



TELEDYNE PRINCETON INSTRUMENTS

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PIXIS: 2048

The PIXIS: 2048 series of cameras from Princeton Instruments (PI) are fully integrated, low noise cameras designed expressly for quantitative scientific imaging applications. Choose front-illuminated (F), back-illuminated (B/BUV), eXcelon® or back-illuminated deep depletion (BR) versions of the 2048 x 2048 CCD for optimized performance from UV to NIR. Designed utilizing PI's exclusive XP cooling technology, PIXIS are the only cameras that offer cooling up to -70°C, while the all-metal, hermetically sealed design, with the industry's only lifetime vacuum guarantee, ensures maintenance free operation. High QE and ultra low-noise electronics make the PIXIS: 2048 series of cameras ideal for demanding, low light applications such as astronomy, Bose-Einstein Condensate (BEC), solar cell inspection, chemiluminescence and fluorescence imaging. The eXcelon and back-illuminated, deep depletion technology of the PIXIS:2048 delivers the highest sensitivity in the NIR while suppressing the etaloning that occurs in standard back illuminated CCDs. Dual speed operation at 100 kHz or 2 MHz allow these cameras to be used for steady state as well as fast kinetics studies.

FEATURE	BENEFITS
eXcelon® technology	Higher QE in the UV and near IR regions; Extremely low etaloning: 100x lower dark charge than back-illuminated deep depletion.
2048 x 2048 imaging array; 13.5µm x 13.5µm pixels Scientific grade CCD	High spatial resolution and large field of view 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.
Large 45 mm integrated shutter	No vignetting even at low f-numbers. Easily acquire bias and dark reference.
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.
Optional: 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:

semiconductor failure analysis, astronomy,
photometry, laser beam profiling,
luminescence and fluorescence imaging, and
Bose-Einstein Condensate (BEC)



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SPECIFICATIONS

	PIXIS: 2048F	PIXIS: 2048B_eXcelon	PIXIS: 2048B	PIXIS: 2048BUV/BR*
Features	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.	Back-illuminated CCD. Highest sensitivity in the visible region. High sensitivity in the NIR. Extremely low etaloning. 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible region.	UV enhanced, back-illuminated (BUV) and back-illuminated, deep depletion (BR) CCDs. BUV has highest sensitivity in 200 - 375nm range and is ideal for UV applications. BR CCD has highest sensitivity & extremely low etaloning, and is ideal for NIR applications.
CCD Image Sensor	e2v CCD42-40 front-illuminated, grade 1, AIMO	Princeton Instruments' proprietary CCD, grade 1, AIMO	e2v CCD42-40 back-illuminated, grade 1, AIMO	e2v CCD42-40 back-illuminated and back-illuminated deep depletion, grade 1, NIMO
Dark current e-/p/s @ -60°C	0.002 (typical) 0.006 (max)	0.005 (typical) 0.02 (max)	0.005 (typical) 0.02 (max)	0.2 (typical) 2 (max)
CCD UV coating	Optional UV coating			
Quantum efficiency	See graph, next page			
CCD format	2048 x 2048 imaging pixels; 13.5 x 13.5-µm pixels; 100% fill factor			
Imaging area	27.6 x 27.6 mm (optically centered)			
Lens mount	F-mount with integral 45 mm shutter			
Deepest cooling temperature	< -70°C (typical), -60°C (guaranteed) with CoolCUBE II liquid circulator < -65°C (typical), -55°C (guaranteed) with air			
Thermostating precision	±0.05°C			
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II required)			
Full well: Single pixel Output node	100 ke- (typical), 80 ke- (min) 1000 ke- (typical), 800 ke- (min)			
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit			
System read noise @ 100 kHz @ 2 MHz	3.5 e- rms (typical), 5 e- rms (max) 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 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	19.51 cm (7.67") x 11.81 cm (4.65") x 11.38 cm (4.48") (L x W x H) / 2.5 kg (5.5 lbs)			

