



# TELEDYNE PRINCETON INSTRUMENTS

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## PIXIS: 1024

The PIXIS: 1024 series of cameras from Princeton Instruments (PI) are fully integrated, low noise cameras with 1024 x 1024 resolution designed for quantitative scientific imaging applications from UV to NIR. Based on PI's exclusive XP cooling technology, PIXIS are the only cameras that offer cooling down to -90°C, with an all-metal, hermetically sealed design and the industry's only lifetime vacuum guarantee. High QE and ultra low-noise electronics make the PIXIS: 1024 series of cameras ideal for demanding, low light applications such as astronomy, Bose-Einstein Condensate (BEC), solar cell inspection, chemiluminescence and fluorescence imaging. The exclusive B\_eXcelon and BR\_eXcelon technologies of the PIXIS:1024 deliver the highest sensitivity in the UV-NIR range while suppressing the etaloning that occurs in standard back illuminated CCDs. Dual speed operation at 100kHz or 2MHz enables these cameras to be used both for steady state as well as fast kinetics studies.



FEATURE	BENEFITS
Back-illuminated, deep depletion CCD with eXcelon® technology (BR_eXcelon)	Highest QE in the UV and NIR range; High QE in the NIR range; Eliminates etaloning.
Back-illuminated, eXcelon® technology (B_eXcelon)	Lower dark charge than back-illuminated deep depletion CCDs; Extremely low etaloning.
1024 x 1024 imaging array, 13 µm x 13 µm pixels Scientific grade CCD	High spatial resolution. Low noise, few defects, linear response.
All-metal, hermetic vacuum seals; Lifetime vacuum guarantee	No out-gassing (as in epoxy seals) which can compromise vacuum performance; Worry free operation.
Deep cooling	Low dark noise allows detection of faint signals; CoolCUBE II, a compact room temperature coolant circulator, is available for vibration sensitive environments.
Single fused silica vacuum window	Minimizes reflection losses from UV to IR; No optical losses due to multiple optical surfaces; Optional AR coating and wedge windows available.
Optional UV phosphor coatings	Enhances sensitivity throughout the UV to below 200 nm.
TTL input and output, and shutter control	External control and triggering.
Low noise electronics	Best performance for low light level applications.
Dual digitizers	Dual-speed digitization allows complete freedom to select between "slow operation" for low noise and highest SNR or "fast operation" for rapid image acquisition.
Software selectable system gains	Flexibility to optimize signal-to-noise ratio and dynamic range.
Kinetics	Custom readout mode offers microsecond resolution.
USB2.0 data interface	Plug-and-play operation with desktops or laptops; Optional fiber optic interface for remote operation.
<b>Optional:</b> LightField® (for Windows 8/7, 64-bit) Or WinView/Spec (for Windows 8/7/XP, 32-bit)	Flexible software packages for data acquisition, display and analysis; LightField offers intuitive, cutting edge user interface, IntelliCal® and more.
PICAM (64-bit) / PVCAM (32-bit) software development kits (SDKs)	Compatible with Windows 8/7/XP, and Linux; Universal programming interfaces for easy custom programming.

### Applications:

Astronomy, Photometry, EL/PL Imaging,  
Luminescence & Fluorescence Imaging,  
and Bose-Einstein Condensate (BEC)



