...SEE the Future

Princeton Instruments

PI-SX: 1300

1340 x 1300 imaging array | 20 x 20 µm pixels

The Princeton Instruments PI-SX: 1300 is a high-sensitivity camera system featuring an exclusive back-illuminated CCD. The 1340 x 1300 imaging array without AR coating and 20 x 20 µm 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.

Applications: X-ray imaging, X-ray microscopy, EUV lithography, X-ray plasma diagnostics

Features	Benefits
Back-illuminated CCD, no AR coating, direct detection technology	Provides very low X-ray flux and energy imaging, high sensitivity and high spatial resolution
1 Mhz / 16-bit readout **100 kHz / 16-bit readout**	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 for each digitization speed	Allows optimization of system performance for lowest noise to widest dynamic range
1340 x 1300 image area, 20 x 20 µm pixels	"Princeton Instruments exclusive" CCD provides large image area
Flexible user selectable binning and readout	Total flexibility to optimize experiments and SNR
Cryogenic cooling option (liquid nitrogen)	Allows long exposures and very low dark current
Thermoelectric cooling option	Maintenance-free operation in deep vacuum
"PCI Interface" configuration	Industry standard for fast data transfer over long distances
"USB 2.0 interface" configuration	Seamless, plug-and-play connection to PC notebooks and desktops Easy OEM integration
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

Readout Rates

Binning	@ 1 MHz	@ 100 kHz	@ 50 kHz
1 x 1	1.82 msec	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

