



SPEC-10: 400

The Spec-10: 400 series of cameras from Princeton Instruments is designed with extremely low noise electronics and 1340 x 400 pixel resolution for quantitative scientific spectroscopy applications from UV to NIR. Spec-10 cameras provide software-selectable gains that permit operation in either high-capacity mode (absorbance spectroscopy) or high-sensitivity mode (Raman or fluorescence spectroscopy), delivering sensitivity and dynamic range unmatched by industry-standard 1024 pixel CCDs. Cooling the CCD to cryogenic temperatures effectively eliminates dark noise and provides the highest possible signal to noise ratio, even at low light levels. Princeton Instruments' exclusive eXcelon technology delivers the highest sensitivity in the UV and NIR while suppressing etaloning that occurs in standard back-illuminated deep depletion or back-illuminated CCDs.

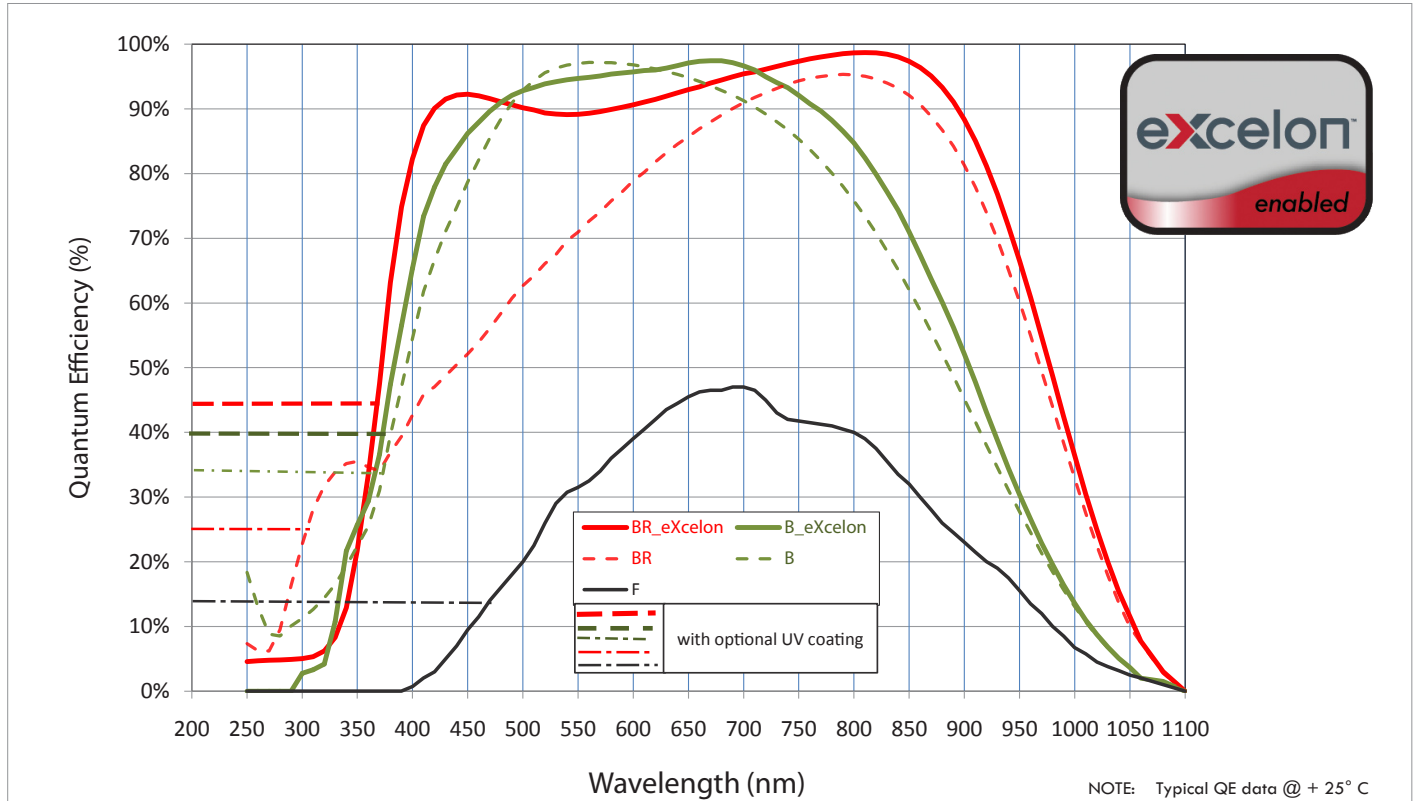
FEATURE	BENEFITS
Back-illuminated, deep depletion CCD with eXcelon technology (BR_eXcelon)	Highest QE in the UV and NIR range; High QE in the visible range; Eliminates etaloning
Back-illuminated, eXcelon technology (B_eXcelon)	Lower dark charge than back-illuminated deep depletion CCDs; Extremely low etaloning
1340 x 400 imaging array	Provides highest level of resolution for demanding applications
20 x 20 μm pixel	Small pixel size supports high resolution
Back-illuminated AR-coated CCD with single fused silica vacuum window *	High quantum efficiency for low-light applications in the ultraviolet
Cryogenic cooling	Effective elimination of dark noise, even for long exposure times
Software-selectable amplifiers	Exclusive feature provides highest level of sensitivity and dynamic range for absorbance, Raman, and fluorescence applications
Standard spectrometer interface	Easily interfaces with most spectrometers
Dual-digitizer option	Multiple-speed digitization allows complete freedom to select between "slow operation" for low noise and highest SNR (signal-to-noise ratio) or "fast operation" for rapid image acquisition
USB 2.0 interface configuration	Seamless, plug-and-play connection to PC notebooks and desktops; Easy OEM integration
PCI interface configuration	Industry standard for fast, reliable data transfer
WinSpec (for Windows XP/7; 32-bit) and PVCAM®	Offers easy-yet-sophisticated Windows® GUI controls; Powerful, yet easy-to-use software packages for automated data acquisition, display and analysis; Universal programming interface for easy custom programming
Linux® drivers and SITK™ plug-in for National Instruments' LabVIEW™	Extends system utility

