



XR/MEGA-10™ and XR/MEGA-10LC™

MEGA-PIXEL ICCD CAMERAS FOR SCIENTIFIC IMAGING
EXTENDED BLUE GEN III AND NEW LOW COST/ -LC OPTION

- **Photon limited fluorescence imaging**
- **High Quantum Efficiency: 40% typical**
- **Light Gains of 80,000**
- **Mega-pixel, Nyquist limited resolution**
- **Video rates and faster for dynamic event capture**
- **Exclusive ABF™/ Automatic Bright Field technology**
- **The most cost effective GEN III technology available**



Since its introduction in 1999, the **XR/MEGA-10™** has been the price-performance leader among ICCD camera products for fluorescence imaging in life science applications. In the standard configuration, the Extended Blue GEN III offers the broadest spectral response, optimized from the near IR all the way down to and below 400nm. Alternatively, the new lower priced **XR/MEGA-10LC™** provides the same intrinsic specifications but with a short wavelength cut-off in the blue-green region of the spectrum. Both the Extended Blue and -LC™ tube types are of the traditional filmed photocathode design. This translates to a meaningful cost savings relative to the top-of-the-line, unfilmed photocathode XR/MEGA-10EX™ products, which are available from Stanford Photonics for the most demanding detection requirements. Both the XR/MEGA-10™ and XR/MEGA-10LC™ use the SONY XX285 image sensor for mega-pixel, Nyquist limited resolution at speeds ranging from 15 to 120 frames per second. The intensifier tubes are fiber-optic coupled with a 1.6:1 taper ratio, resulting in a 10 micron pixel (nominal) at the image plane; proprietary, single step bonding assures maximum system resolution and contrast. The Stanford Photonics XR™ cameras are the only product line on the market with the exclusive ABF™ (Automatic Bright Field) feature that instantaneously adjusts photocathode gate time and intensifier gain to compensate for up to seven decades of light level change, allowing for hands-off surveys of samples with large variances in brightness and bright field imaging without the need for a second camera. The XR/MEGA-10™ and -10LC™ are Mac® and PC compatible and are supported by a number of high-end image capture and analysis systems.

CAMERA MODELS

XR/MEGA-10™ and XR/MEGA-10LC™: General purpose/multi-user; Highest resolution

- 1.4K by 1K full resolution, 15 FPS
- 640 by 480 (binned 2X2), 30 FPS
- 1.4K by 104 V (binned 4X) for 40% height, 120 FPS and
- RS-170 high resolution (1.4K by 488 interlaced)
- RS-170 windowed, 2X zoom (640 by 480 interlaced)

XR/MEGA-10™ S30 and XR/MEGA-10LC™ S30: Highest Speed

- 1K by 1K, 30 FPS
- 512 by 512 (binned 2X2), 60 FPS
- 256 by 256 (binned 4X4), 90 FPS
- 1.4K by 104 V (binned 4X) for 40% height, 120 FPS

ALL MODELS:

- 10 bit, LVDS PCI or Camera Link® interface for maximum transfer speeds
- On chip integration via computer or external control
- Gating power supply with auto (ABF™) or external control
- Remote, hand held controller for gain and mode control:
 - Compact, illuminated read-out of camera and intensifier set up parameters
 - Remote switching/ selection/ setting of gains and modes.

FEATURES/ BENEFITS

GEN III-LC (Gallium Arsenide)

- Lowest cost
- High performance GaAs (Gallium Arsenide) GEN III
- Flat spectral response from 525 to 850nm

EXTENDED BLUE GEN III

- Blue Enhanced GaAs GEN III
- Spectral response from near UV to 875nm
- No fall-off in sensitivity at/near 500nm

SIMULTANEOUS ANALOG AND DIGITAL OUTPUTS

- RS-170 display and recording (XR/MEGA-10™) or multisync display (S-30)
- High Speed Camera Link® or LVDS digital bus and interface for highest image speeds and storage rates, universal connectivity to large selection of image capture boards

SINGLE STEP FIBER OPTIC BONDING

- Optimized design and process derived from extensive experience in military and night vision arena
- 10-15% improvement relative to standard methods

EXCLUSIVE ABF™ EXPOSURE CONTROL

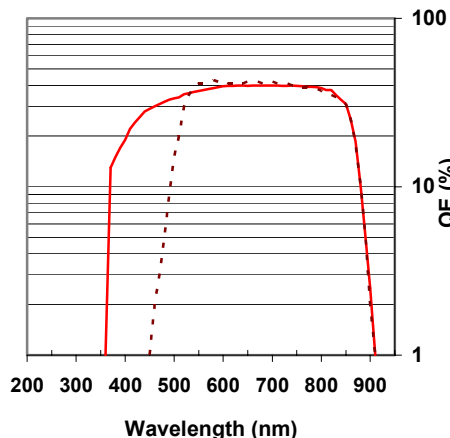
- In-camera electronics automatically control intensifier gate speed (shutter) and gain on a frame by frame basis for seven decades of light level compensation
- Use for survey mode, bright field/fluorescence interweaving
- Protects image intensifier tube from inadvertent high light exposure
- Easy override to fixed/manual gain operation for quantitative measurements

