SPECTROSCOPY

" New USB Camera for Spectroscopy "

Andor's DU401A CCD camera with USB connectivity provides thermoelectric cooling down to -100°C, enabling negligible dark current and greatly improved air cooling capabilities.
This camera offers the best price/performance for a wide range of spectroscopy applications.
The 1024 x 127 array with 26μm^2 pixels offers the best dynamic range versus resolution.

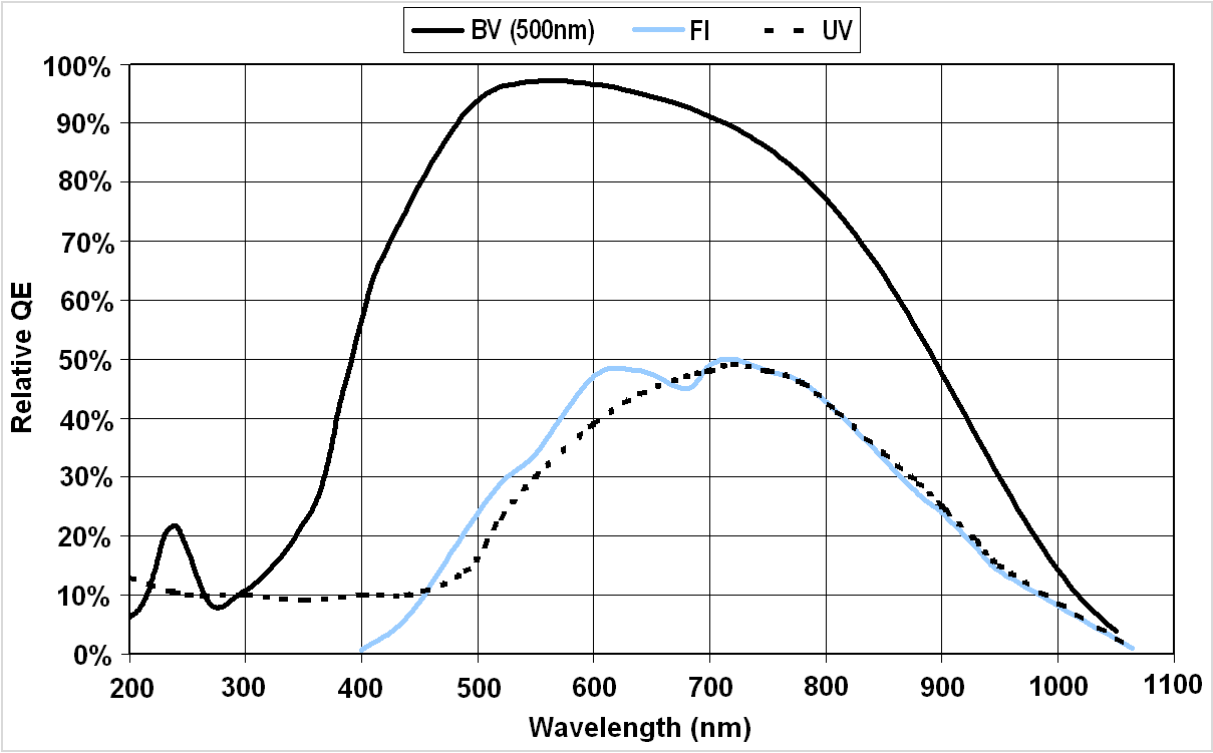
● Peak QE of 95%	...	High detector sensitivity
● Min operating temp of -100°C with TE cooling	...	Negligible dark current without the aggravation or safety concerns associated with LN_2
● UltraVac™ ♦1	...	Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year.
● Simple USB Connection	...	USB connection direct from back of the camera – no controller box required
● Single window design	...	Delivers maximum photon throughput
● Unique Fringe Suppression Technology standard on DU401-BV models	...	Eliminates fringing (etaloning) effects
● Front or back illuminated sensor	...	Offers the ultimate in price/performance options
●26 x 26µm pixel size	...	Optimised pixel size for high dynamic range and resolution
● Andor Solis software	...	Friendly Windows user interface offers system integration, automation and advanced data manipulation facilities
● Software selectable pre-amplifier gain (PAG)	...	Offers best choice for noise and dynamic range

● Camera Overview:

