



PI•SX:2048

2048 x 2048 imaging array | 13.5 x 13.5- μ m pixels

The PI•SX:2048 from Princeton Instruments is a high-sensitivity, back-illuminated camera that incorporates a CCD without AR coating for very low energy x-ray imaging. With 13.5 x 13.5-micron pixels and 100% fill factor, this system provides a large imaging area with high spatial resolution. The Conflat® flange and high-vacuum-seal design make the system well suited for deep-vacuum applications such as x-ray microscopy. The thermoelectrically cooled option provides maintenance-free operation, whereas the LN-cooled option provides extremely low dark current for long exposures.

Features	Benefits
Back-illuminated CCD, no AR coating, Direct-detection technology	Provides very low x-ray flux imaging, high sensitivity, and high spatial resolution
Dual-speed, 16-bit digitization	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, readout speeds, and output amplifiers	Allows optimization of system performance (lowest noise to widest dynamic range)
2048 x 2048 imaging array 13.5 x 13.5- μ m pixels	Largest available area with no AR coating for x-ray imaging
Flexible binning and readout	Increases SNR and frame rate
Cryogenic cooling option (liquid nitrogen)	Allows long exposures and very low dark current
Thermoelectric cooling option	Maintenance-free operation in very deep vacuum
Conflat vacuum interface	Industry-standard, high-vacuum compatibility
PCI interface	Industry standard for fast data transfer over long distances
WinView and PVCAM®	Offers powerful, easy-to-use set of Windows® GUI controls Automates data acquisition, analysis, and display
Linux® drivers and SITK™ plug-in for National Instruments' LabVIEW™	Extends system utility