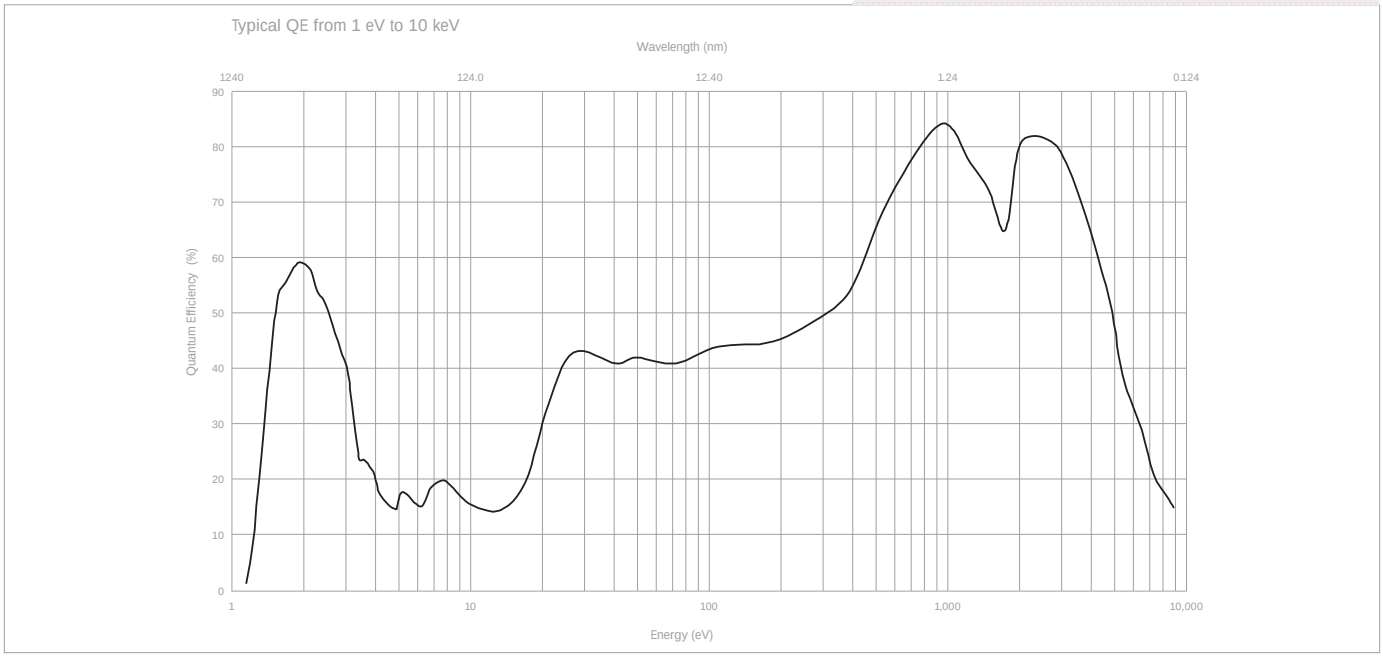
PI-SX: 1300 Specifications

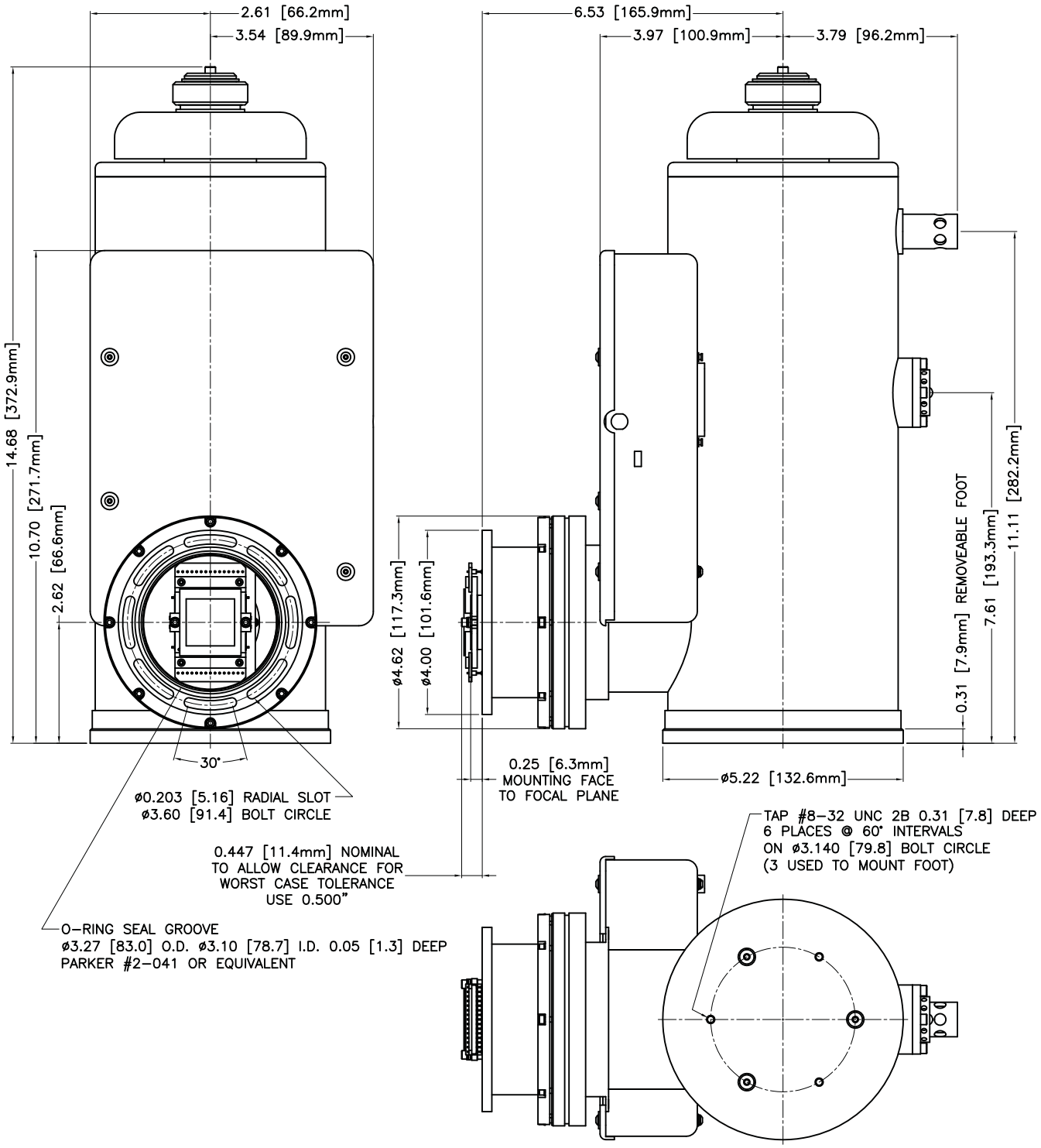
CCD image sensor	Princeton Instruments exclusive; scientific-grade 1, MPP, back-illuminated device without AR coating					
CCD format	1340 x 1300 imaging pixels 20 x 20 µm pixels 100% fill factor 26.8 x 26.0 mm imaging area (optically centered)					
	Minimum		Typical		Maximum	
CCD read noise			2 e- rms			
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/hour		1 e-/p/hour	
Deepest cooling temperature						
TE air	-40°C		-45°C			
TE chilled water	-45°C		-55°C			
Cyogenic liquid nitrogen	-100°C		-110°C			
Thermostating precision	±0.05°C across entire temperature range					
Software-selectable gains (@100 kHz)	**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%					
Vertical shift rate	48.2 µsec per row					
Dynamic range	16 bits					
Scan rates	100 kHz/1 MHz or 50 kHz/1 MHz					
LN hold time	> 25 hours					

Notes: All specifications subject to change.

* The minimum temperature attainable is dependent on the vacuum condition (can be lowered with lower vacuum).

Quantum Efficiency Curve




2.61 [66.2mm]
3.54 [89.9mm]
6.53 [165.9mm]
3.97 [100.9mm]
3.79 [96.2mm]
14.68 [372.9mm]
10.70 [271.7mm]
2.62 [66.6mm]
ø4.62 [117.3mm]
ø4.00 [101.6mm]
0.31 [7.9mm] REMOVEABLE FOOT
7.61 [193.3mm]
11.11 [282.2mm]
30°
ø0.203 [5.16] RADIAL SLOT
ø3.60 [91.4] BOLT CIRCLE
0.25 [6.3mm]
MOUNTING FACE
TO FOCAL PLANE
ø5.22 [132.6mm]
TAP #8–32 UNC 2B 0.31 [7.8] DEEP
6 PLACES @ 60° INTERVALS
ON ø3.140 [79.8] BOLT CIRCLE
(3 USED TO MOUNT FOOT)
0.447 [11.4mm] NOMINAL
TO ALLOW CLEARANCE FOR
WORST CASE TOLERANCE
USE 0.500"
O–RING SEAL GROOVE
ø3.27 [83.0] O.D. ø3.10 [78.7] I.D. 0.05 [1.3] DEEP
PARKER #2–041 OR EQUIVALENT