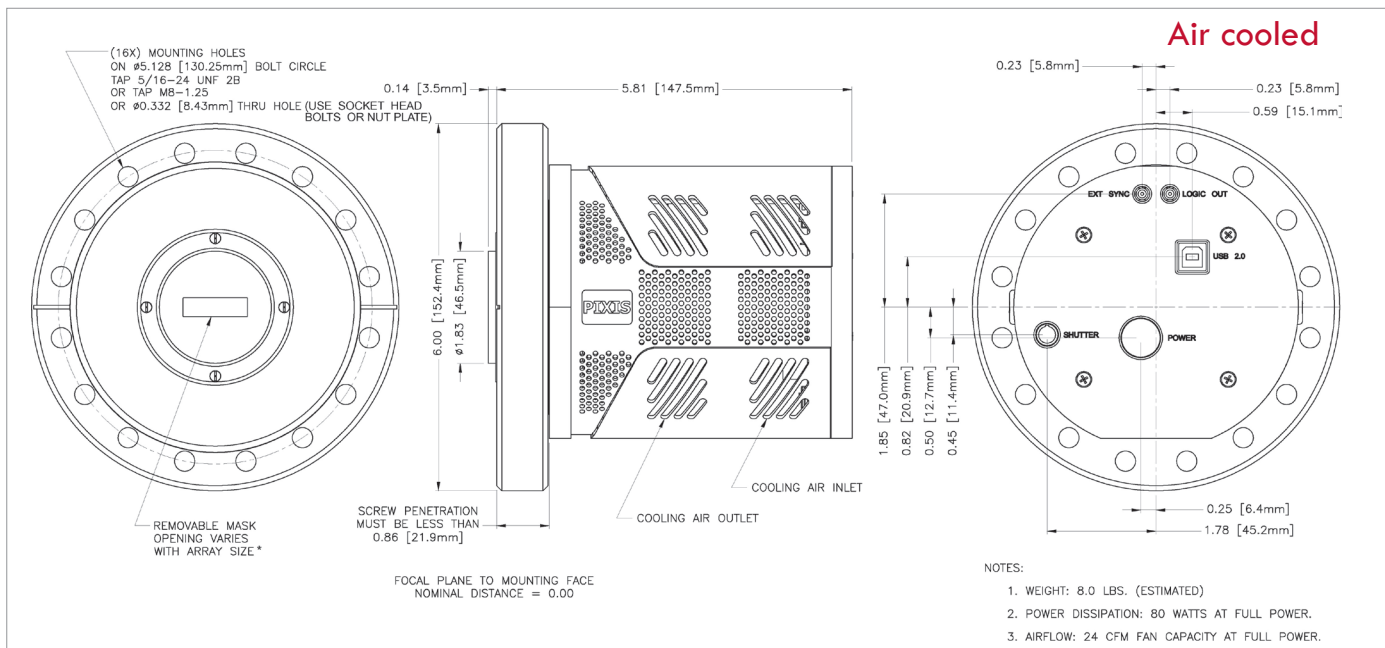
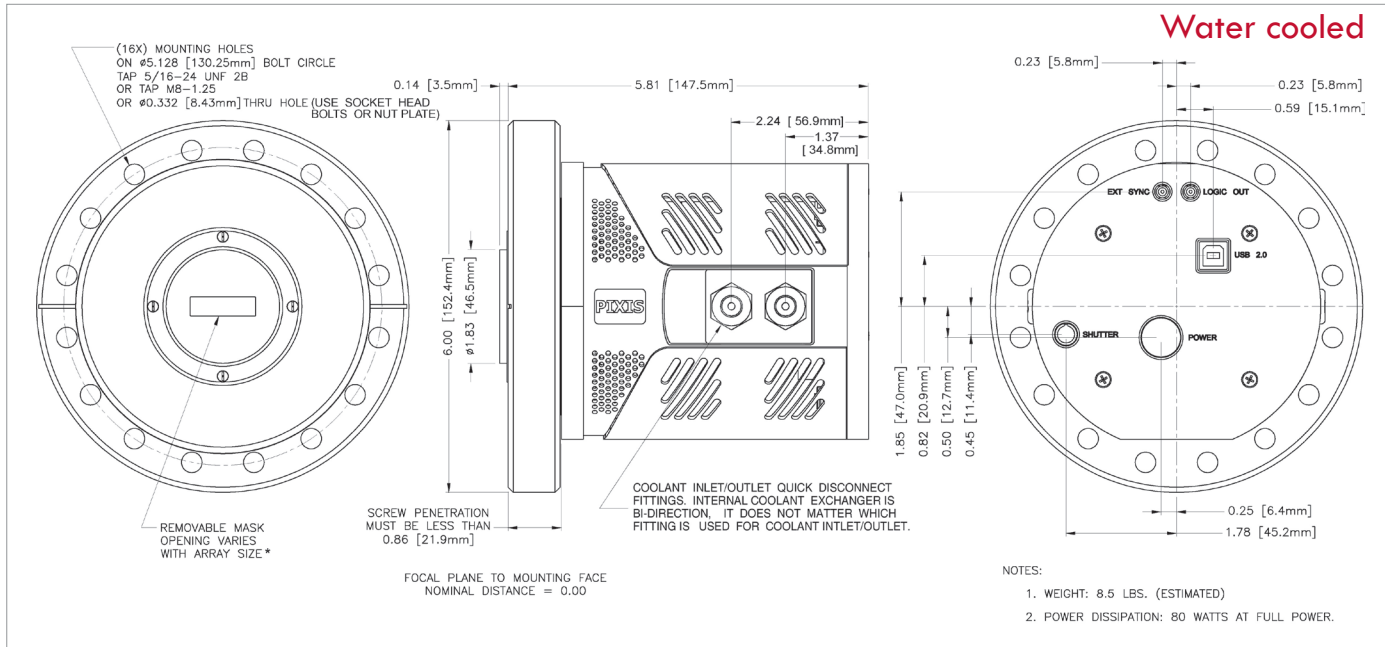
† The weight of the camera is with 6.00" Conflat flange and air cooling.

## Readout Rates

| Binning | @ 2 MHz   | @100 kHz  |
|---------|-----------|-----------|
| 1 x 1   | 2.265 sec | 36.45 sec |
| 2 x 2   | 0.956 sec | 9.521 sec |
| 4 x 4   | 0.458 sec | 2.595 sec |
| 8 x 8   | 0.249 sec | 0.738 sec |
| 16 x 16 | 0.154 sec | 0.288 sec |



### 6" Conflat



| CCD Array   | CCD Image Area<br>inches (mm) | Mask Opening<br>$\pm .001$ inches ( $\pm .0254$ mm) |
|-------------|-------------------------------|---|
| 2048 x 2048 | 1.087 x 1.087 (27.6 x 27.6)   | 1.083 x 1.083 (27.508 x 27.508)                     |