## SPECIFICATIONS

	 PIXIS: 1024BR_eXcelon	PIXIS: 1024BR	 PIXIS: 1024B_eXcelon	PIXIS: 1024B/BUV	PIXIS: 1024F
Features	Back-illuminated, deep depletion CCD with eXcelon technology. Highest QE in the UV and the NIR. No etaloning.	Back-illuminated, deep depletion CCD. High QE in the NIR and no etaloning.	Back-illuminated CCD with eXcelon technology. Highest QE in the visible and high QE in the NIR. Extremely low etaloning. 5x - 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible region. Special BUV version offers the highest sensitivity in the UV region.	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.
CCD Image Sensor	Princeton Instruments' proprietary CCD with eXcelon technology, grade 1, NIMO	e2v CCD47-10 back-illuminated deep depletion, grade 1, NIMO	Princeton Instruments' proprietary CCD with eXcelon technology, grade 1, AIMO	e2v CCD47-10 back-illuminated, grade 1, AIMO	e2v CCD47-10 front-illuminated, grade 1, AIMO
Dark current @ -70°C (e-/p/sec)	0.02 (typical) 0.07 (max)	0.02 (typical) 0.07 (max)	0.0004 (typical) 0.001 (max)	0.0004 (typical) 0.001 (max)	0.0002 (typical) 0.0007 (max)
CCD UV coating	Optional UV coating (not needed for BUV version)				
CCD format	1024 x 1024 imaging pixels; 13 x 13 μm pixels; 100% fill factor				
Imaging area	13.3 x 13.3 mm (optically centered)				
Lens mount	Adjustable C-mount with integral 25mm shutter; spectrometer adapter available				
Deepest cooling temperature	-90°C typical; -70°C guaranteed, specified at ambient temperature of +20°C				
Thermostating precision	±0.05°C				
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II liquid circulator available)				
Full well: Single pixel	100 ke- (typical), 60 ke- (min)				
Output node	250 ke- (typical), 220 ke- (min)				
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit				
System read noise @100 kHz	3.0 e- rms (typical), 5 e- rms (max)				
@2 MHz	9.0 e- rms (typical), 15 e- rms (max)				
Vertical shift speed	< 3.2 μsec/row to 18 μsec/row (programmable)				
Non-linearity	<1% @ 100 kHz				
Software selectable gains	1, 2, 4 e-/ADU (typical); available at all speeds				
Operating systems supported	Windows 8/7 (64-bit) and Linux (64-bit), Windows 8/7/XP (32-bit)				
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 to +30°C non-condensing				
Certification	CE				
Dimensions / Weight	16.59 cm (6.53") x 11.81 cm (4.65") x 11.38 cm (4.48") (L x W x H) / 2.27 kg (5 lbs)				