* AR coatings for broad- and narrowband windows, and wedged or MgF₂ windows, are available for all models. Contact your Princeton Instruments representative for more details.



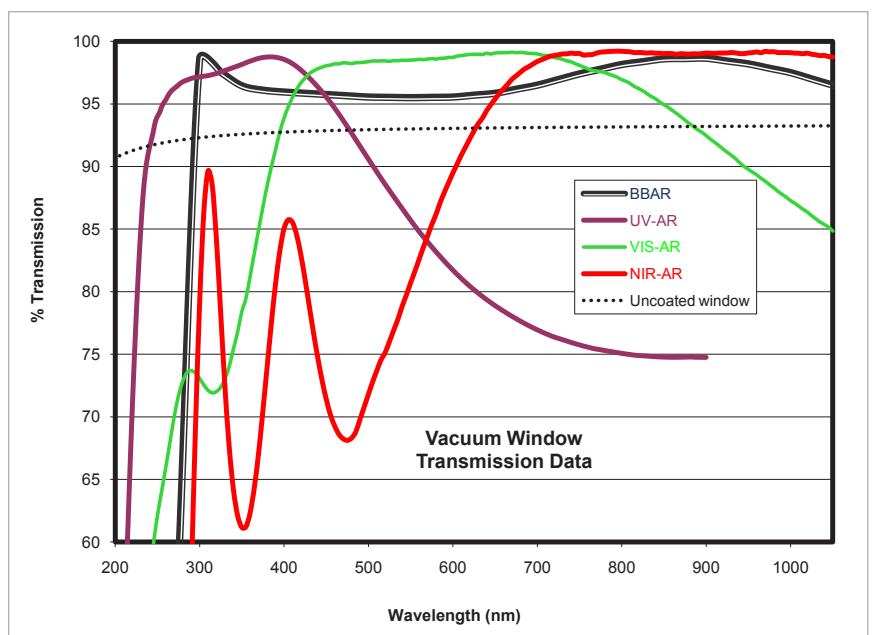
	SPEC-10: 400BR_eXcelon	SPEC-10: 400BR	SPEC-10: 400B_eXcelon	SPEC-10: 400B	SPEC-10: 400F
Features	Back-illuminated, deep depletion CCD with eXcelon technology. Highest QE in the UV and the NIR. No etaloning.	Back-illuminated, deep depletion CCD. High QE in the NIR and no etaloning.	Back-illuminated CCD with eXcelon technology. Highest QE in the visible and high QE in the NIR. Extremely low etaloning. 50x - 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible 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	Princeton Instruments' proprietary CCD; back-illuminated deep depletion, grade 1, NIMO	Princeton Instruments' proprietary CCD with eXcelon technology, grade 1, AIMO	Princeton Instruments' proprietary CCD; back-illuminated, grade 1, AIMO	Princeton Instruments' proprietary CCD; front-illuminated, grade 1, AIMO
Dark current @ -120° C (e-/p/hr)	0.3 (typical) 2.5 (max)	0.3 (typical) 2.5 (max)	0.3 (typical) 1.0 (max)	0.3 (typical) 1.0 (max)	0.3 (typical) 1.0 (max)
	Front-illuminated		Back-illuminated		
	Typical	Maximum	Typical	Maximum	
System Read Noise @ 100 kHz @ 1 MHz @ 2 MHz	3 e-rms 6 e-rms 12 e-rms	4 e-rms 8 e-rms 15 e-rms	3.5 e-rms 8 e-rms	5 e-rms 10 e-rms	
CCD format	1340 x 400, 20 x 20 μm pixels with 100% fill factor				
Imaging area	26.8 x 8.0 mm (optically centered)				
Vertical Shift Rate	< 15 μsec/row (programmable)				
Spectral Rate @ 100 kHz @ 1 MHz @ 2 MHz @ 2MHz	65 spectra/sec (FVB) 350 spectra/sec (FVB) 450 spectra/sec (FVB) 1000 spectra/sec (1.0 mm high)				
Spectrometric Well Capacity High Sensitivity High Capacity	300 ke- (typical), 250 ke- (minimum) 1 Me- (typical), 800 ke- (minimum)				
Deepest Cooling Temperature	-120° C (typical),				
Thermostating Precision	±0.05° C across entire temperature range				
Dynamic Range	16 bits				
Nonlinearity @ 100 kHz @ 1 MHz @ 2 MHz	< 1% < 2% < 2%				

