iDus DU401A BR-DD

ANDOR TECHNOLOGY

spectroscopy

Features & benefits

Unique Fringe Suppression Technology standard on DU401-BV models
Eliminates fringing (etaloning) effects.

Peak QE of 94%
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

Front or back illuminated sensor
Offers the ultimate in price/performance options.

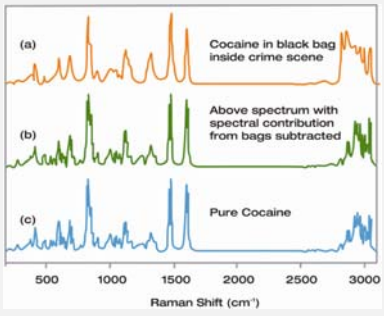
26 x 26µm pixel size
Optimised pixel size for high dynamic range and resolution.

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

Applications

- Absorption/Transmittance/Reflection
- Atomic Transmission spectroscopy
- Fluorescence
- NIR spectroscopy
- Raman spectroscopy



Forensic spectra of cocaine sample obtained from a real crime scene using Raman spectroscopy.

"USB Camera for Spectroscopy"

Andor's DU401A CCD camera with USB connectivity provides thermoelectric cooling to -100°C, enabling negligible dark current and greatly improved air cooling capabilities.

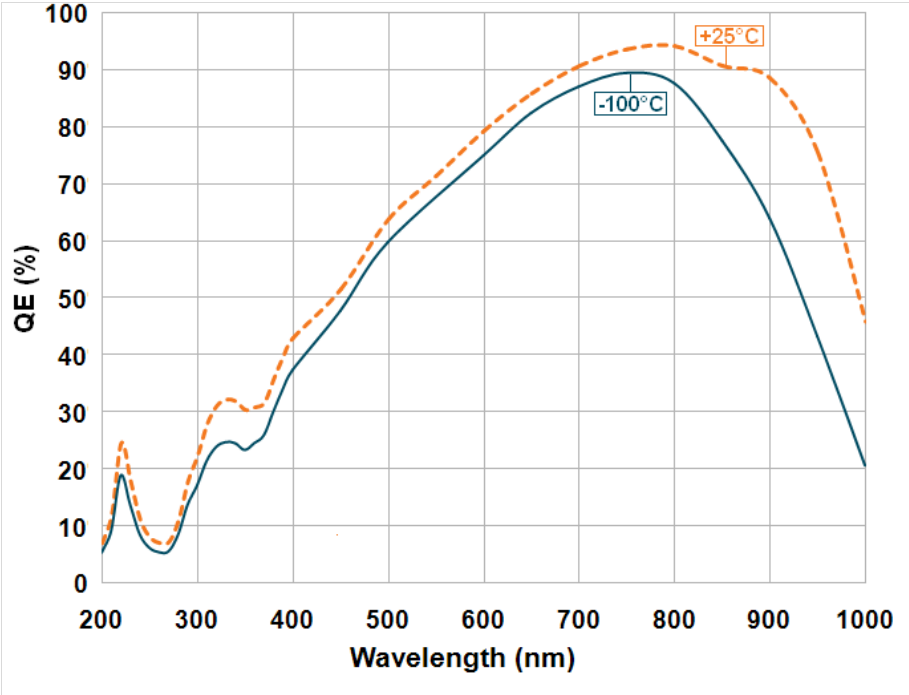
This camera is designed to offer the ultimate for applications in the NIR. Along with Andor's DU420A BR-DD camera, these systems are currently the only Deep Depletion spectroscopic sensors that incorporate Fringe Suppression Technology™ to minimize fringing effects.

The 1024 x 128 array camera is ideally suited to rapid, multi-channel, low-light applications including fluorescence and Raman spectroscopy.

Camera overview

Active Pixels♦2	1024 x 128
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

Quantum efficiency♦5



Technical specifications

System characteristics

Dummy Pixels[6]	8, 8, 0, 0		
Linearity (%, maximum)[7]	1		
Vertical Clock Speed (µs)[8]	16		
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 coated on both sides. 1° degree wedge optimized at 900 nm.		