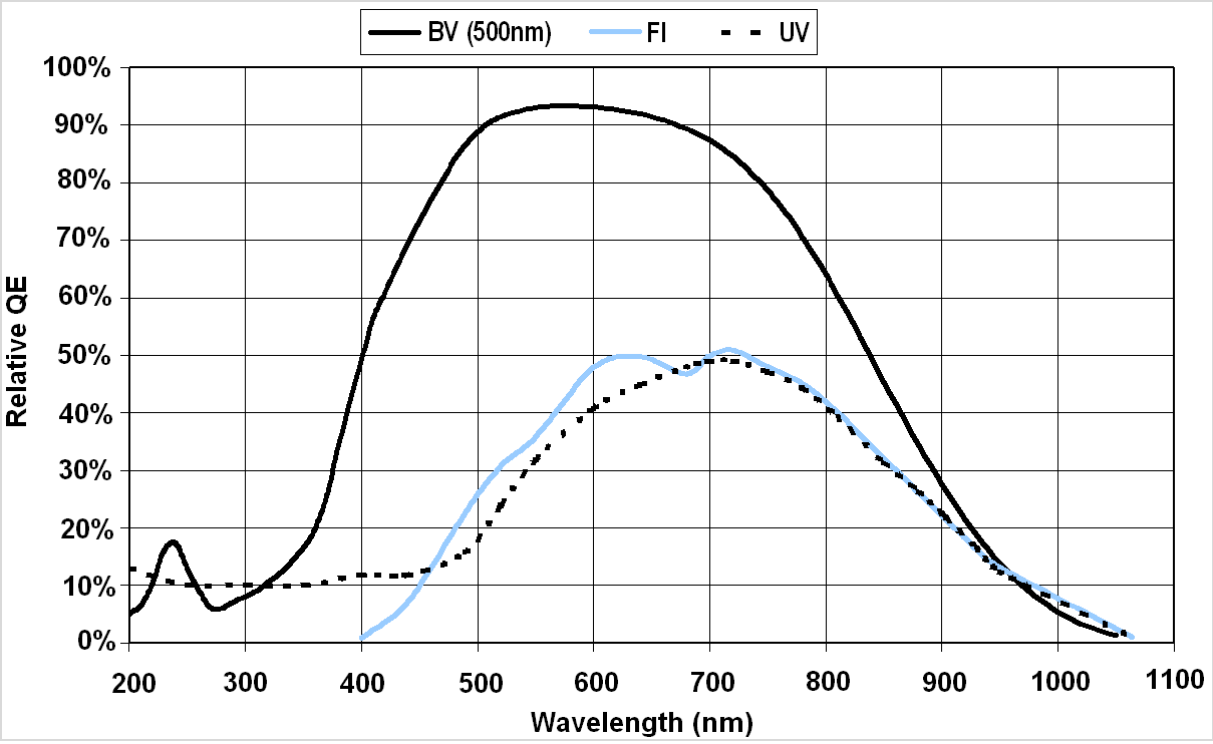
Active Pixels♦2	1024 x 127
Pixel Size (W x H; µm)	26 x 26
Image Area (mm)	26.6 x 3.3
Pixel well depth (e^-, minimum)	180,000
(typical)	300,000
Register Well Depth (e^-, typical) ♦3	1,000,000
Max spectra per sec (FVB) ♦4, ♦7	81
Read Noise (e^-, typical)*	3 @ 33 kHz

* Noise quoted is for FI device

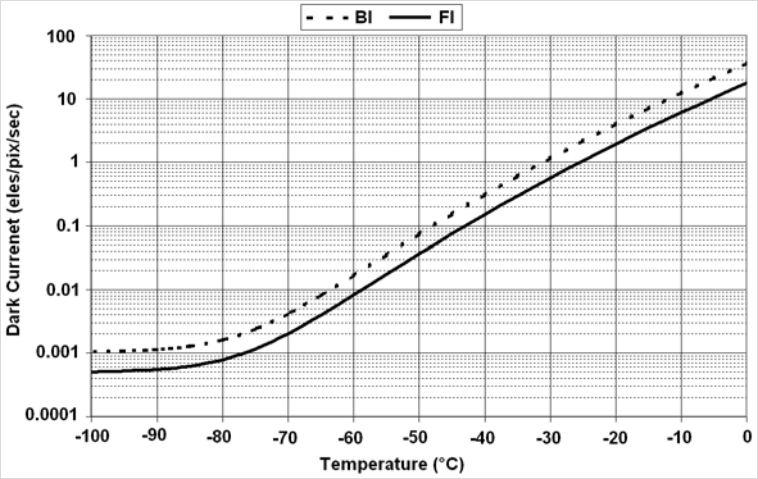
- Quantum Efficiency @ Room Temperature♦5