All specifications subject to change

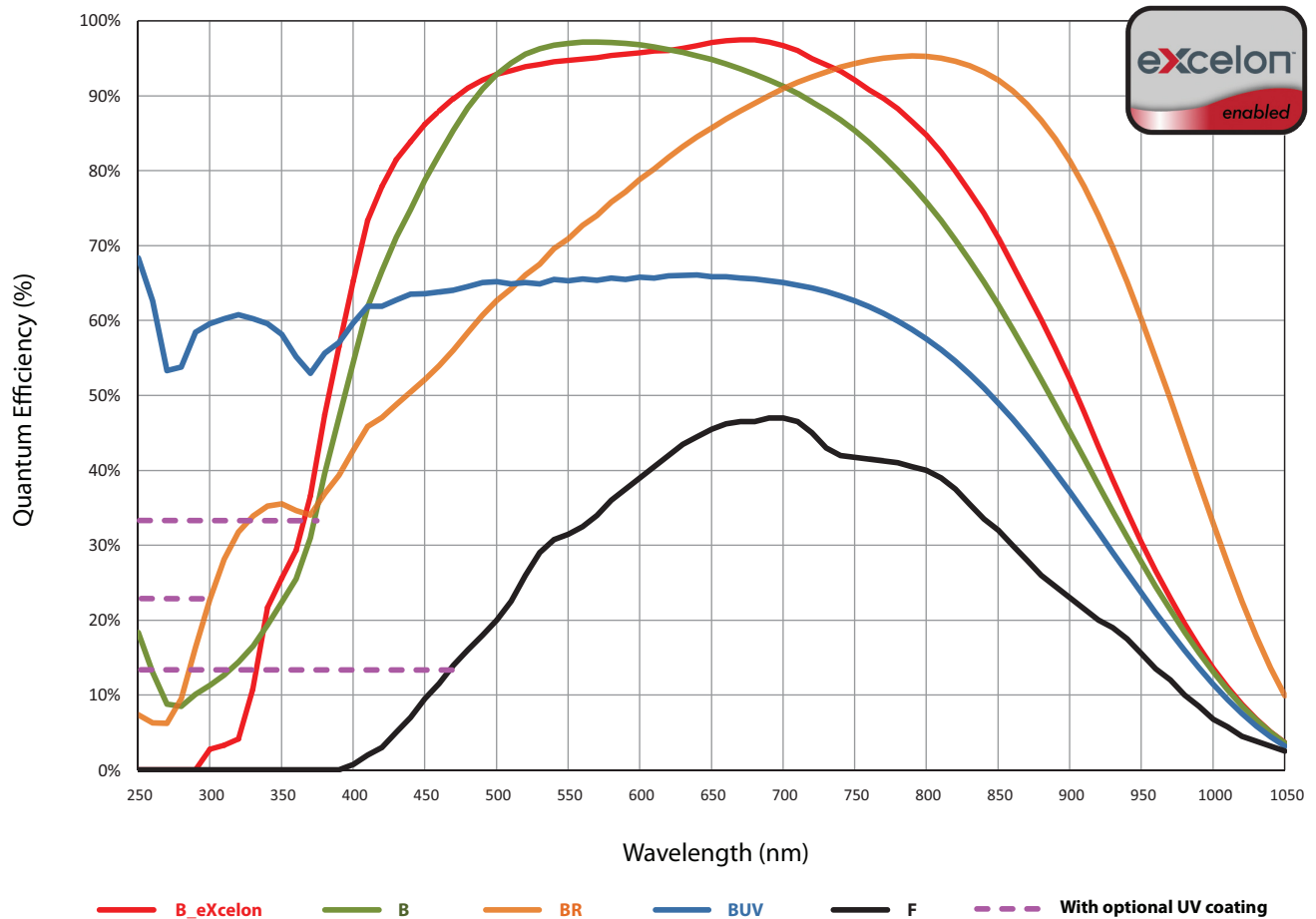
* Contact your local sales representative for information on the availability of the BR model.