Specifications

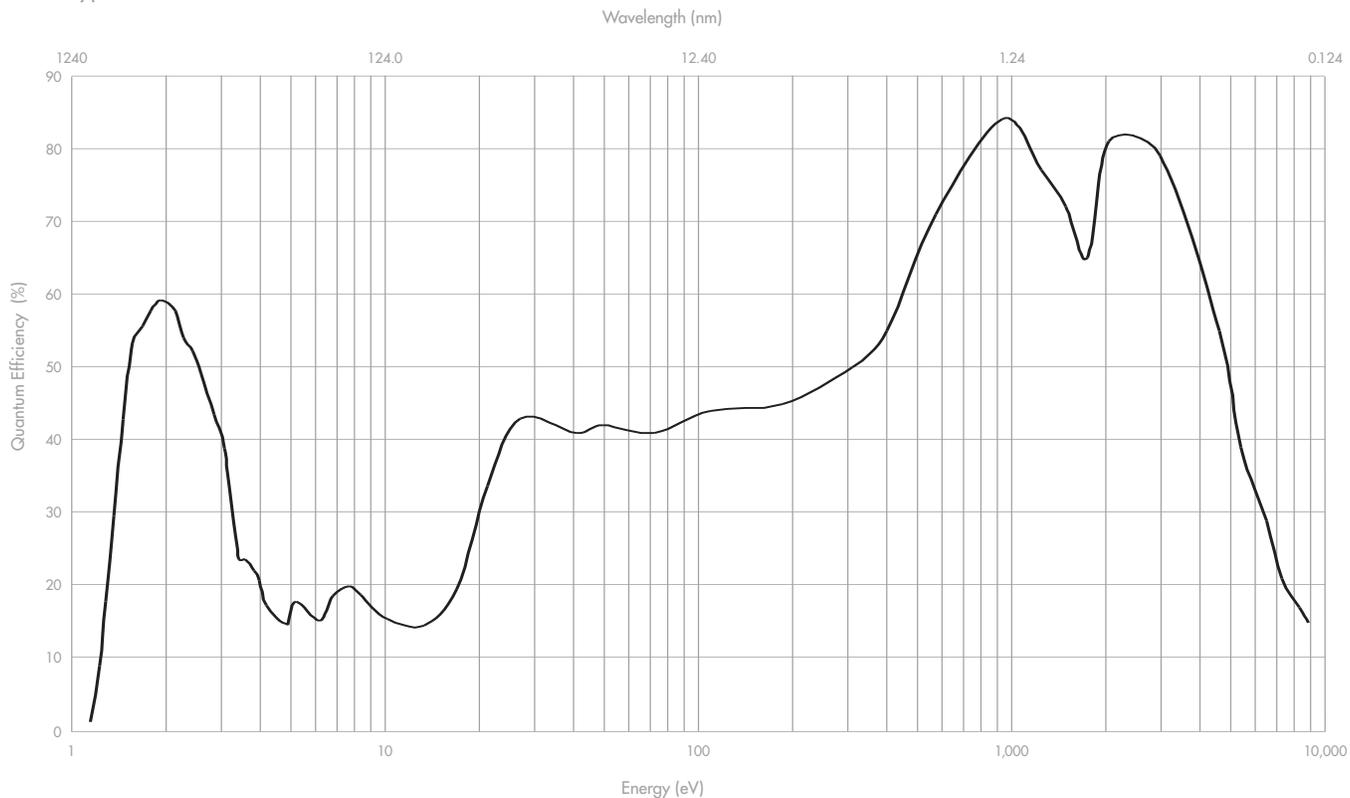
CCD image sensor	E2V CCD42-40; scientific-grade, MPP, back-illuminated device without AR coating				
CCD format	2048 x 2048 imaging pixels 13.5 x 13.5- μ m pixels 100% fill factor 27.6 x 27.6-mm imaging area (optically centered)				
Grade	Grade 1				
	Minimum		Typical		Maximum
			low noise	high capacity	low noise high capacity
CCD read noise			3 e- rms	6 e- rms	4.5 e- rms
System read noise					
@ 50-kHz digitization			3.5 e- rms	11 e- rms	5.5 e- rms 13 e- rms
@ 100-kHz digitization			5.5 e- rms	13 e- rms	7 e- rms 15 e- rms
@ 1-MHz digitization			9 e- rms	25 e- rms	12 e- rms 30 e- rms
Single-pixel full well	80 ke-		100 ke-		
Binned full well	low noise	high capacity	low noise	high capacity	
	100 ke-	700 ke-	150 ke-	800 ke-	
Dark current					
@ -45°C operation			0.05 e-/p/s		0.1 e-/p/s
@ -55°C operation			0.015 e-/p/s		0.03 e-/p/s
@ -110°C operation			0.5 e-/p/hr		1.0 e-/p/hr
Deepest cooling temperature					
thermoelectric (air)	-40°C		-45°C		
thermoelectric (chilled water)	-45°C		-55°C		
cryogenic (liquid nitrogen)	-100°C		-110°C		
Outputs	Low-noise (high-sensitivity) or high-capacity amplifier; user selectable				
Software-selectable gains (@100kHz)	High e-/ADU		Mid e-/ADU		Low e-/ADU
low-noise mode	1.25		2.5		5.0
high capacity mode	5.0		10.0		20.0
Nonlinearity @ 100 kHz	<2%				
Dynamic range	16 bits				
Scan rates	"100 kHz / 1 MHz" or "50 kHz / 1 MHz"				
Vertical Shift time	96.2 μ sec				
Thermostating precision	\pm 0.05°C across entire temperature range				
LN hold time	>25 hours				



Note: Specifications are subject to change.
*The minimum temperature attainable is dependent on the vacuum condition and can be lower with deeper vacuum.

Princeton Instruments PI•SX:2048

Typical QE from 1 eV to 10 keV



		Readout Time		
		1 MHz	100KHz	50 KHz
Binning	1 x 1	4.48 sec	42.76 sec	84.77 sec
	2 x 2	1.92 sec	12.37 sec	22.52 sec
	4 x 4	824.53 msec	3.75 sec	6.33 msec