XR/MEGA-10™ and XR/MEGA-10LC™

ICCD Camera and System Specifications

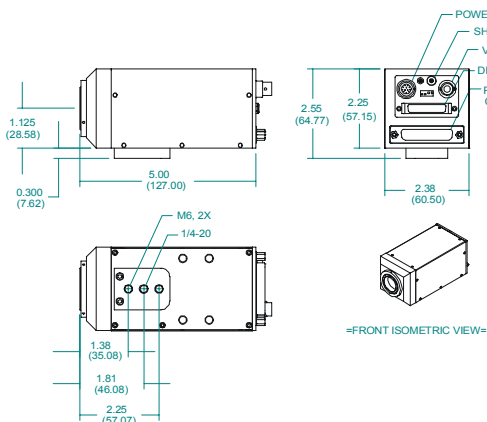
SPECTRAL RESPONSE CURVES

XR/MEGA-10 and XR/MEGA-10LC



— Extended Blue GEN III
 - - - GEN III-LC

CAMERA DIMENSIONS: in. (mm)



CAMERA CONTROLLER



INTENSIFIER OPTIONS: Extended Blue GEN III and GEN III-LC

Parameter	Extended Blue GEN III	GEN III-LC
Spectral Response (min. and max. wavelengths for 10% QE and higher)	370nm to 875nm	500nm to 875nm
Equivalent Background Input (EBI) X10 ⁻¹¹ lum/cm ²	2.5 Max., 1.0 typical	2.5 Max., 1.0 typical
Dark Counts: Equivalent photons/sec-pixel	TBD	TBD
Resolution (limiting) ¹	64 lp/mm	64 lp/mm
Phosphor and decay time to 10% ²	P43, 2 ms	P43, 2 ms
Max. Gain	80,000 typical	80,000 typical
Min. Gate Width (internal via ABF™)	100 ns	100 ns
Min. Gate Width (External/ Optional) ³	5 ns	5 ns

Notes:

- (1) The XX285 image sensor, with taper, has a resolution limit of approximately 50 line pairs per millimeter. This is less than either of the tubes and defines the finest structure that can be resolved at the image plane.
- (2) The decay time of P43 decreases with shorter (pulsed) exposure. For example, a 250 microsecond pulsed excitation and/or a photocathode gate time of 250 microseconds reduces the decay time to 1 ms. Higher temporal resolution within each frame can be derived by using a pulsed or gated exposure.
- (3) Both intensifier tube types can be externally gated to 5 ns. Contact the main office for information regarding gating and gate control options.

CCD SENSOR AND READOUT ELECTRONICS

Both cameras use the Sony XX285 scientific grade image sensor, which has a full frame pixel count of 1380 by 1024K. Pixels are 6.47 microns square. The addition of a 1.6:1 fiber optic taper between the CCD and image intensifier output creates an effective pixel sized of 10.35 microns at the input image plane. For this pixel size the resolution limit is close to 50 line pairs per millimeter, so the CCD and not the image intensifier is the limiting resolution element. At 100X, the pixels are roughly 100nm square when referenced back to the object/ sample plane.

Type	XR/MEGA-10™ and XR/MEGA-10LC™	XR/MEGA-10™ S30 and XR/MEGA-10LC™S30
Active Pixels (readout)	1380 x 1024	1024 X 1024
Baseline frame rate	15 FPS, Full frame	30 FPS, Full frame
Effective Pixel Size (including taper mag.)	10.35 microns	10.35 microns
Single Pixel Well Capacity	18,000 electrons	18,000 electrons
Pixel Clock (unbinned, native)	27 Mhz	45 Mhz
Read out noise (CCD)	10 electrons rms	15 electrons rms
Active Image Area	14.23 mm H by 10.6 mm V	10.6 mm H by 10.6 mm V

MODES AND SPEEDS

Unbinned full frame	1.4 by 1K, 15 FPS	1K by 1K, 30 FPS
2 by 2 binning, full	640 by 480, 30 FPS	512 by 512, 60 FPS
4 by 4 binning, full		256 by 256, 90 FPS
1 by 4 binning, centered	1.4 by 104 (40% V height), 120 FPS	1K by 180 (70% V height), 120 FPS
Analog video	1.4K by 488 RS-170 and 640 by 480 RS-170, 2X Zoom	Analog progressive scan output; all modes

CAMERA

Digital outputs	10 bit LVDS or Camera Link®
Video Gain (Manual Remote)	Unity to 10X
External Controls	Free run or Async.; Mode select; Integrate on chip
Thread Mount	C-mount, 18mm image format
Weight	26 oz./728 gms.
Power	12VDC @ 400 mA

SYSTEM

Because of the RS-170 outputs available with the XR/MEGA-10™ and -10LC™, they can be operated in a stand-alone mode with direct video display and video recording devices. Images may also be captured into a computer using analog (typically 640 by 480 by 8 bits) frame grabbers. All of the XR/MEGA-10™ and -10LC™ cameras can be input as 10 bit digital images into a PC or Mac® using a number of Camera Link® or PCI LVDS capture cards and software systems. Contact main office for more information regarding high performance software and acquisition via Camera Link®. Each camera is shipped with:

- 12 VDC power supply; wall mount
- Computer interface cable (capture card and software specific)
- Hand held controller and 2 meter interconnect cable

Note: Specifications are typical and subject to change without notice. All sales are subject to export control under the International Traffic in Arms Treaty.