

## Features & Benefits

**QE > 90% beyond 800 nm, optimized for NIR**  
Very high detector sensitivity in near infra-red

**5 MHz and 3 MHz readout speeds**  
Rapid frame rates for high throughput cell inspection

**Dual Exposure Ring Mode**  
Unique acquisition mode for fast exposure switching without timing overheads. Dual exposure (cell bias differential) EL inspection rates in excess of 1 cell/s

**Fringe Suppression Technology™**  
Minimizes fringing (etaloning) effects in the NIR

**Single AR-coated window design, incorporating UltraVac™ guaranteed hermetic vacuum seal technology**  
Ultimate reliability and sustained performance characteristics. Andor 5 year vacuum warranty

**Thermoelectric cooling to -70°C (air cooled)**  
Unparalleled TE cooling performance for negligible darkcurrent and reduced sensor inhomogeneities

**High Dynamic Range (80dB)**  
Contrast rich imaging.

**Lockable USB connection**  
Ensures secure, vibration resistant connectivity (5 m cable length).

**Cooling on power-up**  
PV Inspector does not require PC connectivity to maintain stable thermoelectric cooling

**Enhanced Baseline Clamp**  
Essential for quantitative accuracy of dynamic measurements

**13 x 13 μm pixel size**  
Optimal balance of dynamic range and resolution

**Integrated shutter (optional)**  
Close during readout to avoid vertical smear

**Andor Solis software / SDK (Linux SDK available)**  
Friendly Windows user interface offers intuitive acquisition optimization, system integration, automation and advanced data manipulation facilities

**Halcon software interface**  
Compatibility of PV Inspector acquisition modes with this powerful image processing library

## “NIR optimized CCD for high throughput EL/PL Inspection”

Andor's iKon-M PV Inspector is designed to offer ultimate speed and sensitivity performance for in-line Electro- and Photoluminescence Inspection, delivering > 90% QE beyond 800 nm and incorporating Fringe Suppression Technology™ to minimize fringing effects in the NIR.

The 1024 x 1024 array boasts high resolution 13 μm pixels, and benefits

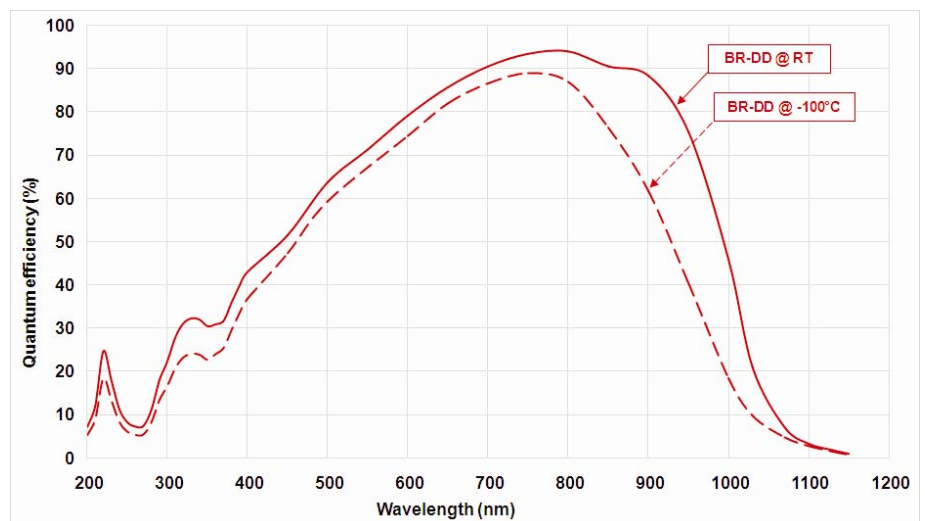
from negligible darkcurrent with thermoelectric cooling down to -70°C. PV Inspector offers industry highest throughput via rapid readout speeds up to 5 MHz, combined with a unique 'dual exposure ring mode' that allows fast exposure switching. A lockable USB 2.0 port ensures secure vibration resistant connectivity.



### Key specifications

Active pixels* <sup>1</sup>	1024 x 1024
Pixel size (W x H; μm)	13 x 13
Image area (mm)	13.3 x 13.3
Active area pixel well depth (, typical)	100,000
Output saturation (e <sup>-</sup> , typical)* <sup>2</sup>	200,000
Frame rate (frames per sec)* <sup>3</sup>	4.1 @ 5 MHz
Read noise (e <sup>-</sup> , typical)	9 @ 3 MHz

### Quantum efficiency\*<sup>4</sup>



## Technical specifications

### System characteristics

Dummy pixels	24, 24, 3, 3
Pixel readout rate (MHz)	5 MHz Visualization mode 3 MHz Precision photometry mode
Linearity (% maximum) <sup>*5</sup>	> 99
Vertical clock speed (µs)	3 to 44 (software selectable)
Software selectable sensitivity (e <sup>-</sup> per A/D count, typical)	4, 2, 1
Digitization	16 bit (at all readout speeds)
Camera window type	Single NIR-optimized AR coated window with 0.5° wedge.