- Quantum Efficiency @ -100°C



● Dark Current♦6



● Minimum Temperatures ♦7

	Using PS-25	Using PS-24
Air-cooled (ambient air @ 20°C)	-80°C	-70°C
Re-circulator (XW-RECR) (ambient air @ 20°C)	-95°C	-80°C
Water-cooled (@ 10°C, 0.75 l / min)	-100°C	-85°C

● System Characteristics

Dummy Pixels ♦8	8, 8, 0, 0
Linearity (%, maximum) ♦9	1
Vertical Clock Speed (µs) ♦10	8, 16, 32

Sensitivity (e^-/count) typical values

	PAG x1	PAG x1.7
@ 33 KHz	2	N/A
@ 50 KHz	3.5	2.5
@ 100 KHz	14	9

Digitization	16-bit
Camera window type	Single quartz window; AR coating and MgF_2 window available

● Noise

System Readout Noise (e^-) ♦11 [BI]

	Typical	Maximum
33 kHz pixel readout rate	3 [6]	5 [8]
50 kHz pixel readout rate	4 [9]	6 [12]
100 kHz pixel readout rate	8 [11]	12 [15]

● Computer

Minimum:

- 800MHz Pentium + 256Mbytes RAM
- Minimum of 25MB free hard disc to install software
- USB 2.0

Recommended:

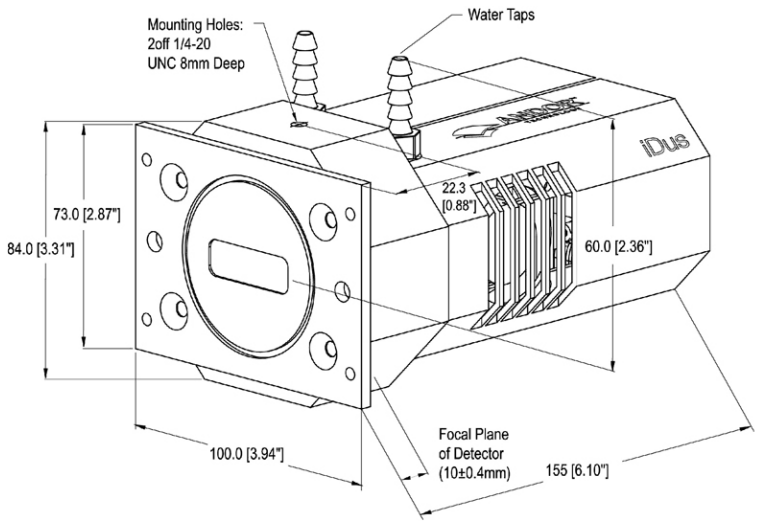
- 2.4GHz Pentium (or better) + 512 Mbytes RAM

● Operating & Storage Conditions

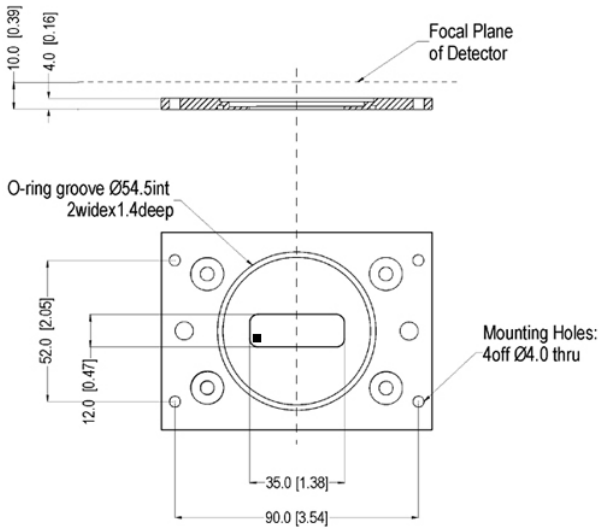
Operating Temperature	0°C to 30°C ambient
Relative Humidity	< 70% (non-condensing)
Storage Temperature	-25°C to 55°C

● Dimensions

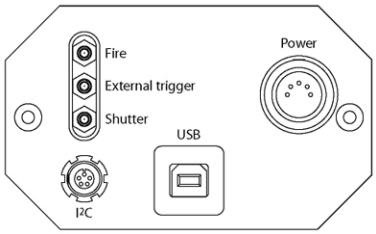
● Weight: 2 Kg [4 lb 8 oz]



NOTE: There are two mounting holes (1/4-20UNC), one located on the top of the CCD head and one on the bottom. They are positioned centrally at a distance of 22mm from the front of the front face.



