Lambert INSTRUMENTS

High Speed Intensified CCD Camera

UV to NIR spectral sensitivity

3 ns minimal exposuretime

sensitivity 0,0001 lux

Low light level imaging

The combination of CCD cameras and image intensifiers allows image acquisition at very low light levels over a wide range of spectral response and at relatively high speed. Single photons can be detected and discriminated from CCD noise. Ultra high-speed phenomena can be captured by using the image intensifier as a fast shutter (gating).

II18

The Lambert Image Intensifier II18 is a low-light-level camera attachment that can be coupled to a monochrome (B/W) video camera. The Lambert Image Intensifier II18 increases the sensitivity of the camera and enables the detection of images at a light level as low as 10^{-5} lux. The spectral sensitivity can be matched to the application.

The II18G is the gated version of the Lambert image intensifier II18. The gating option offers the possibility to use the image intensifier as an ultra fast Electro-optical shutter with minimum exposure time down to 40ns (optional 3ns → II18GDF). Through gating the input light range is extended significantly, offering unique options for time resolved experiments.

	II18	II18 G	II18 GD	II18 GDF
Intensifier configurations	see last page			
analog gain control	X	X		
digital gain control			X	X
Computer controlled timing (delay, gate width)			X	X
minimal gate width		40 ns	40 ns	3ns (Gen 2) 5ns (Gen 3)
maximal repeti-tion frequency		100 kHz	100 kHz	200 kHz
Lens-/ Camera-mount	C-mount input, C-mount output			
Relay optics (Backfocal distance)	0,5 x magnification (8mm, 13 mm optional)			
	1 x magnification (38 mm)			
Windows 2000/XP/Vista software			X	X
USB interface			X	X

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PERFECTION IN IMAGE DETECTION

LI²CAM

The LI²CAM is an ICCD -Intensified CCD camera for scientific and industrial applications. The LI²CAM offers high sensitivity down to single photon level combined with speeds up to 15 fps at the full resolution of 1392 x 1040 pixels.

The LI²CAM is equipped with an image intensifier, fibre optically coupled to the CCD sensor. Depending on the application the LI²CAM can be equipped with several types of image intensifiers selected for spectral sensitivity, resolution, gain, linearity, gating, type of phosphor, etc.

The LI²CAM has a USB 2.0 interface and is completely controlled via software. A detailed SDK is available for integration with customer software.

