PHOTOMETRICS®
a division of Roper Scientific, Inc.

EMCCD Technology

Cascade II:512

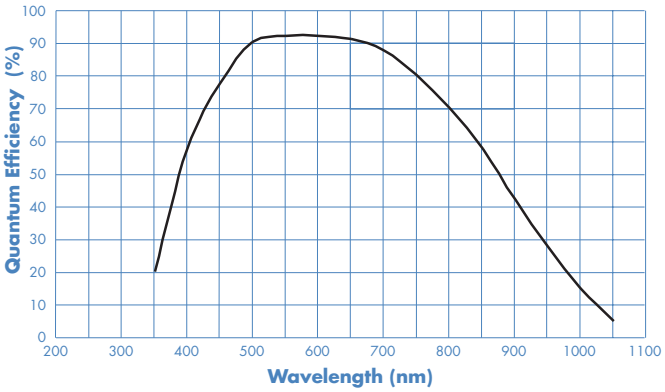
512 x 512 imaging array | 16 x 16-µm pixels

The Photometrics® Cascade® II:512 is the only EMCCD microscopy camera in the world to offer -80°C cooling without LN_2 or water! This 16-bit, high-resolution camera uses its deep thermoelectric cooling to maximize gain and minimize dark current. A stainless-steel vacuum chamber (with all-metal seals) houses a high-QE, back-illuminated, frame-transfer EMCCD. *The camera's exclusive vacuum technology is so robust it carries a lifetime guarantee.*

Primary applications: Low-light fluorescence, TIRFM, single-molecule fluorescence, spectral imaging, luminescence

Features	Benefits
On-chip multiplication gain	Low-noise, impact-ionization process provides very high sensitivity
Back-illuminated EMCCD	Highest available quantum efficiency (>90% peak QE)
Deep cooling	Thermoelectric cooling to -80°C minimizes dark current and allows long exposure times No need for a bulky chilled-water circulator or cryogenic compressor, both of which are prone to leaks, blockages, and condensation
Lifetime vacuum	Permanent, all-metal vacuum seals guaranteed for lifetime of camera Maintenance-free operation
512 x 512 imaging array 16 x 16-µm 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: (1) optimal high-speed / high-sensitivity performance (2) optimal wide-dynamic-range performance
16-bit digitization	Wide dynamic range allows detection of bright and dim signals in the same image
Frame-transfer EMCCD	100% duty cycle for continuous data collection No mechanical shutter required
Single optical window	Single vacuum window is the only optical surface between incident light and EMCCD surface No light loss from multiple optical surfaces
C-mount	Easily attaches to microscopes, standard lenses, or optical equipment
Acquisition software	Captures, analyzes, and saves high-resolution images
PCI interface	High-bandwidth, uninterrupted data transfer
PVCAM® Circular buffers Device sequencing	Supported by numerous third-party software packages Real-time focus Precise integration with shutters, filter wheels, etc. *Compatible with Windows® 2000/XP, Mac OS X, and Red Hat® Linux® 9.0 (kernel version 2.4)*

Photometrics Cascade II



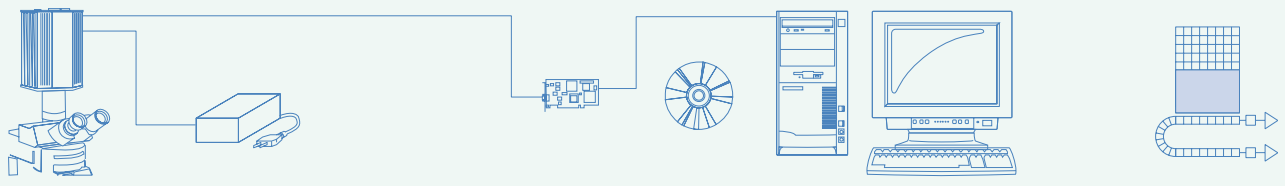
Binning	Region: 512 x 512	256 x 256	128 x 128	64 x 64
1 x 1	29	54	95	157
2 x 2	54	96	157	229
4 x 4	95	156	227	298
6 x 6	127	196	273	331

(Frames per second)

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

Specifications

Image sensor	e2v CCD97; back-illuminated, frame-transfer EMCCD with on-chip multiplication gain	
EMCCD format	512 x 512 imaging pixels; 16 x 16-µm pixels; 8.2 x 8.2-mm imaging area (optically centered)	
Linear full well single pixel output node	 200 ke- 800 ke- ("on-chip multiplication gain" amplifier)	
Digitizer type	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 *Read noise effectively reduced to <1 e- rms with on-chip multiplication gain enabled*	<8 e- rms @ 1 MHz 15 e- rms @ 5 MHz
On-chip multiplication gain	1 to 1,000x (typical) Controlled via software	Not applicable
Parallel (vertical) shift rate	2.0 µsec/row	
EMCCD temperature	-70°C (minimum) -80°C (typical)	
Dark current @ -70°C	0.008 e-/p/s (typical) 0.03 e-/p/s (maximum)	
Binning	Flexible binning capabilities in parallel direction; 1 through 6 binning in serial direction	
Operating environment	0 to 30°C ambient, 0 to 80% relative humidity noncondensing	



Note: Specifications are subject to change.

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