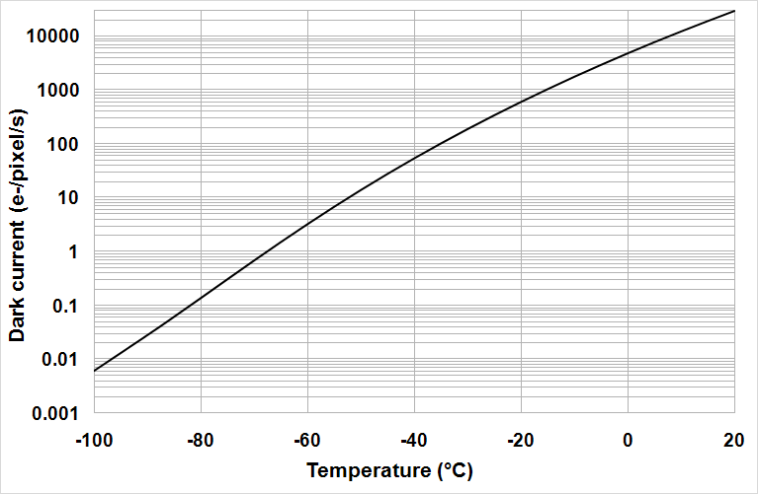
System readout noise[9]

	Typical	**Maximum**
@ 33 KHz pixel readout rate	3	5
@ 50 KHz pixel readout rate	4	6
@ 100 KHz pixel readout rate	8	12

Minimum Temperatures[10]

	PS-25
Air cooled (ambient air at 20ºC)	-80ºC
Re-circulator (XW-RECR) (ambient air @ 20ºC)	-95ºC
Water-cooled (@ 10 ºC, 0.75 l / min)	-100ºC

Dark current[11]



Operating & storage conditions

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

Power requirements

- 5Vdc with 15 Watts
- 7.5Vdc with 30 Watts
- ±15Vdc with 3 Watts

Computer requirements

The minimum specification required is:

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

The following specification is recommended:

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

Need more information? Please contact us at:

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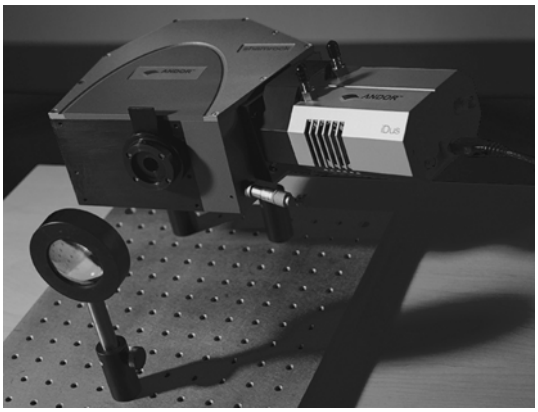


iDus attached to SR163 spectrograph

Ordering information & notes

To order this camera, please quote the following model number:

DU401A BR-DD	Back illuminated deep depletion device

The DU401A BR-DD is supplied with the following power supply as standard:

PS-25	Switchable power supply for maximum air or water cooling, with 2x settings; **standar**d or **deep cooling**.

The DU401A BR-DD 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 ready-to-run Windows 2000 or XP-based package with rich functionality for data acquisition and processing. Available for Windows 2000 or XP and Linux.

The following accessories are available for use with the DU401A BR-DD:

P25 Shutter	Prontor 25mm shutter. **NOTE: Standalone unit, not internal. Does not mount to camera.**
SD-166	iDus shutter driver
XW-RECR	Re-circulator for enhanced cooling performance

Rear view showing connections

Specifications are subject to change without notice

♦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.

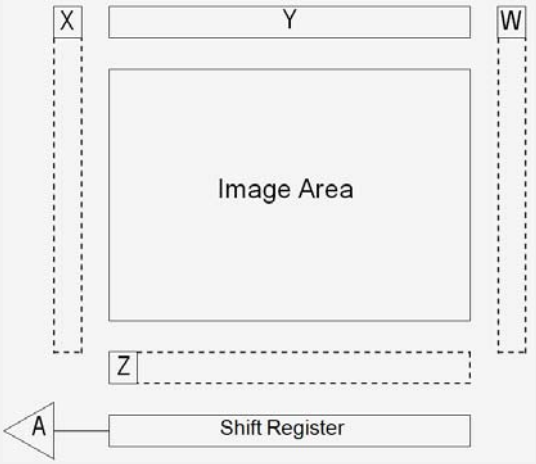
♦2 Edge pixels may exhibit a partial response.

♦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 100 KHz and a vertical pixel shift of 8µS.

♦5 Quantum efficiency of the CCD sensor as measured by the CCD Manufacturer (shown at room temperature).

♦6 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 above shows what is seen when looking at the front of the CCD.

♦7 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.

♦8 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 **C**harge **T**ransfer **E**fficiency (**CTE**).

