

PHOTON COUNTING CAMERAS



ICCD325 Photon Counting CCD Camera

INTRODUCTION

The ICCD318/325/340 is a highly sensitive three stage MCP intensified CCD camera suitable for a wide variety of imaging applications. This compact camera is normally supplied with a 'C' mount lens adapter which allows it to be used with a variety of commercially available camera lenses or for direct connection to a microscope. Flange and 'F' mount options are also available. The ICCD340 camera is not available with the 'C' mount lens adapter.

The camera is supplied as part of our High Resolution Photon Counting System, but can also be supplied as a stand alone camera. A camera power supply and control unit providing manual control of intensifier gain and video gain is supplied with the unit. Full characterisation of the intensifier including spectral response and gain calibration is provided.

Customised versions of this camera with a range of different input windows, photocathodes, phosphors and MCP configurations are also available.

FEATURES

- Photon counting image intensifier
- Low gain mode for bright field image capture
- 18mm, 25mm or 40mm active diameter
- Fibre optic or fused silica input windows
- Low noise S20 or bialkali photocathodes
- Sub 100ns gating
- Flange or lens mount options
- CCIR or RS170 or non-standard camera options
- Voltage controlled video and intensifier gain
- Temperature stabilised housing option

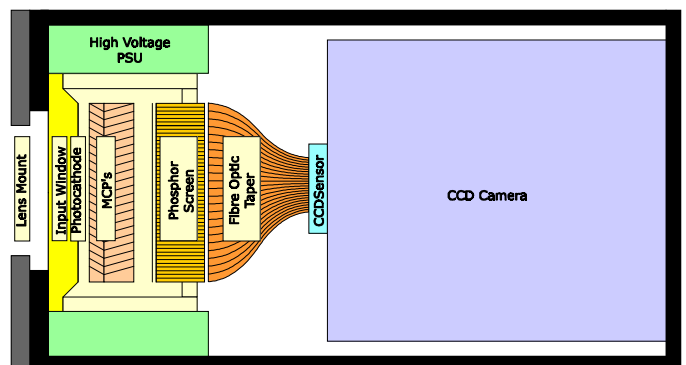
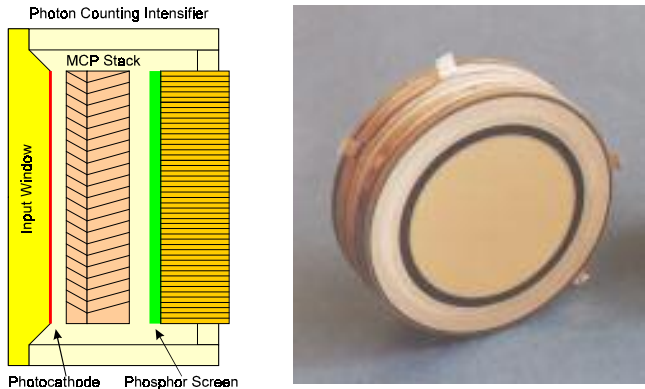


Image Intensifiers

The image intensifiers used in the cameras are generally three stage MCP device. These offer single photoelectron gain of around 10^7 which ensures that all photons seen by the cathode of the intensifier are detected. This technique makes this range of cameras one of the most sensitive available in the world today. For applications not requiring the ultimate sensitivity, two stage MCP detectors are also available. Image intensifiers can be customised in a number of ways so as to achieve ultimate performance.

Intensifier Format

The image intensifiers are available in a range of formats. These include 18mm, 25mm and 40mm. The diagram below shows the typical construction of an image intensifier.



Input Windows

Both fused silica or fibre optic are provided as standard with this camera. The fused silica windows are designed for applications that require enhanced UV imaging and have response to below 190nm. Fibre optic input windows have a sharp cut off at around 320nm, but have the added advantage of allowing direct contact imaging or coupling of a reducing fibre taper to the cathode.

Camera Options

These cameras are supplied with either a conventional TV camera (CCIR or RS170) or with the higher frame rate EEV CAM17 camera. Other specialist CC cameras may be fitted to the camera on request.

Imaging Area

In general CCD, cameras are either of the conventional CCIR TV format e.g. 288x384 pixels non-interlaced (576x768 pixel interlaced) or the square 512x512 pixel format of the EEV CAM17 CCD camera.

Size	CAM17	CCIR	Area
18mm	12.5x12.5	11x14	1.5 cm ²
25mm	17.5x17.5	15.2x19	3 cm ²
40mm	28x28	24.4 x 31	7.8 cm ²

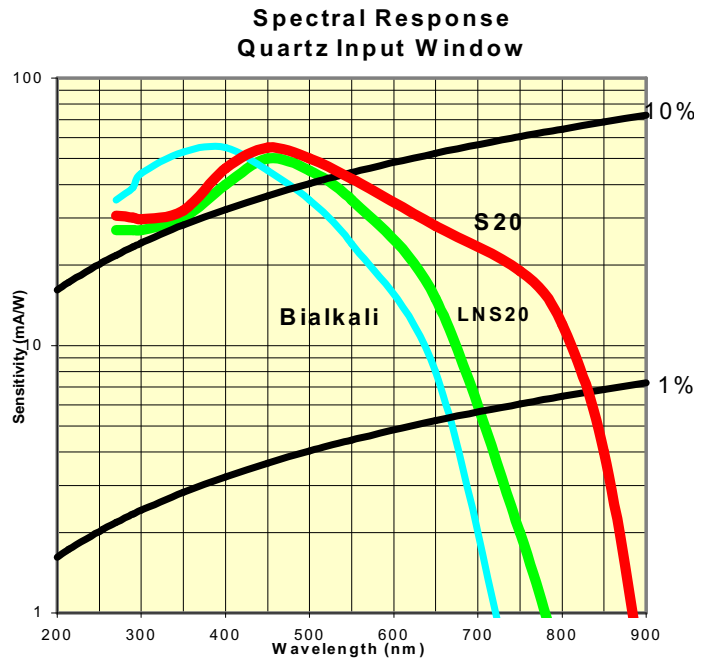
Active imaging area

Camera	Format	18mm	25mm	40mm
CCIR (50Hz)	576x768	36	50	106
CCIR (25Hz)	288x384	18	25	53
CAM17	512x512	24	34	55

Pixel size at photocathode (microns)

Photocathodes

Photek can offer a range of photocathodes including S20, low noise S20 and bialkali. Typical spectral response curves are shown below. For full details see the separate photocathode data sheet.



Dark Noise

The dark noise of a detector is related to the type of photocathode and the operating temperature. Typical dark noise of photocathodes at room temperature (20 degrees C) are as follows:

Cathode Type	Dark Noise
Bialkali	10 to 20 counts cm ² /sec
Low Noise S20	30 to 60 counts cm ² /sec
S20	1000 to 5000 counts cm ² /sec

Cathode Cooling

In general the dark noise doubles or halves with every 8 degrees change in temperature.

A temperature stabilised housing can be provided to maintain a constant temperature. Setting the temperature at 5 degrees can reduce the dark noise by a factor of four when compared to normal laboratory conditions.

Peltier Cooled Camera

Cameras with the S20 Photocathode can be excessively noisy at room temperature. The dual stage peltier cooled housing allows the image intensifier to be cooled to -35 degrees and enables the dark noise to be reduced to around 40 cps/cm²

A separate peltier controller is supplied with the camera. An optional re-circulating water chiller is recommended, but a mains water supply may be used.

Lens Adapters

All cameras can be provided with a variety of input mounts. These include:

- Standard 'C' Mount
- Nikon 'F' Mount
- Flange Mounting for custom applications.

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