Princeton Instruments

a division of Roper Scientific, Inc.

PI•SX:1300

1340 x 1300 imaging array | 20 x 20-μm pixels

The PI•SX:1300 is a high-sensitivity camera system featuring a back-illuminated CCD designed exclusively for Princeton Instruments. The 1340 x 1300 imaging array without AR coating and 20 x 20-micron pixels make the device ideal for very low energy x-ray imaging. The Conflat® flange and high-vacuum-seal design are well suited for deep-vacuum applications. The thermoelectrically cooled option provides maintenance-free operation, whereas the LN-cooled option provides extremely low dark current to allow 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
1340 x 1300 imaging array 20 x 20-μm pixels	"Princeton Instruments exclusive" CCD provides large image area
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)
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
"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 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	Princeton Instruments exclusive; scientific-grade, MPP, back-illuminated device without AR coating

CCD format	1340 x 1300 imaging pixels 20 x 20-µm pixels 100% fill factor 26.8 x 26.0-mm imaging area (optically centered)

Grade	Grade 1

	Minimum		Typical		Maximum	
CCD read noise			2 e- rms			
System read noise			low noise	high capacity	low noise	high capacity
@ 50-kHz digitization			2.8 e- rms	6 e- rms	4 e- rms	8 e- rms
@ 100-kHz digitization			3 e- rms	10 e- rms	5 e- rms	12 e- rms
@ 1-MHz digitization			8 e- rms	18 e- rms	10 e- rms	20 e- rms
Single-pixel full well	200 ke-		300 ke-			
Output amplifier	low noise	high capacity	low noise	high capacity		
	200 ke-	650 ke-	250 ke-	800 ke-		
Dark current						
@ -45°C operation			0.08 e-/p/s		0.2 e-/p/s	
@ -55°C operation			0.05 e-/p/s		0.10 e-/p/s	
@ -110°C operation			0.5 e-/p/hr		1 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	1.2	2.5	5.0
high-capacity mode	2.7	5.5	11.0

Nonlinearity @ 100 kHz	<2%
Dynamic range	16 bits
Scan rates	"100 kHz / 1 MHz" or "50 kHz / 1 MHz"
Vertical Shift Rate	48.2 µsec
Thermostating precision	±0.05°C across entire temperature range
LN hold time	>25 hours

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

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Typical QE from 1 eV to 10 keV
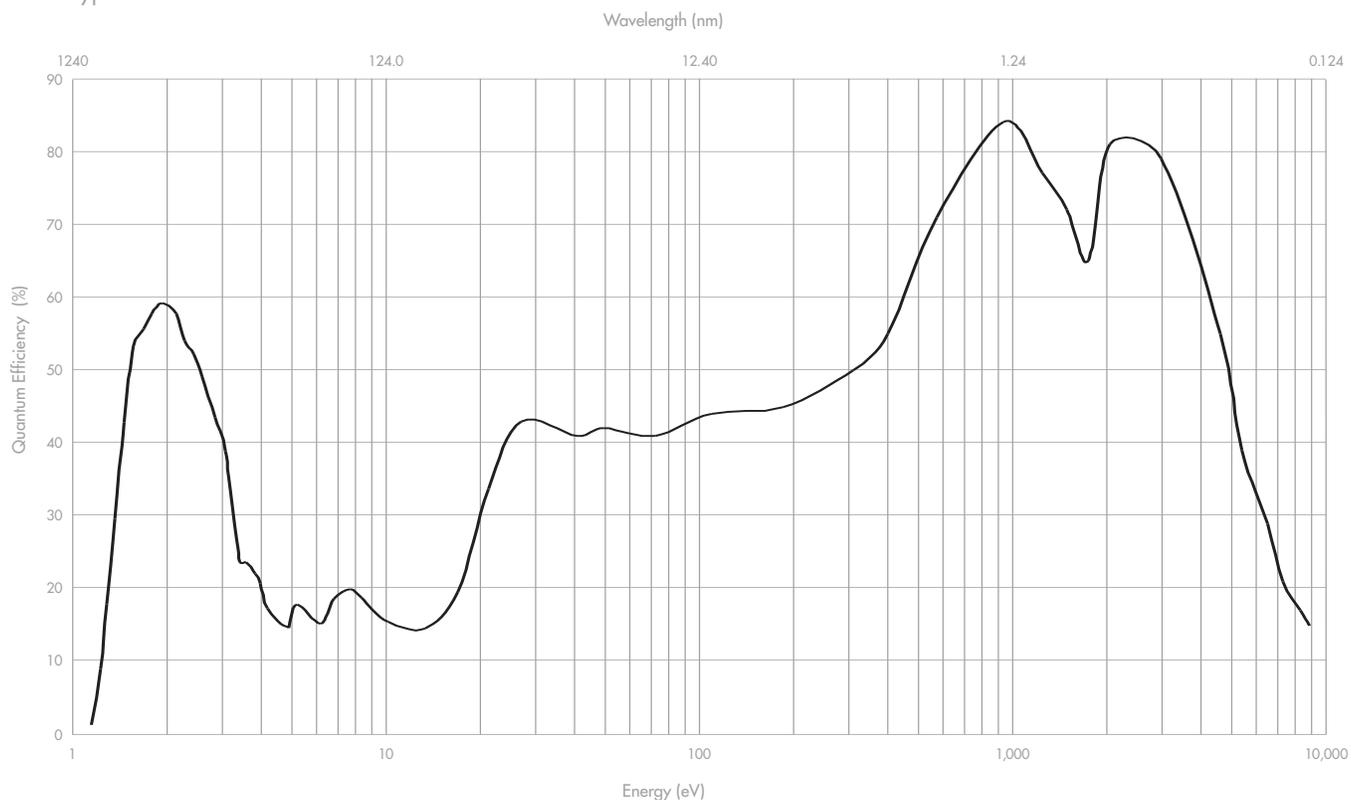
Readout Time

Binning	1 MHz	100KHz	50 KHz
1 x 1	1.82 sec	16.74 sec	32.59 sec
2 x 2	636.09 msec	4.39 sec	8.36 sec
4 x 4	273.57 msec	1.23 sec	2.22 msec