

QuantEM:512SC

512 x 512 imaging array | 16 x 16- μ m pixels



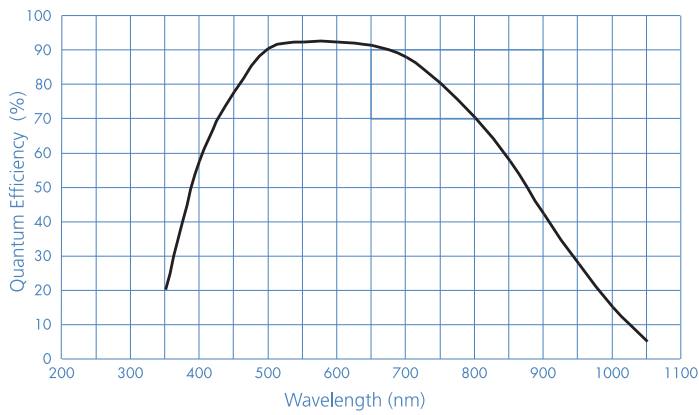
preliminary

The Photometrics® QuantEM:512SC is the world's first and only electron-multiplying CCD (EMCCD) camera to offer on-chip signal amplification with true quantitative stability across 16 bits. The high-speed, high-performance QuantEM™ lets you conduct precision ratiometric analysis in time-course experiments, acquire reproducible data during long-term studies, and capture streaming data for multidimensional time-lapse investigations — all with single-molecule sensitivity. A patent-pending PAR™ feedback system provides exceptional stabilization of EM gain, while an intelligent FPGA design facilitates self-calibrating linearization of EM gain and prevents bias drift over time. Furthermore, patent-pending ACE™ technology enables superior timing resolution of the device's pixel clocks, allowing optimal signal-to-noise sampling and minimizing spurious charge.

Primary applications: intracellular calcium or pH ratio imaging, fluorescence recovery after photobleaching (FRAP), total internal reflection fluorescence (TIRF), fluorescence resonance energy transfer (FRET), widefield confocal microscopy

Features	Benefits
EM gain	Very high sensitivity Low-noise, impact-ionization process
Back-illuminated EMCCD	Highest available quantum efficiency (>90% peak QE)
512 x 512 imaging array 16 x 16- μ m pixels	Good field of view and sensitivity Good resolution
Intelligent FPGA design	Precise linearization of EM gain Self-calibrating linearization ensures truly quantitative data all the time Prevents bias drift over time to guarantee a stable background
PAR* feedback system (Photometrics Active Regulation)	Delivers unsurpassed EM gain stability for outstanding signal fidelity across 16 bits
ACE* technology (Advanced Clocking Enhancement)	Pixel-clock timing resolution 12x better than competing EMCCD cameras Provides lowest noise floor and minimizes generation of spurious charge and background events
10-MHz readout 5- and 1.25-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	Wide dynamic range allows detection of bright and dim signals in the same image
Frame-transfer EMCCD	100% duty cycle to collect continuous data No mechanical shutter required
C-mount	Easily attaches to microscopes, standard lenses, or optical equipment
Turbo 1394™ interface (IEEE 1394a)	High-bandwidth, uninterrupted data transfer with no dropped frames Windows® 2000/XP and Mac OS X compatibility
PVCAM® Circular buffers Device sequencing	Supported by numerous third-party software packages Real-time focus Precise integration with shutters, filter wheels, etc.

* Patent-pending Photometrics technology



Binning	Region			
	512 x 512	256 x 256	128 x 128	64 x 64
1 x 1	31.5	56.5	94.4	140.3
2 x 2	58.6	100.9	155	217
4 x 4	104	160	233	270
8 x 8	157	237	257	279

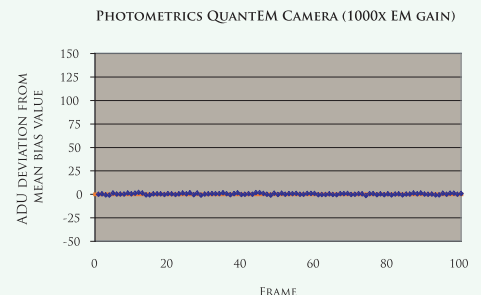
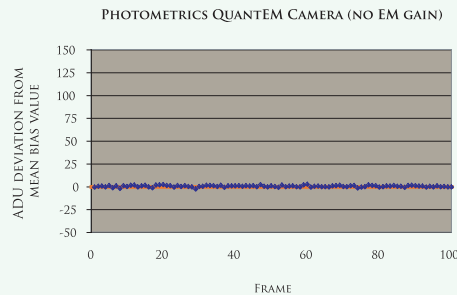
(Frames per second)

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

preliminary Specifications	
EMCCD image sensor	e2v CCD97; back-illuminated, frame-transfer CCD with EM gain
EMCCD format	512 x 512 imaging pixels; 16 x 16- μ m pixels; 8.2 x 8.2-mm imaging area (optically centered)
Linear full well single pixel output node	200 ke- 800 ke- ("EM gain" amplifier)
Digitizer type	16 bits @ 10 MHz, 5 MHz, and 1.25 MHz
	"EM 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 EM gain enabled
EM gain	1 to 1,000x (typical) Self-calibrating linearization
Parallel (vertical) shift rate	2.0 μ sec/row
EMCCD temperature	-30°C (regulated)
Dark current	1 e-/p/s @ -30°C (0.5 e-/p/s @ -30°C typical)
Binning	Flexible binning capabilities up to 256 in parallel direction; 1, 2, 4, 8 binning capabilities in serial direction
Operating environment	0 to 30°C ambient, 0 to 80% relative humidity noncondensing

Typical bias (offset) stability

One hundred 70-ms bias frames were taken both with and without 1000x EM gain and the average bias intensity was measured. Each frame's deviation from the sequence's mean value was plotted against the frame number.



Note: Specifications are subject to change.

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 QuantEM:512SC preliminary