



Princeton Instruments

# Spec-10:400BR

Cryogenic Cooling  
1340 x 400 imaging array  
20 x 20- $\mu$ m pixels

The Princeton Instruments Spec-10:400BR from Roper Scientific® is a high-performance system designed to extend spectroscopy measurements farther into the near infrared via deep-depletion CCD technology. This back-illuminated device utilizes Princeton Instruments' exclusive anti-etaloning process, which allows enhanced NIR response without spectral degradation. The 1340 x 400 imaging array with 8-mm chip height and 27-mm spectral coverage is ideal for single- and multistribe applications. This detector delivers much higher resolution and sensitivity than industry-standard "1024 pixel" sensors. Another exclusive feature is the integration of software-selectable amplifiers that offer an easy choice of high sensitivity or high signal-to-noise ratio (SNR). Liquid nitrogen cooling eliminates dark noise, even for long exposure times.

Features	Benefits
1340 x 400 imaging array	Exclusive feature that provides superior resolution over industry-standard "1024 pixel" format
Exclusive CCD architecture	Provides industry's lowest-noise CCD system
20 x 20- $\mu$ m pixels	Optimum pixel size for full well and high resolution
8-mm chip height	Ideal for rapid, multistribe spectroscopy
Software-selectable amplifiers	Exclusive feature provides choice of superior sensitivity or superior SNR
Back-illuminated, deep-depletion CCD with anti-etaloning technology	High quantum efficiency extended into the NIR without sacrificing sensitivity
Cryogenic cooling	Eliminates noise attributable to dark current, even for long exposure times
Standard spectrometer interface	Will interface with most spectrometers
Dual-digitizer option	Multiple-speed digitization allows complete freedom to select between "slow operation" for low noise and highest SNR 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 and PVCAM®	Offers easy-yet-sophisticated 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 1; NIMO; back illumination; deep depletion; available with Unichrome UV-enhancement coating				
CCD format	1340 x 400 imaging pixels; 20 x 20- $\mu$ m pixels; 100% fill factor; 26.8 x 8.0-mm imaging area				
	Minimum		Typical		Maximum
Dual digitizers: system read noise			2.8 e- rms		3 e- rms
@ 50-kHz digitization			3.5 e- rms		5 e- rms
@ 100-kHz digitization			5 e- rms		6 e- rms
@ 200-kHz digitization			6 e- rms		8 e- rms
@ 500-kHz digitization			8 e- rms		10 e- rms
@ 1-MHz digitization			13 e- rms		16 e- rms
Single digitizer: system read noise			2.8 e- rms		3 e- rms
@ 50-kHz digitization			3.5 e- rms		5 e- rms
@ 100-kHz digitization			8 e- rms		10 e- rms
@ 1-MHz digitization					
Spectrometric well capacity	high sensitivity	high capacity	high sensitivity	high capacity	
	250 ke-	800 ke-	300 ke-	1 Me-	
Deepest cooling temperature			-120°C		
Dark current @ -120°C operation			11 e-/p/hr		36 e-/p/hr
Software-selectable gains	1/2x, 1x, 2x (high-sensitivity mode) 1x, 2x, 4x (high-capacity mode)				
Dynamic range	16 bits				
Nonlinearity	<2%				
Vertical shift time	30 $\mu$ s				
Spectral rates*					
@ 100-kHz digitization	60 Hz				
@ 1-MHz digitization	230 Hz				
@ 2-MHz digitization	270 Hz				
Operating temperature	-70 to -120°C				
Thermostating precision	$\pm$ 0.05°C across entire temperature range				

**SPEC-10**  
PRINCETON INSTRUMENTS



Note: Specifications are subject to change.

\*Spectral rates have been measured with 100 rows vertically binned.

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**USA East Coast** 609.587.9797    **USA West Coast** 520.889.9933    **Benelux** +31.347.324989  
**France** +33.160.86.03.65    **Germany** +49.89.660.779.3    **Japan** +81.43.274.8022

Spec-10:400BR (LN) Rev D1

# Princeton Instruments Spec-10:400BR (LN)