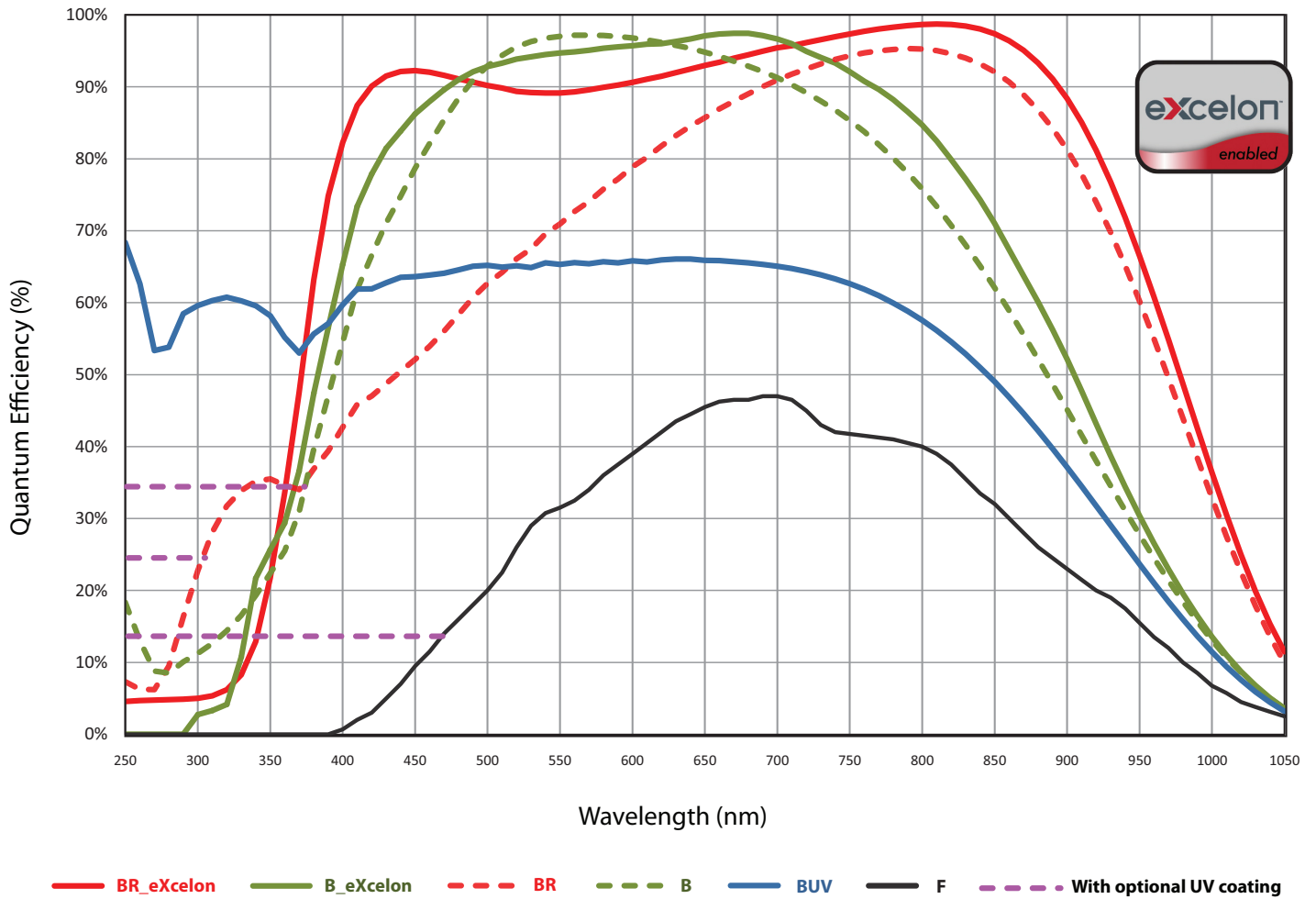
All specifications subject to change

## FRAME RATE

	Readout Time		
	@ 2 MHz	@ 100 kHz	
Binning	1 x 1	0.58 sec	10.0 sec
	2 x 2	0.28 sec	2.8 sec
	8 x 8	0.14 sec	0.85 sec



## QE DATA



**NOTE:**

Graph shows typical Quantum Efficiency (QE) data measured at + 25°C. QE decreases at normal operating temperatures. For the best results for your application, please discuss the specific parameters of your experiment with your sales representative.

