iDus 401 Series

26.6 x 3.3 mm / 1024 x 127 pixel
Spectroscopy CCD
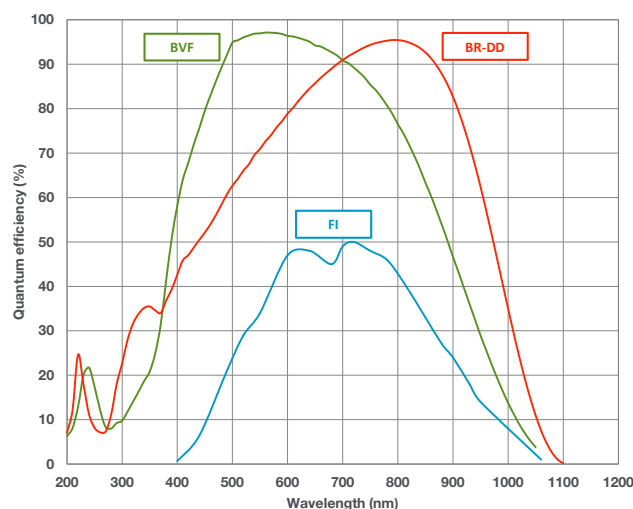
ANDOR
an **Oxford Instruments** company

New

NOW AVAILABLE WITH
ANTI-FRINGING
BACK THINNED
— **TECHNOLOGY** —

Features and Benefits

- **Peak QE up to 95%**
  Visible-optimized 'BVF' & infrared-optimized 'BR-DD' model

- **Fringe suppression technology as standard**
  Fringing greatly eliminated (Deep-Depletion) or minimized (Back-Thinned 'BVF')

- **TE cooling down to -100ºC**
  Critical for elimination of dark current detection limit - no inconvenience associated with LN_2

- **Ultravac™ •1**
  Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year

- **Single UV-grade fused silica window**
  Best UV-NIR throughput performance, specific AR coating and wedge options available

- **26 x 26 μm pixels**
  Optimized format for high dynamic range and resolution

- **Software-selectable pre-amplifier gain**
  Choice of best SNR performance or dynamic range at the touch of a button

- **USB 2.0 connection**
  Ideal for laptop operation
  Seamless operation alongside USB-based Shamrock spectrograph family

- **Compact and rugged platform**
  Ideal for OEM integration & laboratory setups

- **Solis software for Spectroscopy**
  Comprehensive, user-friendly interface for simultaneous detector & spectrograph control

- **Software Development Kit (SDK)**
  Ease of control integration into complex setups: Matlab, Labview, Visual Basic or C/C++

- **Integrated in EPICS**
  Platform is fully integrated into the EPICS control software

Workhorse laboratory and OEM CCD platform

The USB 2.0-based iDus series is a compact, yet feature-rich platform suitable for demanding spectroscopy applications such as low-light UV/NIR Photoluminescence or Raman spectroscopy, as well as day-to-day routine laboratory operation and integration into industry-grade systems.

The iDus 401 boasts market-leading deep thermo-electric cooling to -100°C, complemented by Andor's Ultravac™ technology with its unmatched reliability track record in the scientific and industrial community. The iDus low-noise electronics allows seamless access to the best signal-to-noise ratio performance for the widest range of photon detection regimes. Anti-fringing comes as standard on back-illuminated sensors for this 1024 x 127, 26 μm pixels array optimized for high dynamic range and high resolution acquisitions from far UV to NIR.