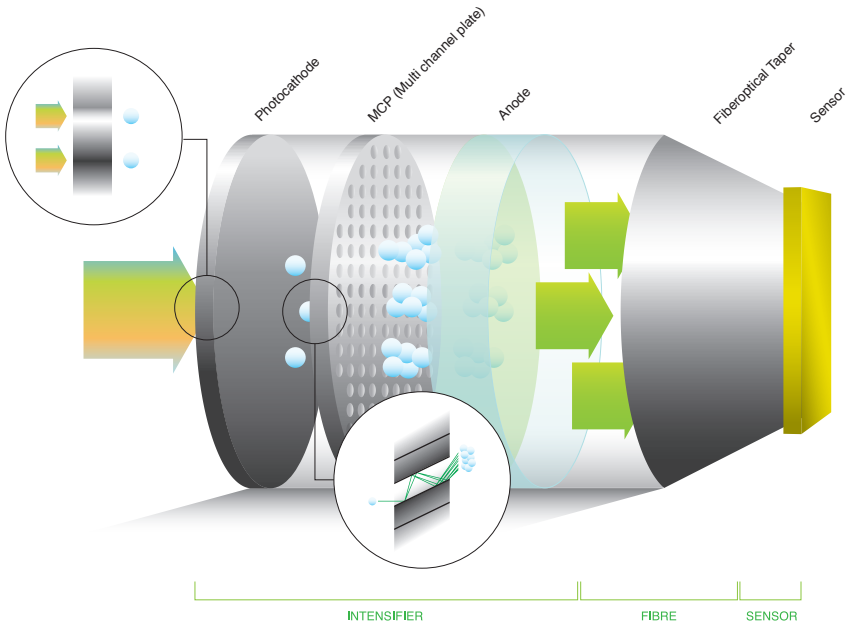
Key Features

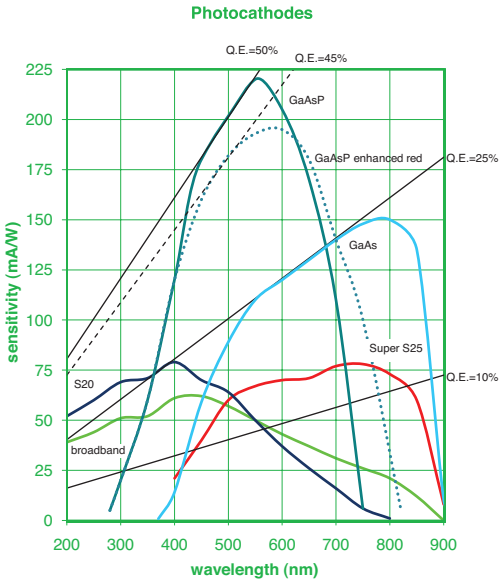
- High sensitivity
- 1.4 MegaPixels
- Frame rates up to 15 fps at full resolution
- Exposure times can be set between 40ns (with the use of gating) and 10 seconds.
- Optional gating down to 5ns or 3ns
- ROI, selectable and user defined
- Digitization can be set to 8 or 12 bits (snap shot mode)
- Many different image intensifiers
- Optional: modulation
- Intensifier Fiberoptically coupled to CCD sensor
- User friendly software

Specifications

- **CCD sensor:** 2/3" Interline CCD, 1392x1040 square pixels, 66dB dynamic range
- **Effective pixel size:** 10,3 μm (including magnification fiber optic taper)
- **Examples selectable ROI:** 1392x1040 (full frame) @ 15fps, 1024x768 @ 20fps, 800x600 @ 24fps, 640x480 @ 30fps
- **Binning mode:** A binning of 2x2, 3x3 and 4x4 can be selected to enhance the sensitivity.
- **Digitization:** 8 or 12 bits (snap shot mode)
- **Synchronization CCD:** Trigger input to take a snapshot, trigger output for synchronizing an application.
- **Synchronization gating:** Gating can be synchronized with the start of a new CCD exposure or an external TTL trigger.
- **Housing:** Metal housing that holds the electronics, image intensifier, HV power supply, gate unit and programmable delay/pulse generator for gating.
- **Lens mount:** C-mount (other lens mounts on request)
- **Software:** With a Control program running under Windows 2000/ ME/XP/Vista all the functions of the camera are controlled. A Software Development Kit is available for users who want to link the LI²CAM to their own software.
- **Interface:** USB2.0 for fast image transfer, RS-232 or USB for controlling the camera.

Intensifier principle:
Photons converted to electrons, accelerated and then multiplied in the MCP. The electron clouds get converted back to photons at anode screen.





Intensifier Configurations

Available configurations for both II18 and LI²CAM:

- High quality Gen 2 or Gen 3 image intensifier
- Spectral responses from UV to NIR (see chart)
  - Gen 2: S20, S25, Broadband
  - Gen 3: GaAsP, GaAsP enhanced red, GaAs
- Sensitivity 0.0001 lux
- Phosphor
  - P43: 6,5 ms decay time to 10%
  - P46, P24 and P20 available on request
- MCP: single or dual
- Luminance gain: up to 30.000 lm/m2/lux
- Standard gating down to 40ns
- Fast gating:
  - Gen 2: 3 ns
  - Gen 3: 5 ns

Applications for the LI²CAM and II18 are:

- Low Light level Imaging
- Fluorescence Microscopy
- Bioluminescence Imaging
- Chemiluminescence Imaging
- Calcium Imaging
- Time Resolved Imaging
- Ratio Imaging
- Combustion Research
- X-ray Imaging

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