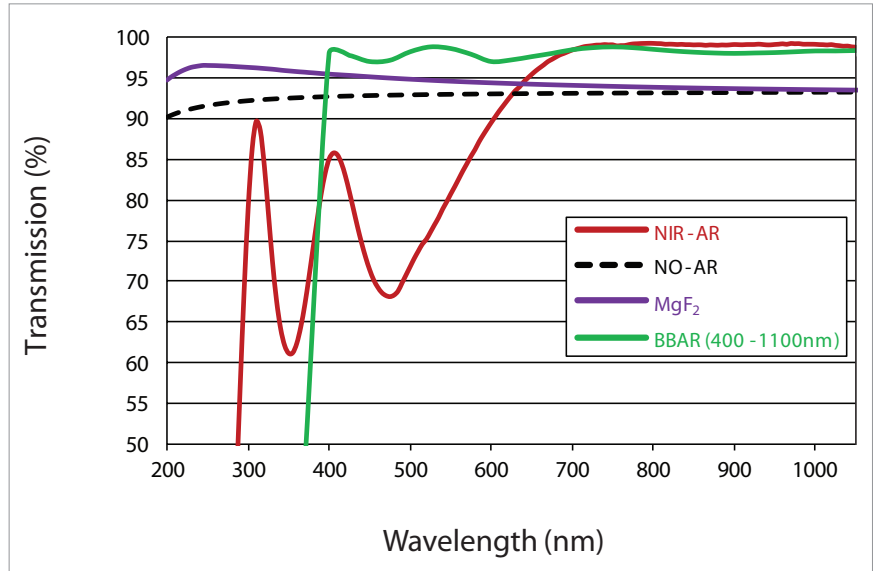


VACUUM WINDOW AR COATINGS

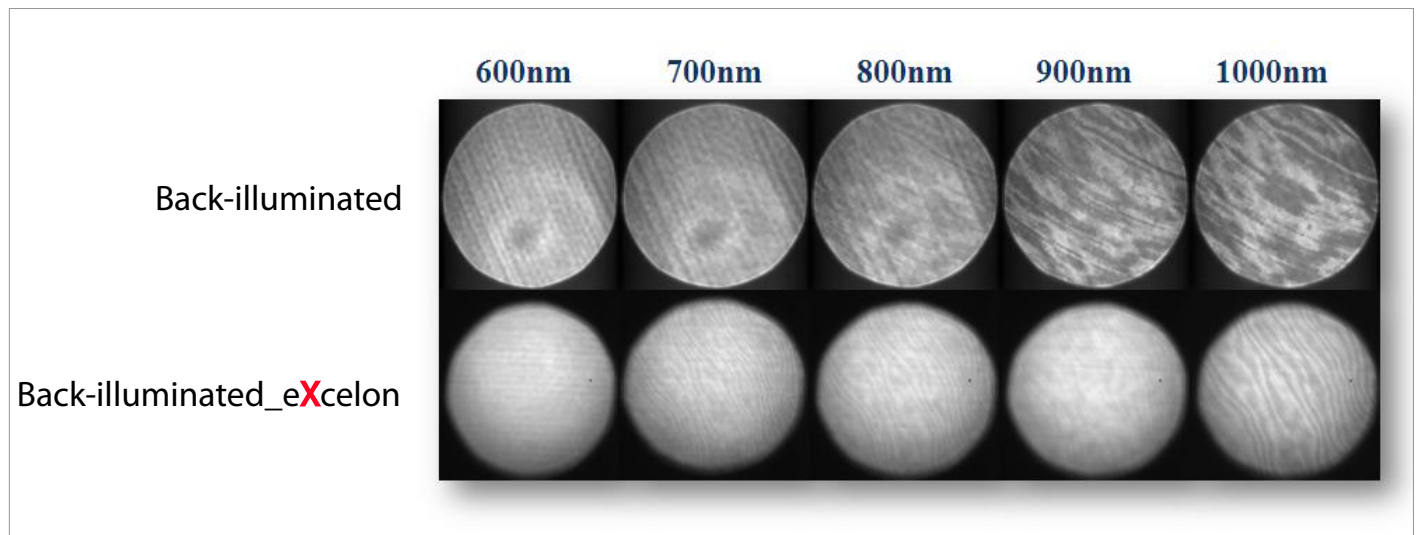
**NOTES:**

- Standard anti-reflection (AR) coating options shown on graph
- Designed by Acton Optics, our BBAR coating offers unmatched performance for 400 nm - 1100 nm
- Custom wedge window options and other AR coatings are also available

*Contact your local sales representative for more information*



eXcelon Performance

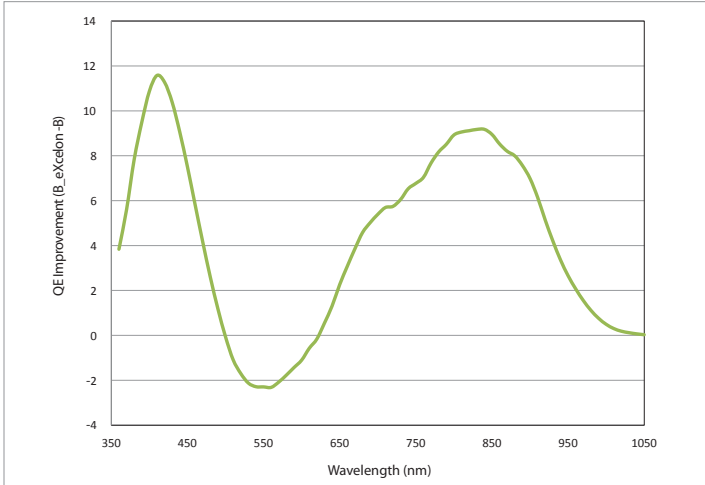


Data taken with white light source through a monochromator comparing etaloning performance of eXcelon vs. back-illuminated CCDs.