NOTE: All specifications subject to change



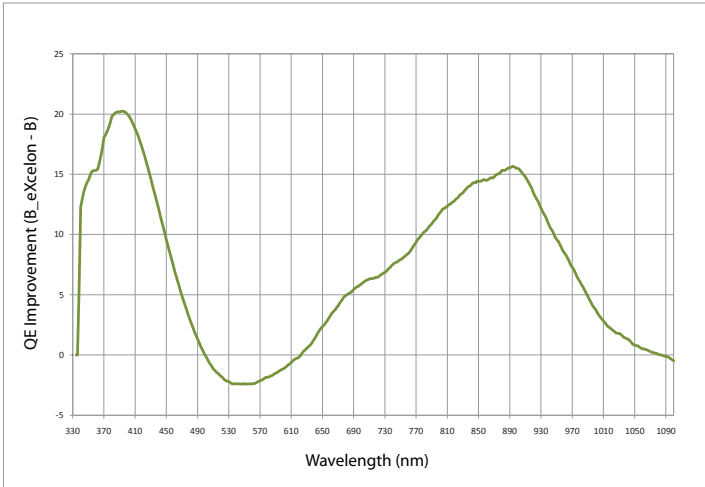
VACUUM WINDOW AR COATINGS

NOTE:
Standard anti-reflection (AR) coatings shown. Custom AR coatings and wedge window options are also available. Please contact your local sales representative for more information.



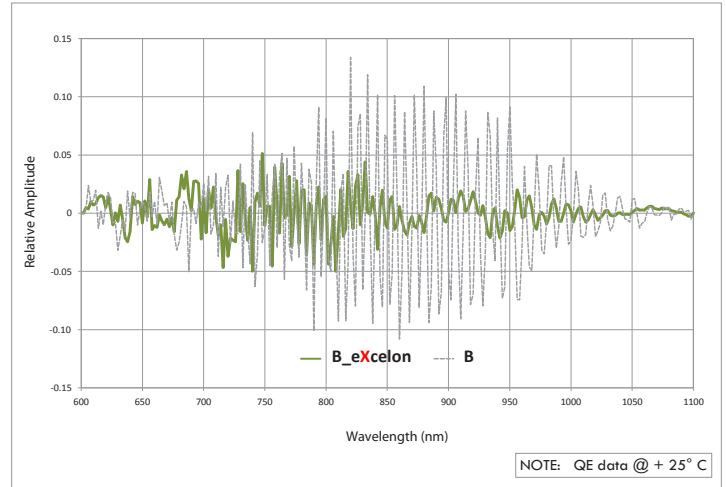
eXcelon Performance

QE Improvement (B_eXcelon vs. B)