Specifications Summary •2

Active pixels	1024 x 127
Pixel size (W x H)	26 x 26 μm
Image area	26.6 x 3.3 mm
Register well depth (typical)	1,000,000 e⁻
Maximum cooling	-100ºC
Maximum spectra per sec	88
Read noise	As low as 3 e⁻
Dark current	As low as 0.0005 e⁻/pixel/sec

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26.6 x 3.3 mm / 1024 x 127 pixel
Spectroscopy CCD

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Key Specifications [2]

Model number	DV401A	DU401A	DU401A BR-DD
Sensor options	• **BVF:** Back Illuminated CCD, Vis-optimized and anti-fringing • **FI:** Front Illuminated CCD	• **BVF:** Back Illuminated CCD, Vis-optimized and anti-fringing • **FI:** Front Illuminated CCD	• **BR-DD:** Back Illuminated CCD, Deep Depletion with anti-fringing Optimum sensor for Near IR applications
Active pixels [3]	1024 x 127		
Pixel size	26 x 26 μm		
Image area	26.6 x 3.3 mm with 100% fill factor		
Minimum temperatures [4] Air cooled Coolant recirculator Coolant chiller, coolant @ 10ºC, 0.75l/min	-55ºC -65ºC -70ºC	-80ºC -95ºC -100ºC	-80ºC -95ºC -100ºC
Max spectra per second [5]	88 (10 row crop mode), 81 (Full Vertical Bin)		
System window type	**BVF, FI sensors:** UV-grade fused silica, 'Broadband VUV-NIR', unwedged **BR-DD sensor:** UV-grade fused silica, 'VIS-NIR enhanced', wedged (Various AR coatings & MgF$_2$ options available)		
Blemish specifications	Grade 1 as per sensor manufacturer definition		

Advanced Specifications [2]

Dark current, e$^-$/pixel/sec @ max cooling FI BVF BR-DD	0.0035 0.006 -			0.0005 0.003 -			- - 0.013		
Register well depth	1,000,000 e$^-$								
Read noise (e$^-$) [6]	33 kHz	50 kHz	100 kHz	33 kHz	50 kHz	100 kHz	33 kHz	50 kHz	100 kHz
FI: Typ (Max) BVF: Typ (Max) BR-DD: Typ (Max)	3 (5) 7 (8) -	4 (6) 10 (12) -	9 (12) 12 (15) -	3 (5) 7 (8) -	4 (6) 10 (12) -	9 (12) 12 (15) -	- - 5 (6)	- - 6 (8)	- - 10 (15)
Sensitivity (e$^-$/count)	33 kHz	50 kHz	100 kHz	33 kHz	50 kHz	100 kHz	33 kHz	50 kHz	100 kHz
High Dynamic Range mode High Sensitivity mode	2 -	3.5 2.5	14 9	2.5 -	3.5 2.5	16 11	2.5 -	4.5 2.7	18.2 12
Linearity [7]	Better than 99%								
Digitization	16 bit								
Vertical clock speed [8]	8, 16, 32, 64 μs (software selectable)								

Have you found what you are looking for?

Need a larger sensor? The iDus 420 series is similar to the 401 series with 26.6 x 6.6 mm format and 1024 x 255 pixels.

Need to work further into the NIR? The iDus InGaAs series, with up to 1024 pixel linear array with transmission to 2.2 μm.

Need a faster or more sensitive CCD? The Newton series offers over 1,600 spectra per second and EM technology.

Need more UV sensitivity? The iDus 420 series is similar to the 401 series with a range of UV optimized sensors.
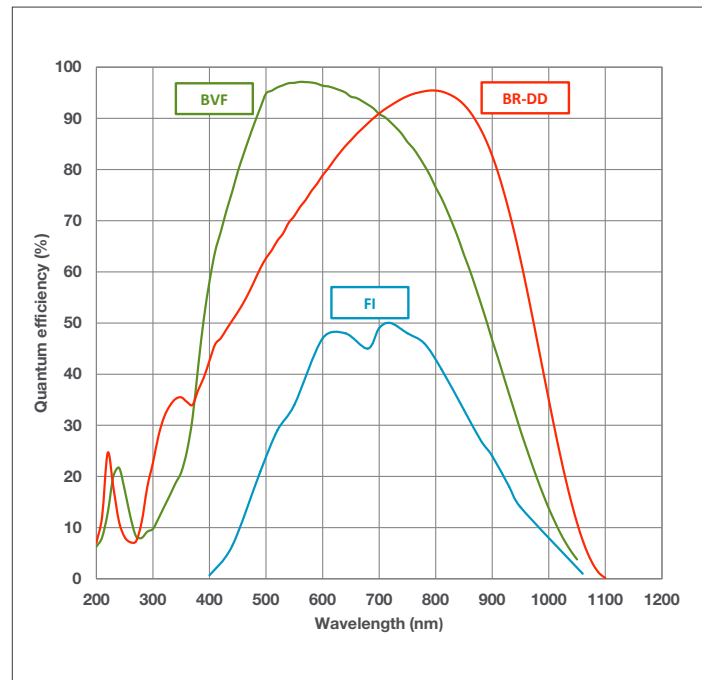
Need a customized version? Please contact us to discuss our Customer Special Request options.