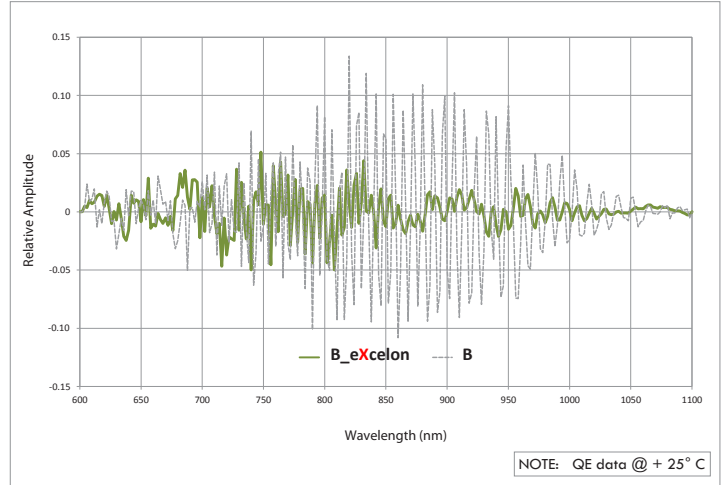
## eXcelon Performance

### QE Improvement (B\_eXcelon vs. B)



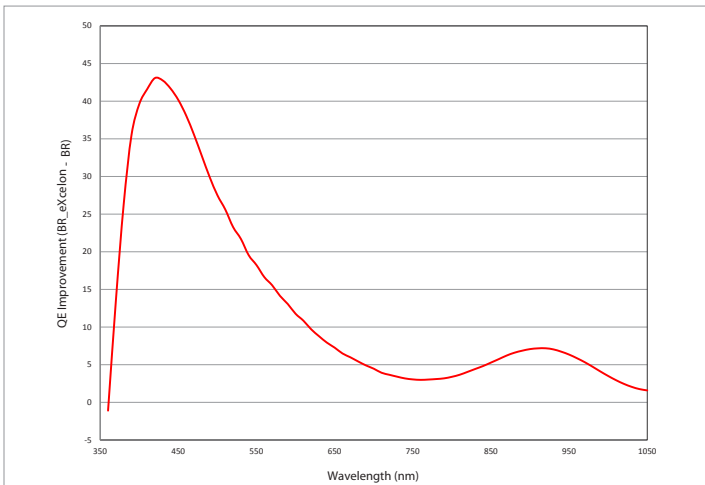
B\_eXcelon provides superior QE over the standard back illuminated ("B") version in the UV-NIR range.

### Etalon Oscillations (B\_eXcelon vs. B)



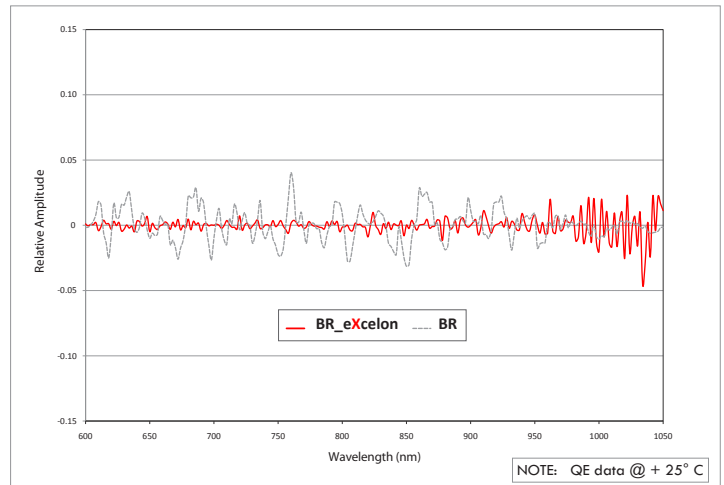
B\_eXcelon provides significantly lower etaloning (unwanted fringes) compared to standard back illuminated ("B") version.

### QE Improvement (BR\_eXcelon vs. BR)



BR\_eXcelon provides superior QE over standard back deep depletion ("BR") version over most of the UV-NIR range.

