Spectroscopy

Features and Benefits

- **0.6 to 1.7 µm**
  Operating wavelength range

- **Peak QE of > 85%**
  High detector sensitivity

- **TE cooling to -90°C** [1]
  Negligible dark current without the inconvenience of LN_2

- **UltraVac™** [2]
  Permanent vacuum integrity, critical for deep cooling and sensor performance

- **Single window design**
  Delivers maximum photon throughput

- **25 µm pixel width option**
  Ideal for high-resolution NIR spectroscopy

- **Simple USB 2.0 connection**
  USB plug and play – no controller box. Inputs & Outputs: External Trigger, Fire and Shutter TTL readily accessible. I^2C for the more adventurous user

- **Software selectable output amplifiers**
  Allows user to optimize operation with choice of High Dynamic Range (HDR) or High Sensitivity (HS) modes of operation

- **Minimum exposure time of 1.4 µs**
  Enables higher time-resolution and minimization of dark current contribution for applications with reasonable signal level

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

Andor's iDus InGaAs detector array for Spectroscopy

Andor's iDus InGaAs 1.7 array detector series provides the most optimized platform for Spectroscopy applications up to 1.7 µm. The TE-cooled, in-vacuum sensors reach cooling temperatures of -90°C where the best Signal-to-Noise ratio can be achieved.
Indeed dark current will improve moderately below -90°C where scene black body radiation will dominate, while Quantum Efficiency of the sensor will be greatly impacted at these lower temperatures and lead to a lower Signal-to-Noise ratio.

Specifications Summary

Active pixels	**512 or 1024**
Pixel size (W x H)	**25 x 500 or 50 x 500 µm**
Pixel well depth (typical)	
High Dynamic Range mode	**170 Me-**
High Sensitivity mode	**5 Me-**
Maximum cooling [1]	**-90ºC**
Maximum spectra per sec	**193**
Read noise (typical)	**580 e-**
Dark current (typical)	**11.7 ke-/pixel/sec**
Minimum exposure time	**1.4 µs**

iDus InGaAs 1.7 µm

600 nm - 1.7 µm
Spectroscopy InGaAs PDA

ANDOR
an **Oxford Instruments** company

Key Specifications [3]

Model number	DU490A	DU491A	DU492A
Sensor options	512 pixels, 25 µm pitch	1024 pixels, 25 µm pitch	512 pixels, 50 µm pitch
Active pixels	512	1024	512
Pixel size	25 x 500	25 x 500	50 x 500
Cooler type		DU	
Wavelength range		600 nm - 1.7 µm	
Minimum exposure time [4]		1.4 µs	
Minimum temperatures [5] Air cooled Coolant chiller, coolant @ 16°C , 0.75 l/min Coolant chiller, coolant @ 10°C, 0.75 l/min		-70°C -85°C -90°C	
Max spectra per second (100 kHz readout)	193	97	193
System window type		UV-grade fused silica, 'Broadband VUV-NIR', unwedged	
Digitization		16 bit	

Advanced Specifications [3]

	DU490A	DU491A	DU492A
Dark current ke⁻/pixel/sec @ max cooling [6]	10.7	12.0	21.1
Pixel well depth (Me⁻) [7] High Dynamic Range mode High Sensitivity mode		170 5	
Read noise (e⁻) [8] High Sensitivity mode High Dynamic Range mode		580 8150	
Sensitivity (e⁻/count) High Dynamic Range mode High Sensitivity mode		2800 90	
Blemishes [9]	0	≤ 10	≤ 5
Linearity		Better than 99%	
Insertion delay from external trigger		2.95 µs ± 0.1 µs	

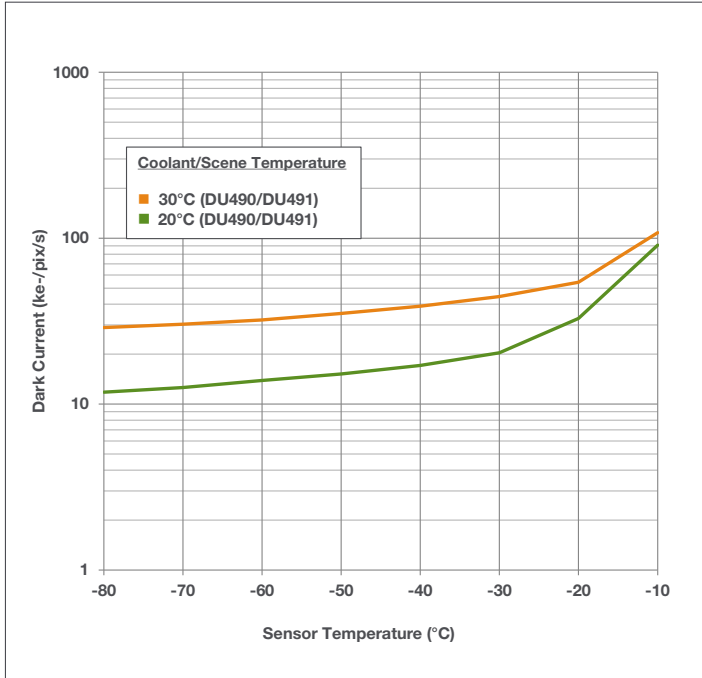## Have you found what you are looking for?