### System readout noise<sup>\*6</sup>

Pixel Readout Rate (MHz)	Readout Noise (e <sup>-</sup> , typical)
3	9
5	12

### Minimum sensor temperatures (typical)<sup>\*7</sup>

Air cooled (ambient air at 20°C) -70°C

### Darkcurrent (back-illuminated)

@ -70°C (typical) 0.02 e<sup>-</sup>/pixel/sec

### Operating & storage conditions

Operating temperature	0°C to 30°C ambient
Relative humidity	< 70% (non-condensing)
Storage temperature	-25°C to 55°C

### Power requirements

- 5Vdc - 3.2 A
- 7.5Vdc - 4.5A
- ±15Vdc - 0.4A

### Max frames per second<sup>\*8</sup>

5 MHz visualization mode				
Binning	Full Frame	512 x 512	256 x 256	128 x 128
1x1	4.1	7.9	14.7	25.9
2x2	9.8	16.1	26.8	42.1
4x4	19.8	28.7	42.9	60.1
8x8	33.6	44.6	60.2	76

3 MHz precision photometry mode				
Binning	Full Frame	512 x 512	256 x 256	128 x 128
1x1	2.5	5.0	9.5	17.3
2x2	7.1	11	18.5	30.4
4x4	16.4	21.2	32	47.2
8x8	30.3	35.5	48.5	64.3

### Dual Exposure Ring Mode

Dual exposure cycle time <sup>*9</sup>	500 ms
Exposure switching time	Negligible
Array size compatibility	Full image only
Trigger type	External trigger

### Computer requirements

The following minimum specification is recommended:

- 3.0 GHz single core or 2.4 GHz multi core processor + 2 GB RAM
- 100 MB free hard disc to install software (at least 1 GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40 MB/s
- Windows (XP, Vista and 7) or Linux

### Regulatory Compliance

Compliant with the requirements of the EU EMC and LV Directives through testing to EN 61326-1 and EN 61010-1



Rear view showing connections

## Ordering information & notes

To order this camera, please quote following model number:

**DU934P-CxV-BR-DD**

x=S (with integrated shutter)

x=0 (without integrated shutter)

The PV Inspector is supplied with the following power supply:

**PS-24** Power supply for air cooling

The PV Inspector also require one of the following software options:

**Andor Solis** A 32-bit Windows compatible software application with rich functionality for data acquisition and processing. Will run under 32-bit and 64-bit Windows (XP, Vista and 7).

**Andor DLL licence** Andor's DLL allows you to control the Andor range of cameras from your own application. Available for 32-bit and 64-bit Windows (XP, Vista and 7) and Linux. A software development kit (Andor SDK) is available for driver development – please enquire.

The following accessories are available for use with the PV Inspector:

<b>XU-TRAN</b>	USB 2.0 Ranger - Transmitter
<b>XU-RECR</b>	USB 2.0 Ranger - Receiver
<b>XU-POWR</b>	15W External Power Supply. <b>NOTE: The XU-TRAN &amp; XU-RECR each need their own supply.</b>
<b>OA-CCFM</b>	C-mount to Canon F-mount adapter
<b>OA-CNAF</b>	C-mount to Nikon F-mount adapter
<b>OA-COFM</b>	C-mount to Olympus F-mount adapter
<b>OA-CTOT</b>	C-mount to T-mount adapter
<b>OA-ECAF</b>	Auto ext. tubes (set of 3) for Canon AF
<b>OA-ECMT</b>	Auto ext. tubes (set of 3) for C-mount
<b>OA-ENAF</b>	Auto ext. tubes (set of 3) for Nikon AF

## iKon-M PV Inspector

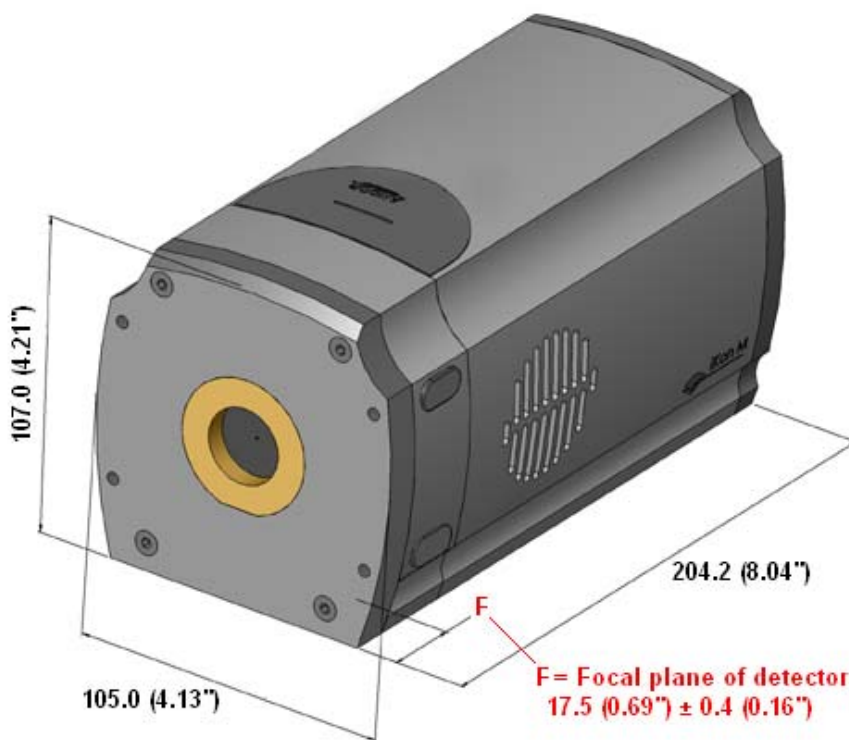
### NOTE:

- ◆1 Edge pixels may exhibit a partial response.
- ◆2 The output saturation that is actually accessible by the CCD system is dependent upon the sensitivity setting & binning mode selected.
- ◆3 Based on a horizontal pixel readout rate of 5 MHz and a vertical shift speed of 5.7  $\mu$ s.
- ◆4 Quantum efficiency of the back-illuminated deep depletion (code: BR-DD) CCD sensor as measured by the CCD manufacturer, providing guidance of the QE profile difference between extremes of +20°C and -100°C cooling. Note that the PV Inspector camera is specified down to -70°C minimum temperature.
- ◆5 Linearity is measured from a plot of counts vs. signal up to the saturation point of the system at 3MHz readout speed. Linearity is expressed as a percentage deviation from a straight line fit.
- ◆6 System Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -50°C and minimum exposure time under dark conditions. Noise values will change with pre-amplifier gain (PAG) selection. Values quoted are measured with highest available PAG setting.
- ◆7 Cooling is provided by the use of an external, mains driven, power supply. Minimum temperatures listed are typical values. Systems are specified in terms of minimum darkcurrent achievable rather than absolute temperature.
- ◆8 Frame rates at 3 MHz and 5 MHz digitization rates for a range of binning or array size combinations. All measurements are made with 5.7 $\mu$ s vertical shift speed. Internal trigger mode of operation and 'zero' exposure time is also assumed.
- ◆9 The cycle time associated with Dual Exposure Ring Mode described the time taken to perform two back to back image acquisitions in this mode. It assumes exposure times of 10  $\mu$ s, 5 MHz horizontal readout and 5.7  $\mu$ s vertical shift time. The cycle time would increase accordingly with use of longer exposure times, which may be of different durations. Note, this mode is only compatible with external trigger.

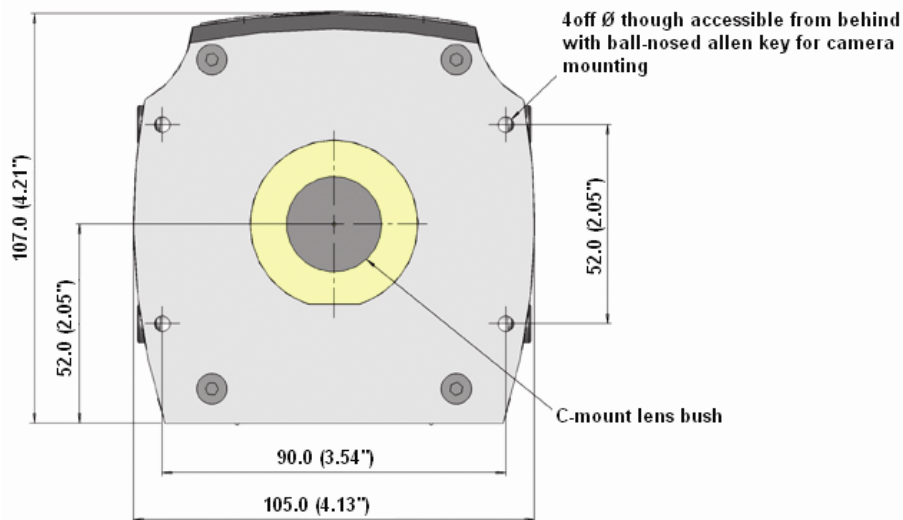
## Dimensions

Weight: 2.6 Kg [5.7 lb]

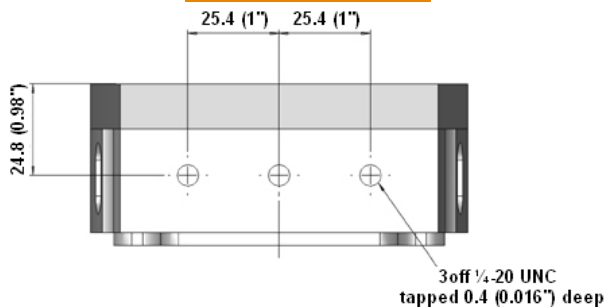
Side / front view



Front face



Mounting hole locations



**Need more information? Please contact us at:**

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