



Photometrics®

## Cascade:512F

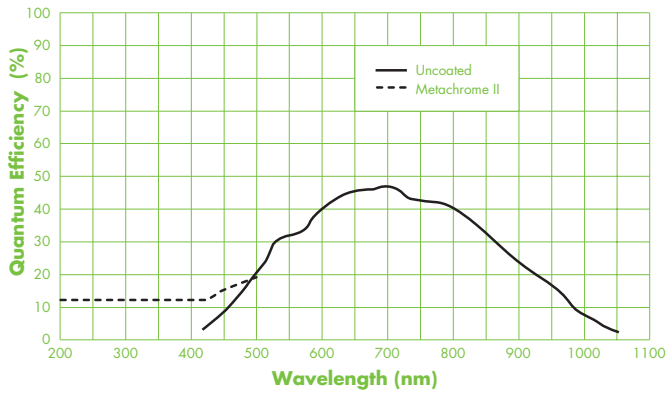
512 x 512 imaging array  
16 x 16- $\mu$ m pixels



The Photometrics® Cascade:512F digital imaging system from Roper Scientific® offers very high sensitivity through the use of *on-chip multiplication gain*. A 512 x 512-pixel array (16 x 16- $\mu$ m pixels) enhances this sensitivity, while providing good field of view. The 16-bit, thermoelectrically cooled system can be operated at 10 MHz for high-speed image visualization or more slowly for high-precision photometry. Supravideo frame rates are achievable via subregion readout. The camera can be configured with dual amplifiers in order to ensure optimal performance not only for applications that demand high sensitivity (e.g., single-molecule fluorescence), but also for those requiring wide dynamic range (e.g., standard fixed-cell fluorescence).

Features	Benefits
On-chip multiplication gain	Very high sensitivity Low-noise, impact-ionization process
512 x 512 imaging array 16 x 16- $\mu$ m pixels	Good field of view and sensitivity Good resolution
10-MHz readout 5- and 1-MHz readout	Excellent for high-speed image visualization Perfect for high-precision photometry
Dual amplifiers*	Select readout mode via software for optimized (1) high-speed / high-sensitivity performance or (2) wide-dynamic-range performance
16-bit digitization	Good dynamic range allows detection of both bright and dim signals in the same image
Frame-transfer CCD	100% duty cycle to collect continuous data No mechanical shutter required
Thermoelectric cooling	Reduces background for high sensitivity
C-mount	Easily attaches to microscopes, standard lenses, or optical equipment
PCI interface	Works with Windows® (2000 and XP) and Mac operating systems
Enhanced PVCAM® Circular buffers Device sequencing	Compatibility with numerous third-party software packages Provides real-time focus Enables precise integration with shutters, filter wheels, etc.

\*The camera is also available in a configuration that features an "on-chip multiplication gain" amplifier only.



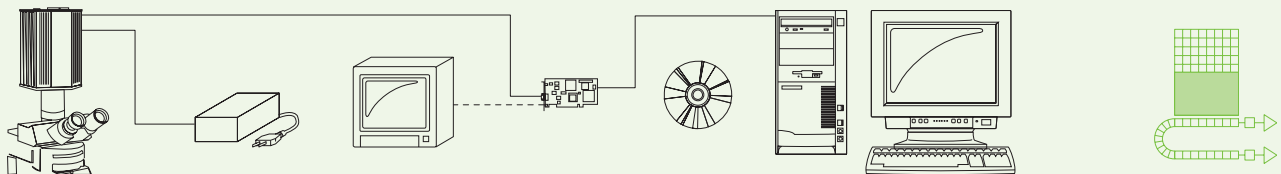
		Region			
		512 x 512	256 x 256	128 x 128	64 x 64
Binning	1 x 1	29	54	95	155
	2 x 2	56	95	155	227
	4 x 4	98	155	227	295
	6 x 6	130	195	262	329

(Frames per second)

Note: Frame rates are measured at 10 MHz with 0-second exposure times.

## Specifications

CCD image sensor	E2V CCD87; front-illuminated, frame-transfer CCD with on-chip multiplication gain; available with Metachrome® II UV-enhancement coating	
CCD format	512 x 512 imaging pixels; 16 x 16- $\mu$ m pixels; 8.2 x 8.2-mm imaging area (optically centered)	
Linear full well single pixel output node	250 ke- 800 ke- ("on-chip multiplication gain" amplifier)	
Readout bits/speed	16 bits @ 10 MHz, 5 MHz, and 1 MHz	
	"On-chip multiplication gain" amplifier (port #1)	"Traditional" amplifier (port #2)
Read noise	~45 e- rms @ 5 MHz ~60 e- rms @ 10 MHz <i>Read noise effectively reduced to &lt;1 e- rms with on-chip multiplication gain enabled</i>	~10 e- rms @ 1 MHz ~15 e- rms @ 5 MHz
On-chip multiplication gain	1 to 500x (guaranteed) 1 to 1,000x (typical) Software controlled in 4,096 steps	Not applicable
Parallel (vertical) shift rate	2.0 $\mu$ sec/row	
CCD temperature	-30°C (regulated)	
Dark current	1.0 e-/p/s @ -30°C	
Binning	Flexible binning capabilities in parallel direction; 1 through 6 binning in serial direction	
Video output	RS170/PAL selectable	
Operating environment	0 to 30°C ambient, 0 to 80% relative humidity noncondensing	



Note: Specifications are subject to change.

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Cascade:512F Rev D0