Need extended NIR response? The iDus InGaAs 2.2 µm series offer three array formats.

Need to work below 1 µm? The iDus 401, 416 & 420 series offer Deep Depletion NIR optimized sensors.
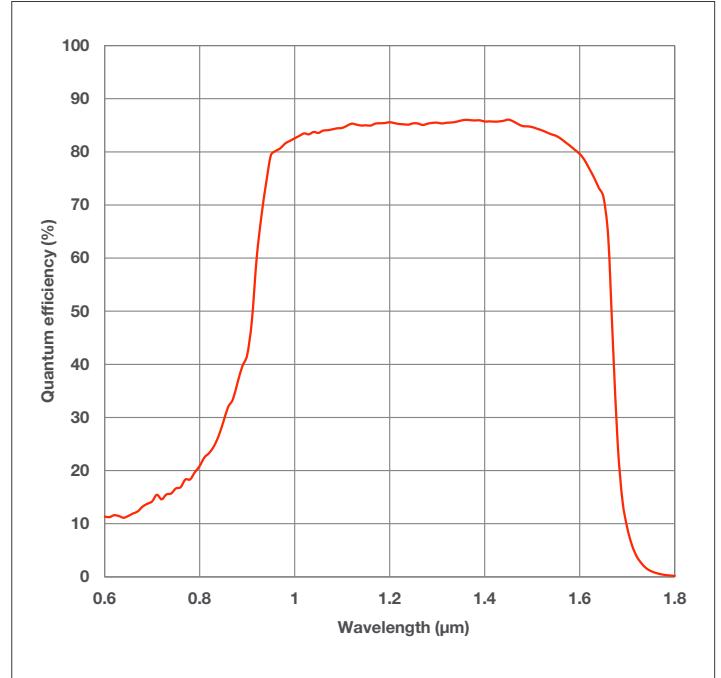
Need a customized version? Please contact us to discuss our Customer Special Request options.

The iDus InGaAs series combines seamlessly with Andor's research grade Shamrock Czerny-Turner spectrographs. These instruments are available on request with gold or silver coated optics for optimized NIR operations.
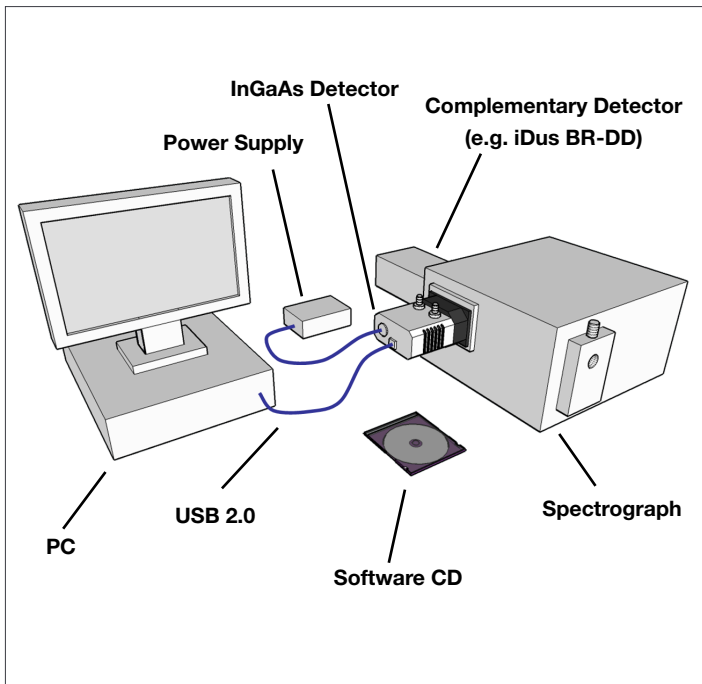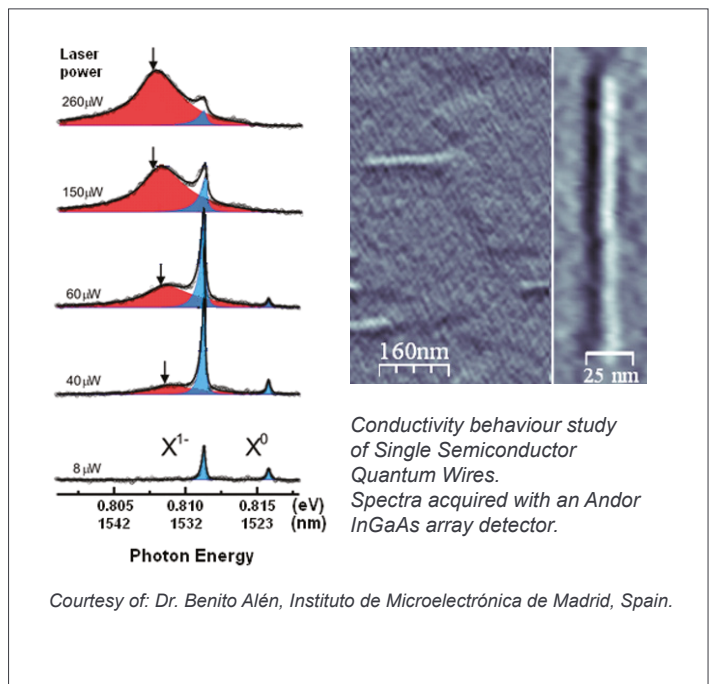
System Dark Current vs Temperature [10]