The iDus series combines seamlessly with Andor's research grade Shamrock Czerny-Turner spectrographs.
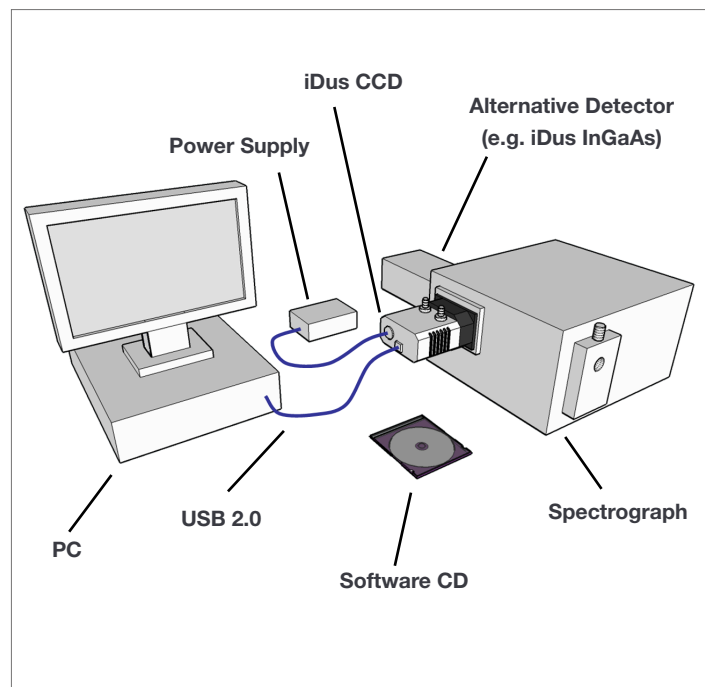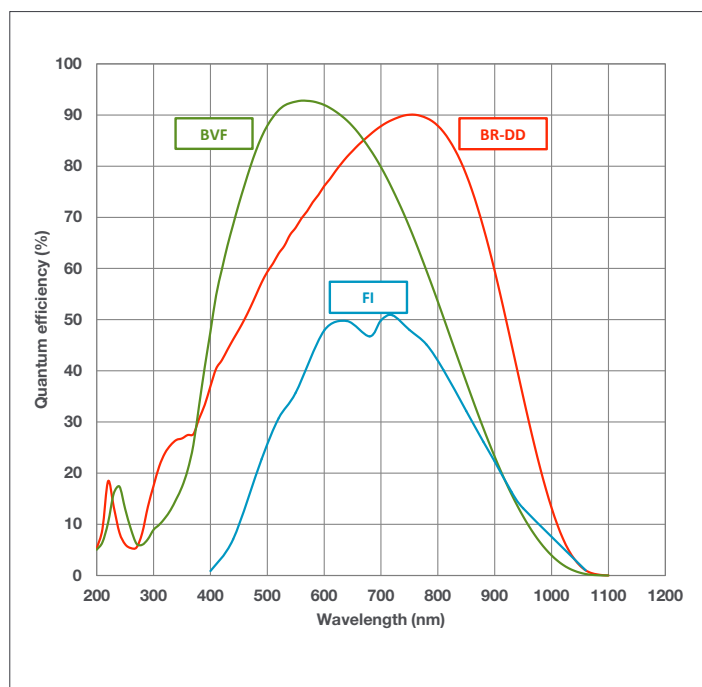
Dark Current [9]
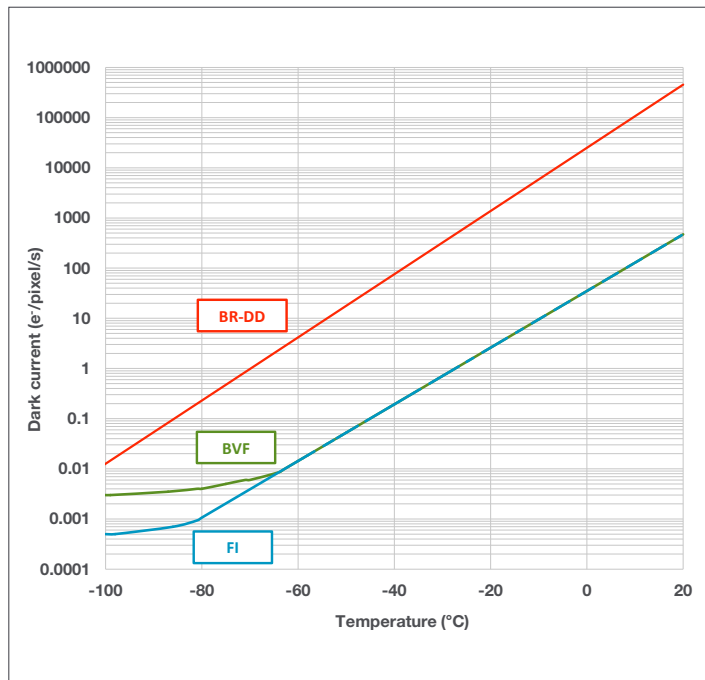
Quantum Efficiency Curves [10]