■ = position of pixel (1,1)



Rear connections

Cable clearances required at rear of camera:

Exit connector type	Clearance
Power supply cable	90 mm
USB cable	60 mm
Right angled variant of power supply cable	40 mm

NOTE: There are two (¼-20UNC) mounting holes. One is located on the top of the camera head and the other is located on the bottom of the head. They are positioned centrally at a distance of 22mm from the front of the front face.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

Notes

♦1 Assembled in a state-of-the-art Class 10,000 clean-room facility, Andor's UltraVac™ vacuum process combines a permanent hermetic vacuum seal (no o-rings), with a stringent protocol to minimize outgassing, including use of proprietary materials. Outgassing is the release of trapped gases that would otherwise prove highly problematic for high-vacuum systems.

♦2 Edge pixels may exhibit a partial response.

♦3 The register well depth that is actually accessible by the CCD system is dependent on the sensitivity setting

♦4 Based on a Horizontal Pixel Readout of 100KHz and a vertical pixel shift of 8µS

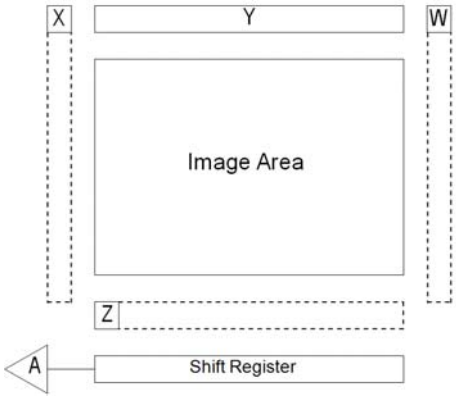
♦5 Quantum efficiency of the CCD sensor as measured by the CCD Manufacturer

♦6 The graph shows typical dark current level as a function of temperature for front illuminated (FI) and back illuminated (BI) CCDs. The dark current measurement is averaged over the CCD area excluding any regions of blemishes.

♦7 Cooling is provided by the use of an external mains driven power brick. Minimum temperatures listed are typical values. Systems are specified in terms of minimum dark current achievable rather than absolute temperature

♦8 Chip manufacturers may include a number of pixels or elements that are neither active nor part of the shift register. Andor refers to these pixels as dummy pixels and represents them in a 4-part notation (W,X,Y,Z), where:

W = dummy pixels to the right of the shift register (non-amplifier end)
X = dummy pixels to the left of the shift register (amplifier end)
Y = dummy pixels at the top of the image area
Z = dummy pixels between the shift register and the image area.
A = position of output amplifier



It should be noted that the elements can be made up of either, pixels, rows or columns. The diagram shows what is seen when looking at the front of the CCD.

♦9 Linearity is measured from a plot of Counts vs. Signal up to the saturation point of the system. Linearity is expressed as a percentage deviation from a straight line fit.

♦10 Vertical speeds are software selectable. All sensors are guaranteed to operate at 16µS vertical pixel shift and most can be clocked faster. At these faster speeds there may be some degradation of Charge Transfer Efficiency (CTE).

♦11 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 is measured at the highest available pre-amplifier gain for each speed.

Ordering Information

To order the camera you require, please quote one of the following model number(s):

DU401A- BV: back illuminated – AR coated for optimal performance in the visible region
FI: standard front illuminated device
UV: front illuminated device with UV coating

- The DU401A requires one of the following power supplies (please specify at time of ordering):

  PS-24 Power supply for air or water cooling
  PS-25 Switchable power supply for maximum air or water cooling, with 2x settings; standard or deep cooling.

- The DU401A also requires one of the following software options:

  Andor Solis (S) A ready-to-run Windows 2000 or XP-based package with rich functionality for data acquisition and processing.

  Andor SDK A DLL driver and software development kit that let you create your own applications for the Andor Camera. Available for Windows 2000 or XP and Linux.

- The following accessories are available for the DU401A:

  XW-RECR Re-circulator for enhanced cooling performance
  SD-166 iDus shutter driver
  P25 Shutter Prontor 25mm shutter

Need more information? Please contact us at:

International Office	US Office	Japanese Office	Chinese Office
Phone +44 28 9023 7126	Phone 800.296.1579	Phone +81 3 3511 0659	Phone +86-10-5129-4977
Fax +44 28 9031 0792	Fax 860.290.9566	Fax +81 3 3239 8264	Fax +86-10-6445-5401