### Etalon Oscillations (BR\_eXcelon vs. BR)

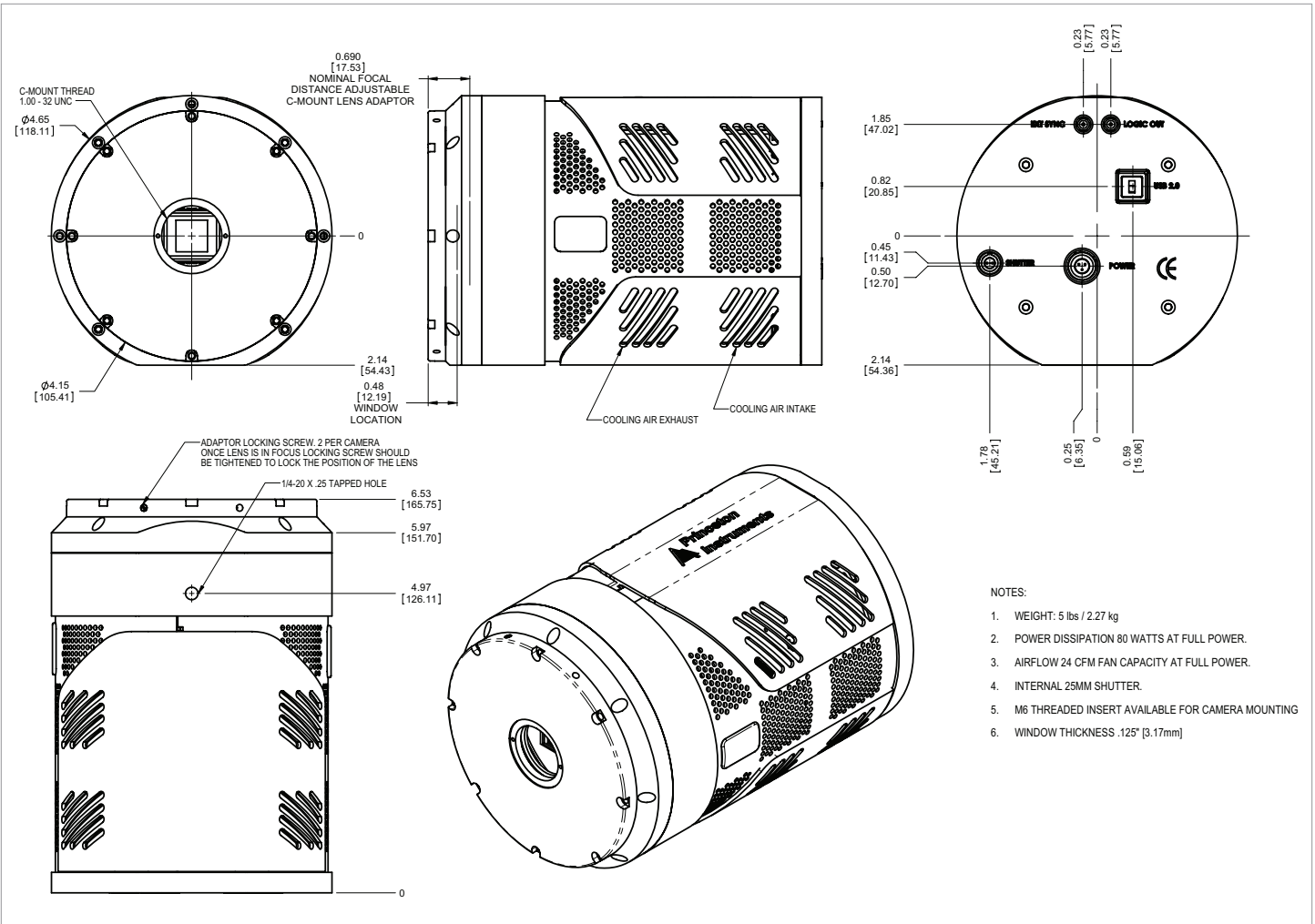


BR\_eXcelon provides significantly lower etaloning (unwanted fringes) compared to standard back deep depletion ("BR") version.



**OUTLINE DRAWING**

**PIXIS: 1024 (AIR COOLED)**





**OUTLINE DRAWING**

**PIXIS: 1024 (LIQUID COOLED)**