25°C

Typical Setup

Quantum Efficiency Curves [10]

-100ºC

# Creating the Optimum Product for you

DV 401A- BVF

example shown

Step 1.   Choose the cooling option

Cooling

Description	Code
Standard cooling: (Air cooled : -55ºC, Coolant recirculator: -65ºC, Coolant chiller, coolant @ 10ºC, 0.75 l/min: -70ºC) (not a valid option with the BR-DD model)	**DV**
Deep cooling: (Air cooled: -80ºC, Coolant recirculator: -95ºC, Coolant chiller, coolant @ 10ºC, 0.75 l/min: : -100ºC)	**DU**

Step 2.   Choose the sensor type option

Sensor Type

CCD
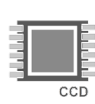
Description	Code
Front Illuminated CCD	**FI**
Back Illuminated CCD, Vis-optimized with anti-fringing	**BVF**
Back Illuminated, Deep Depletion CCD with anti-fringing	**BR-DD**

## Step 3.   Select an alternative camera window (optional)

Camera Window

The standard window has been selected to satisfy most applications. However, other options are available. The alternative camera window code must be specified at time of ordering.

To view and select other window options please refer to the 'Camera Windows Supplementary Specification Sheet' which gives the transmission characteristics, product codes and procedure for entering the order. Further detailed information on the windows can be found in the Technical note – 'Camera Windows: Optimizing for Different Spectral Regions'.

Step 4.   Select the required accessories and adapters
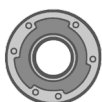
Accessories & Adapters

Description	Order Code
Coolant re-circulator for enhanced cooling performance	**XW-RECR**
Oasis 160 Ultra Compact Chiller Unit (tubing to be ordered separately)	**ACC-XW-CHIL-160**
6 mm tubing option for ACC-XW-CHIL-160	**ACC-6MM-TUBING-2xxxxM**
C-mount lens adaptor	**LM-C**
F-mount lens adaptor	**LM-NIKON-F**
Nikon F-mount lens adaptor with shutter	**LMS-NIKON-F-NS25B**
Shutter Driver for NS25B Bistable Shutter (not needed for Shamrock spectrographs)	**ACC-SD-VDM1000**
Bistable Shutter, Standalone (not needed for Shamrock spectrographs)	**ACC-SHT-NS25B**

Spectrograph Compatibility

The iDus series is fully compatible with Andor's Shamrock spectrograph (163 - 750 nm focal lengths) family. Spectrograph mounting flanges and software control are available for a wide variety of 3rd party spectrographs including McPherson (including 1 m and greater focal length option), JY/Horiba (excluding USB models), PI/Acton, Chromex/Bruker, Oriel/Newport, Photon Design, Dongwoo, Bentham, Solar TII and others.