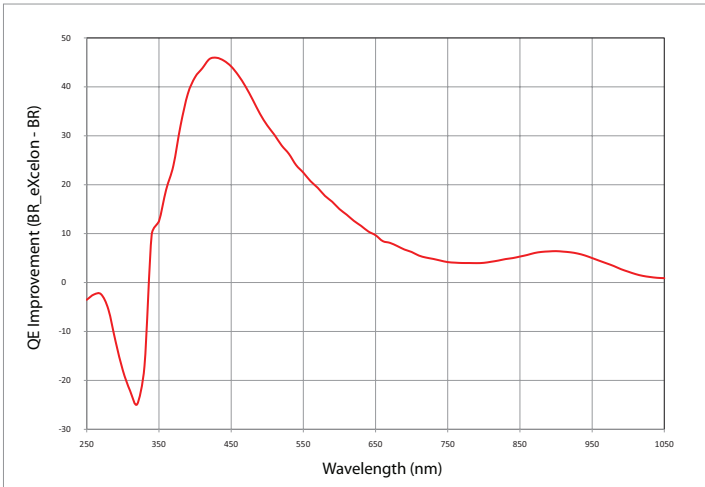
B_eXcelon provides superior QE over the standard back illuminated ("B") version in the UV-NIR range.

Etalon Oscillations (B_eXcelon vs. B)



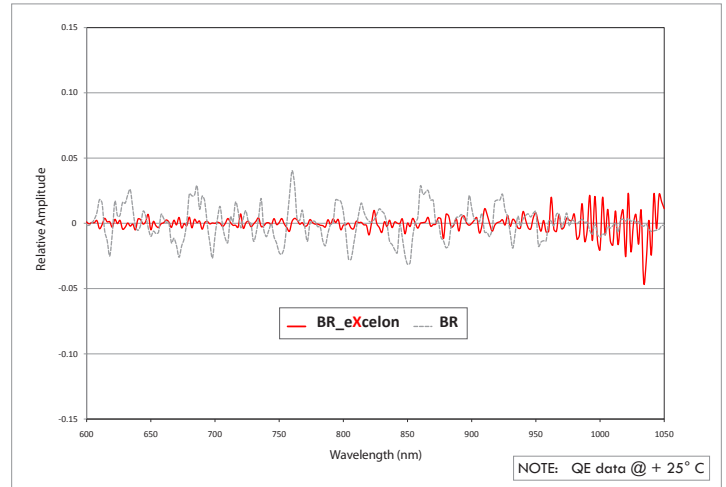
B_eXcelon provides significantly lower etaloning (unwanted fringes) compared to standard back illuminated ("B") version.

QE Improvement (BR_eXcelon vs. BR)



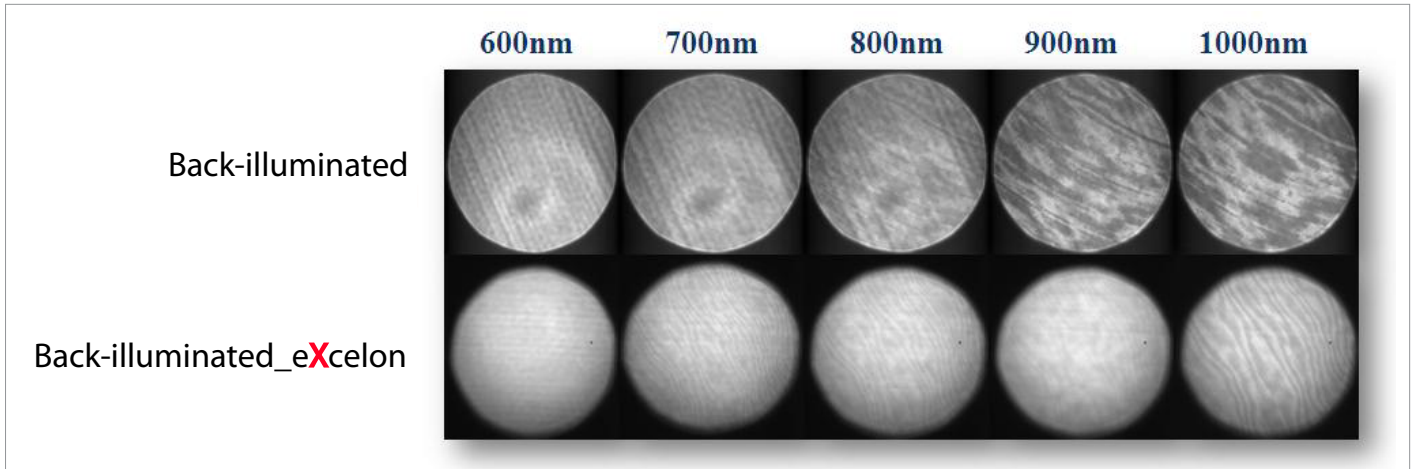
BR_eXcelon provides superior QE over standard back deep depletion ("BR") version over the entire UV-NIR range.