Quantum Efficiency Curve [11]

20°C

Typical Setup

Typical Application

Conductivity behaviour study of Single Semiconductor Quantum Wires.
Spectra acquired with an Andor InGaAs array detector.

Courtesy of: Dr. Benito Alén, Instituto de Microelectrónica de Madrid, Spain.

iDus InGaAs 1.7 μm

600 nm - 1.7 μm
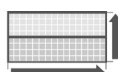Spectroscopy InGaAs PDA

ANDOR
an **Oxford Instruments** company

Creating the Optimum Product for you

DU 490 A-1.7
example shown

Step 1. Choose the sensor array size

Array
Size

Description	Code
25 μm x 500 μm, 512 pixel array	**490**
25 μm x 500 μm, 1024 pixel array	**491**
50 μm x 500 μm, 512 pixel array	**492**

### Step 2. 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 3. Select the required accessories and adapters
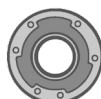
Accessories &
Adapters

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**
SR-750 Adapter Flange for InGaAs detector.	**SR-ASZ-0033**
SR-163 Adapter Flange for InGaAs detector	**SR1-ASZ-8044**
Shutter Driver for NS25B Bistable Shutter (<u>not</u> needed for Shamrock spectrographs)	**ACC-SD-VDM1000**
Bistable Shutter, Standalone (<u>not</u> needed for Shamrock spectrographs)	**ACC-SHT-NS25B**

Spectrograph Compatibility

The InGaAs series is fully compatible with Andor's Shamrock spectrograph (163 - 750 nm focal lengths) family. Shamrock spectrographs are supplied with Al/MgF$_2$ mirror coatings as standard, gold or silver optics are available on request. Spectrograph mounting flanges and software control are available for a wide variety of 3rd party spectrographs including, McPherson, JY/Horiba, PI/Acton, Chromex/Bruker, Oriel/Newport, Photon Design, Dongwoo, Bentham, Solar TII and others.
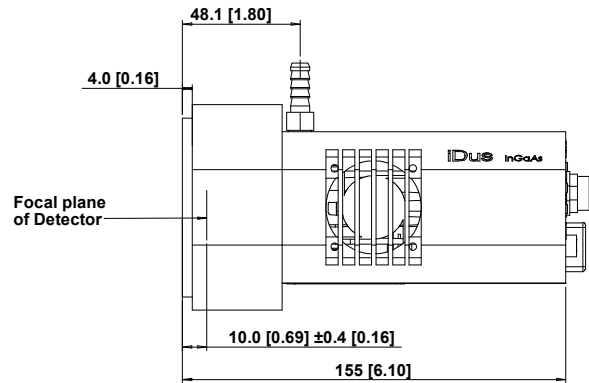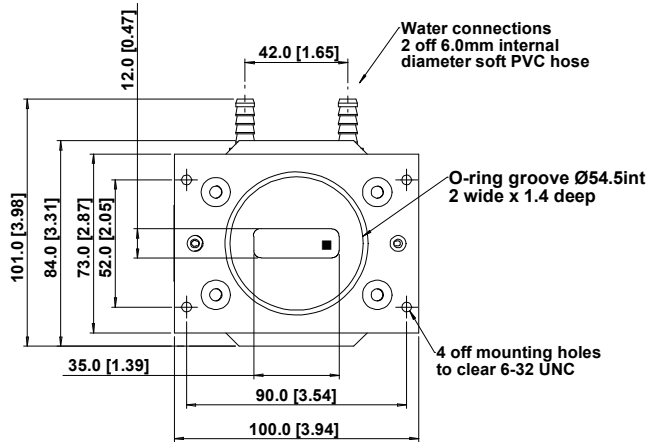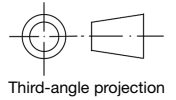
Step 4. Select the required software