## Step 5.   Select the required software

Software

The iDus requires at least one of the following software options:

Solis for Spectroscopy A 32-bit and fully 64-bit enabled application for Windows (XP, Vista, 7 and 8) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export. Control of Andor Shamrock spectrographs and a very wide range of 3rd party spectrographs is also available, see list below.

Andor SDK A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32 and 64-bit libraries for Windows (XP, Vista, 7 and 8) and Linux. Compatible with C/C++, C#, Delphi, VB6, VB.NET, LabVIEW and Matlab.
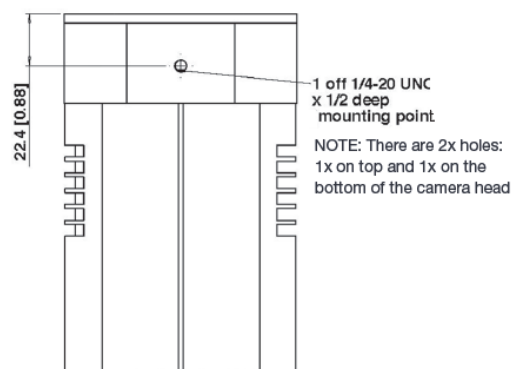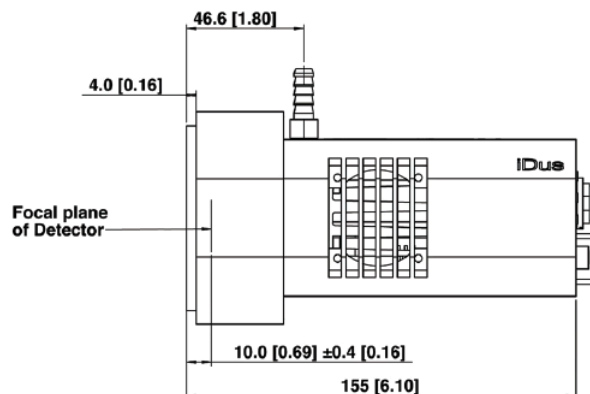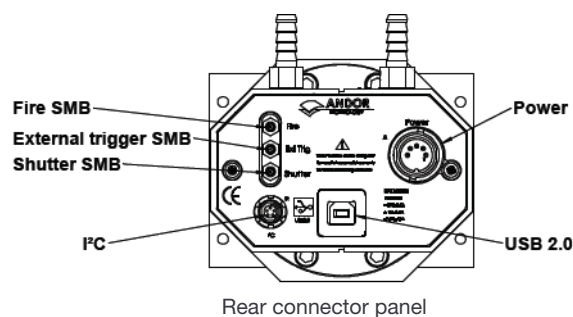
Product Drawings

Dimensions in mm [inches]

Third-angle projection
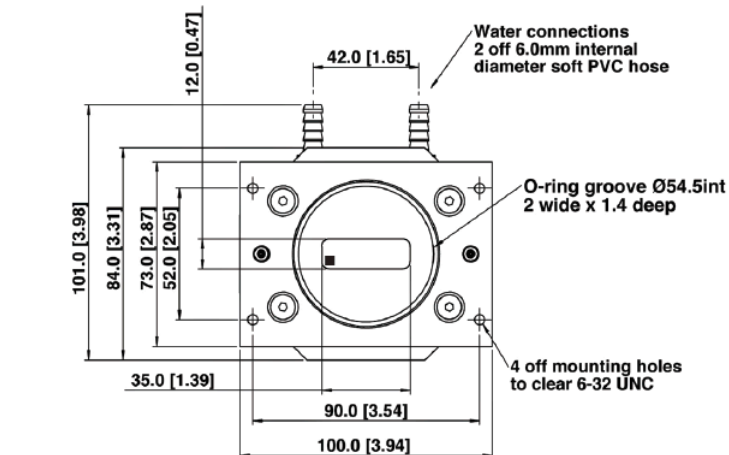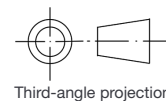
■ = position of pixel 1,1