FRAME RATE

Binning	Readout Time	
	@ 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



QE DATA

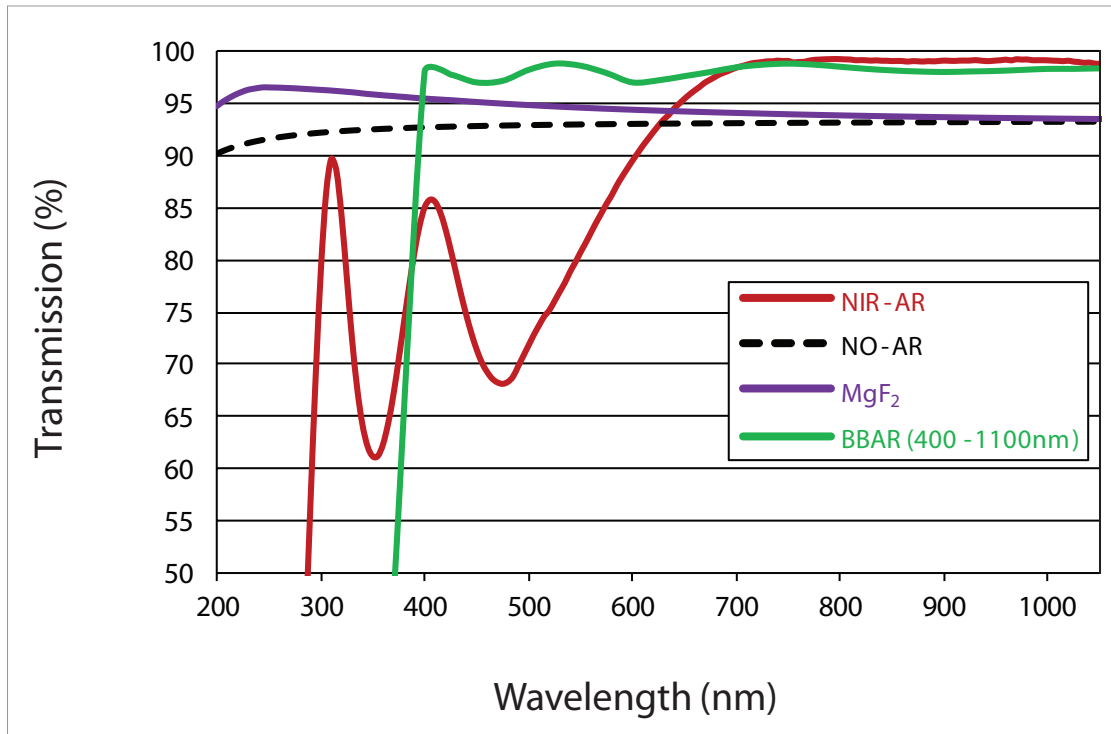


NOTE:

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



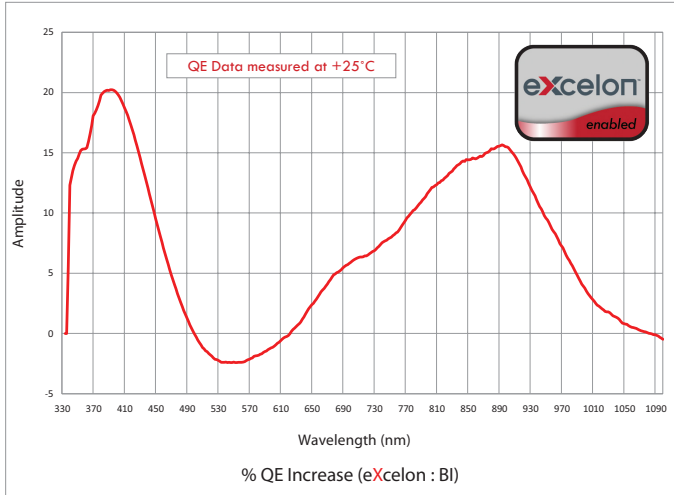
NOTES:

- 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

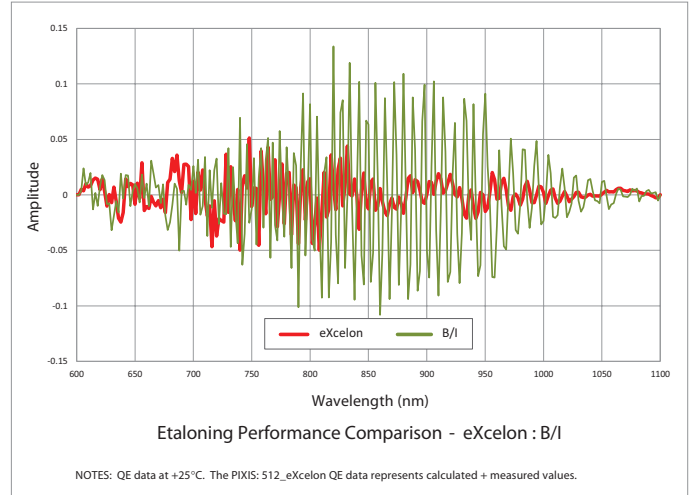
Contact your local sales representative for more information



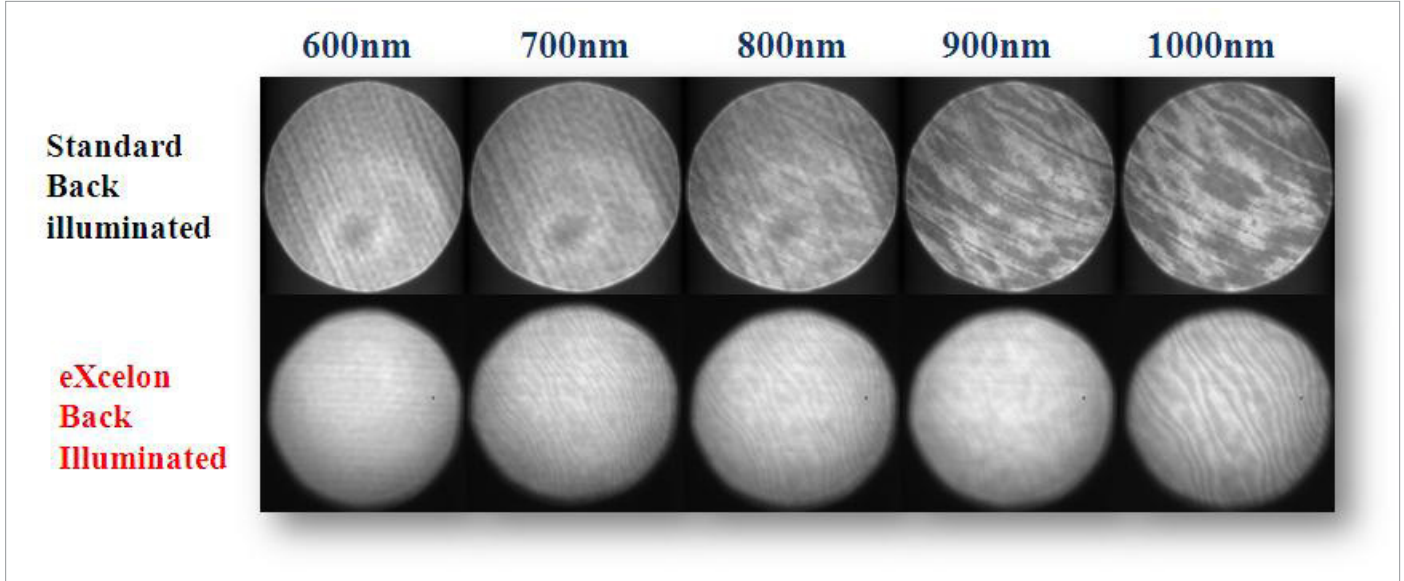
eXcelon Performance



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



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



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



PIXIS: 2048 (AIR COOLED)