Software

The InGaAs 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

Water connections
2 off 6.0mm internal
diameter soft PVC hose

12.0 [0.47]

42.0 [1.65]

101.0 [3.98]
84.0 [3.31]
73.0 [2.87]
52.0 [2.05]

O-ring groove Ø54.5int
2 wide x 1.4 deep

35.0 [1.39]
90.0 [3.54]
100.0 [3.94]

4 off mounting holes
to clear 6-32 UNC

■ = position of pixel 1,1

Weight: 2 kg [4 lb 8 oz]

48.1 [1.80]
4.0 [0.16]

Focal plane
of Detector

10.0 [0.69] ±0.4 [0.16]
155 [6.10]

22.4 [0.88]

1 off 1/4-20 UNC
x 1/2 deep
(mounting point)
NOTE: There are 2x holes:
1x on top and 1x on the
bottom of the camera head

Mounting hole locations

Connecting to the InGaAs

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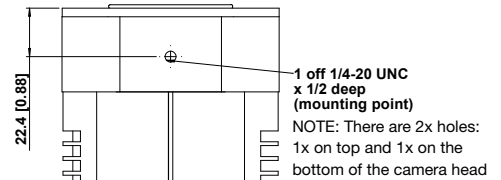
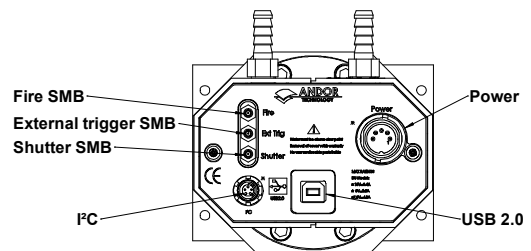**I²C connector**
Compatible with Fischer SC102A054-130
1 = Shutter (TTL), 2 = I²C Clock, 3 = I²C Data, 4 = +5 Vdc, 5 = Ground

Minimum cable clearance required at rear of camera
90 mm

Fire SMB
External trigger SMB
Shutter SMB

Power

I²C
USB 2.0

Rear connector panel

Applications Guide

	DU490-1.7	DU491-1.7	DU492-1.7
NIR Absorption-Transmission-Reflection Spectroscopy	✓	✓	✓
NIR Photoluminescence	✓	✓	✓
1064 nm Raman Spectroscopy	✓	✓	✓

✓ = Suitable

✓ = Optimum

Order Today

Need more information? At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products. For a full listing of our local sales offices, please see: **andor.com/contact**

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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 (PS-25) 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)

Footnotes: Specifications are subject to change without notice

1. Typically obtainable at ambient temperature of 20°C, coolant chillers operating with 10°C coolant @ 0.75 l/min.
2. 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.
3. Figures are typical unless otherwise stated.
4. The InGaAs sensor starts to 'open' to light up to approximately 1 µs before the rising edge of the Fire pulse. It then starts to 'close' to light up to 1 µs before the falling edge of Fire. This ensures that the camera is 100% responsive by the time the Fire pulse has risen and closed by the falling edge. These figures only need to be taken into account for extremely short exposures.
5. The standard PS-25 power supply is suitable for air cooling and deep cooling. Measured at ambient temperature of 20°C.
6. Measured using 16°C water and 16°C target/scene.
7. At exposures below 20 µs, well depth will be reduced by approximately 1/3 of typical value stated.
8. Noise is measured on a single pixel.
9. Blemishes as stated by sensor manufacturer.
10. The coolant temperature is also representative of the scene temperature that the camera is exposed to during these measurements.
11. Quantum efficiency of the sensor at 20°C as supplied by the sensor manufacturer.

OXFORD INSTRUMENTS
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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 (air cooling): 0°C to 20°C ambient
- Operating (deep cooling): 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 ISO 14001 Environmental Management EMS91062
CE
HI-SPEED USB CERTIFIED

EPICS
Windows 7   Windows 8   Linux   LabVIEW   MATLAB

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