Weight: 2 kg [4 lb 8 oz]

Mounting hole locations

Rear connector panel

Connecting to the iDus

Camera Control
Connector type: USB 2.0

TTL / Logic
Connector type: SMB, provided with SMB - BNC cable
1 = Fire (Output), 2 = External Trigger (Input), 3 = Shutter (Output)

I²C connector
Compatible with Fischer SC102A054-130
1 = Shutter (TTL), 2 = I²C Clock, 3 = I²C Data, 4 = +5 Vdc, 5 = Ground

Minimum cable clearance required at rear of camera
90 mm

Applications Guide

	DV 401 FI	DV 401 BVF	DU 401 FI	DU 401 BVF	DU 401 BR-DD
Absorption/Transmittance/Reflection	✓	✓	✓	✓	✓
Atomic Emission Spectroscopy				✓	
Fluorescence & Luminescence	✓	✓	✓	✓	✓
NIR Spectroscopy			✓		✓
Raman Spectroscopy (244 – 488 nm)	✓	✓		✓	
Raman Spectroscopy (514, 532, 633 nm)	✓	✓	✓	✓	
Raman Spectroscopy (785, 830 nm)	✓		✓		✓

✓ = Suitable
✓ = Optimum

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North America
Connecticut, USA
Phone +1 (860) 290 9211
Fax +1 (860) 290 9566

China
Beijing
Phone +86 (10) 8271 9066
Fax +86 (10) 8271 9055

Items shipped with your camera:

1x 2m BNC - SMB conection cable
1x 3m USB 2.0 cable Type A to Type B
1x Set of Allen keys (7/64" & 3/32")
1x Power supply with mains cable
1x Quick launch guide
1x CD containing Andor user guides
1x Individual system performance booklet
1x CD containing either Solis software or SDK (if ordered)

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Footnotes: Specifications are subject to change without notice

1. Assembled in a state-of-the-art facility, Andor's UltraVac™ vacuum process combines a permanent hermetic vacuum seal (no o-rings), with a stringent protocol and proprietary materials to minimize outgassing. Outgassing is the release of trapped gases that would otherwise degrade cooling performance and potentially cause sensor failure.
2. Figures are typical unless otherwise stated.
3   Edge pixels may exhibit a partial response.
4. Minimum temperatures listed are typical values with ambient temperature of 25°C.
5. Based on a Horizontal Pixel Readout of 100 kHz and a vertical pixel shift of 8 μs.
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 (BR-DD models tested at -80°C) and minimum exposure time under dark conditions. Noise is measured at the highest available pre-amplifier gain for each speed.
7. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
8. Vertical speeds are software selectable. All sensors are designed to give optimum ChargeTransfer Efficiency (CTE) at 16 μs vertical pixel shift, some decrease in CTE may be observed at faster shift speeds.
9. The graph shows typical dark current level as a function of temperature. The dark current measurement is averaged over the CCD area excluding any regions of blemishes.
10. Quantum efficiency of the sensor as supplied by the sensor manufacturer.

Minimum Computer Requirements:

- 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, 7 and 8) or Linux

Operating & Storage Conditions

- Operating Temperature: 0°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C

Power Requirements

- 100 - 240 VAC, 50 - 60 Hz

bsi. ISO 9001 Quality Management FM40523
bsi. OHSAS 18001 Occupational Health and Safety Management OHS02497
CE
USB CERTIFIED HI-SPEED

EPICS
Windows 7 | Windows 8 | Linux | LabVIEW | MATLAB

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