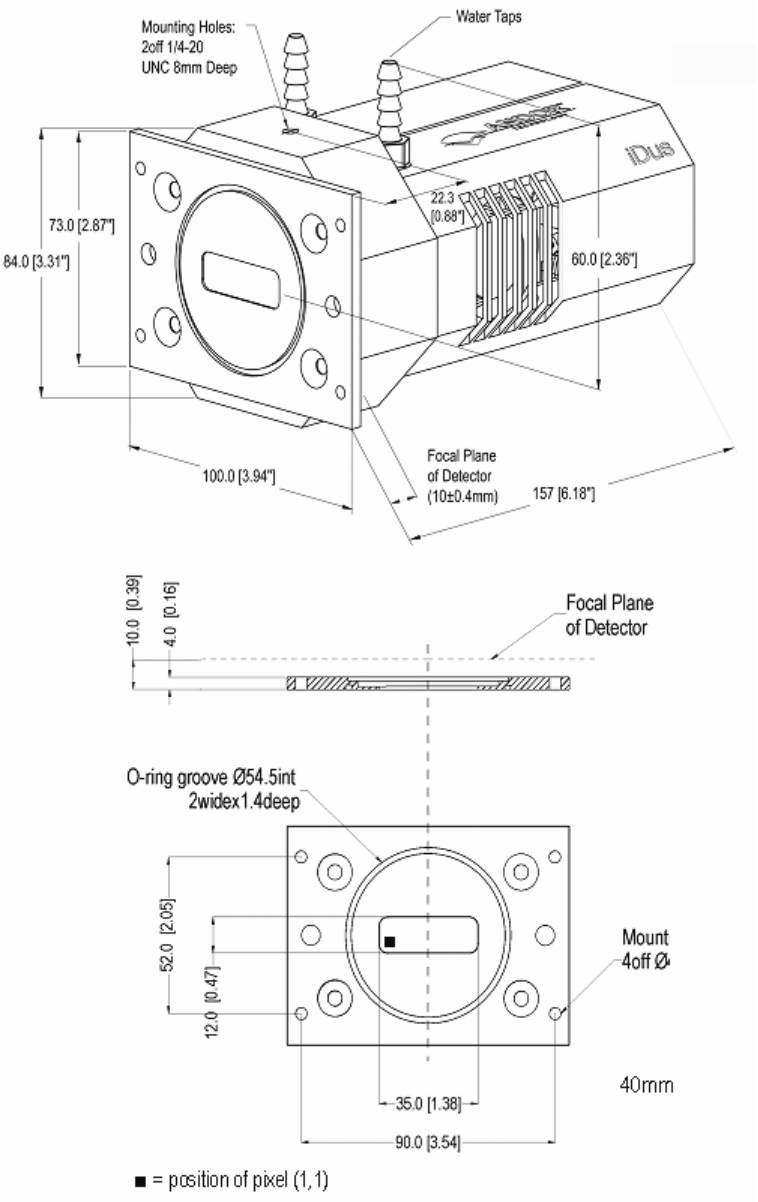
♦9 System Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -50°C and minimum exposure time under dark conditions. Noise is measured at the highest available pre-amplifier gain for each speed.

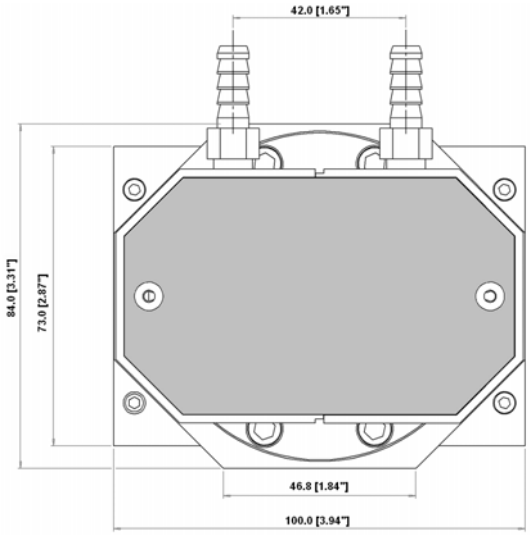
♦10 Cooling is provided by the use of an external mains driven power brick. Minimum temperatures listed are typical values. Systems are specified in terms of minimum dark current achievable rather than absolute temperature.

♦11 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.

Dimensions in mm [inches]

Weight: 2 kg [4 lb 8 oz]

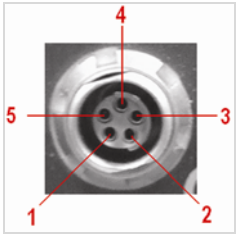




NOTES:

1. **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 22.3 mm from the front of the front face.**
2. **Cable clearances required at rear of camera:**

Exit connector type	Clearance
PS25 cable	90mm
USB cable	60mm
Right angled variant of power supply cable	40mm



I^2C connector pin-outs

Pin	Function
1	SHUTTER (TTL)
2	I^2C CLOCK
3	I^2C DATA
4	+5V
5	GROUND
Fischer Clic-Loc™ SC102A054-130	