Etalon Oscillations (BR_eXcelon vs. BR)



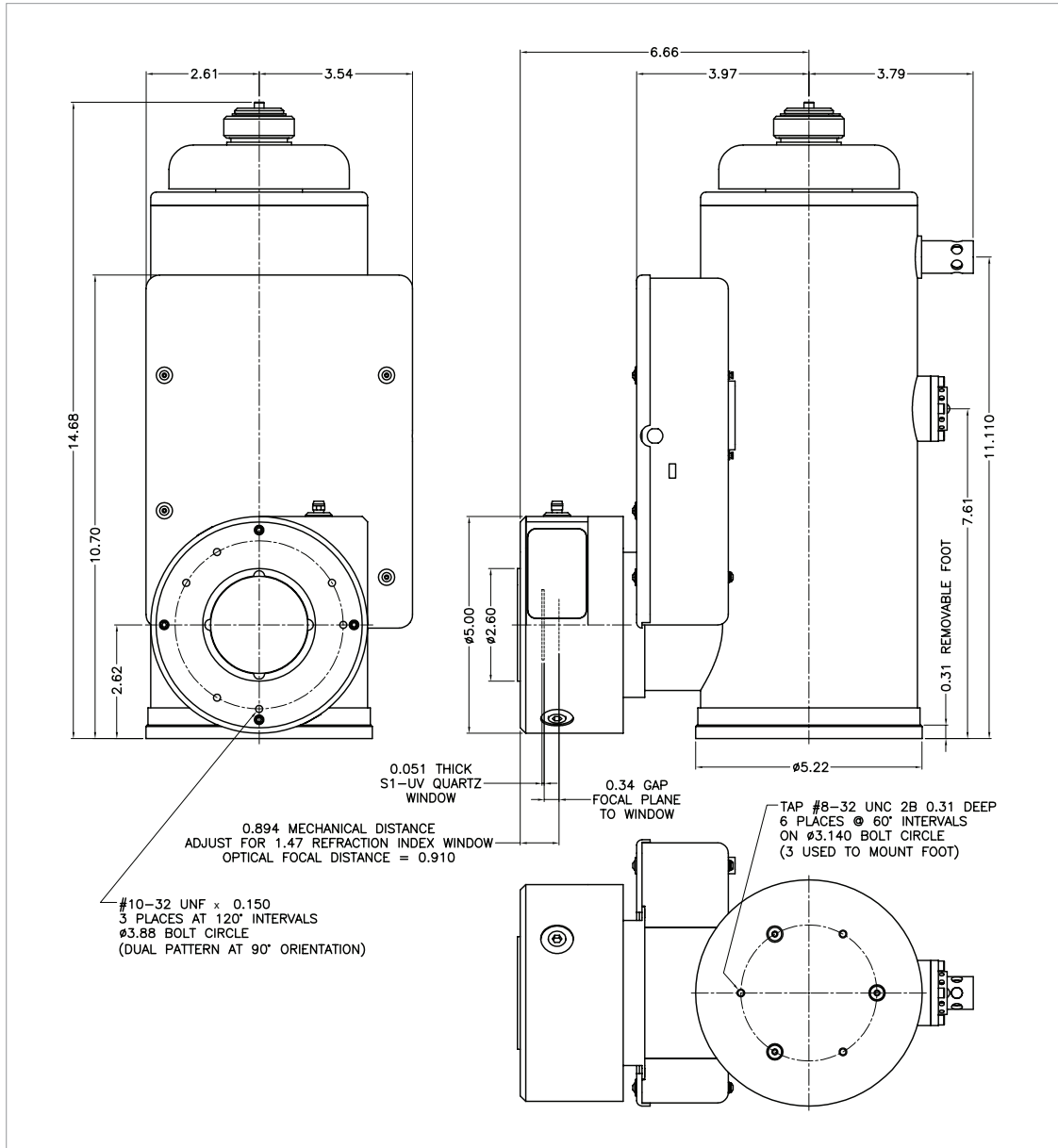
BR_eXcelon eliminates the residual etaloning observed in the standard back-illuminated deep depletion ("BR") version.

eXcelon Performance



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

SPEC-10: 400 WITH SHUTTER



SPEC-10: 400 WITHOUT SHUTTER

