iDus InGaAs 2.2 µm

Detector array for Spectroscopy

Key Specifications

- ✓ Operating wavelength 0.8 - 2.2 µm
- ✓ High detector sensitivity peak QE > 70%
- ✓ 25 µm pixel width option
- ✓ Minimum exposure time of 1.4 µs
- ✓ UltraVac™ sustained vacuum integrity

Key Applications

- ✓ NIR Absorption-Transmission-Reflection Spectroscopy
- ✓ NIR Photoluminescence

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Introducing iDus InGaAs 2.2 µm

Andor's iDus InGaAs 2.2 array detector series provides the most optimized platform for Spectroscopy applications up to 2.2 µm. The TE-cooled, in-vacuum sensors reach cooling temperatures of -90°C where the best Signal-to-Noise ratio can be achieved.

Applications Guide

	DU490-2.2	DU491-2.2
NIR Absorption-Transmission-Reflection Spectroscopy	○	●
NIR Photoluminescence		●

○ = Suitable   ● = Optimum

Features and Benefits

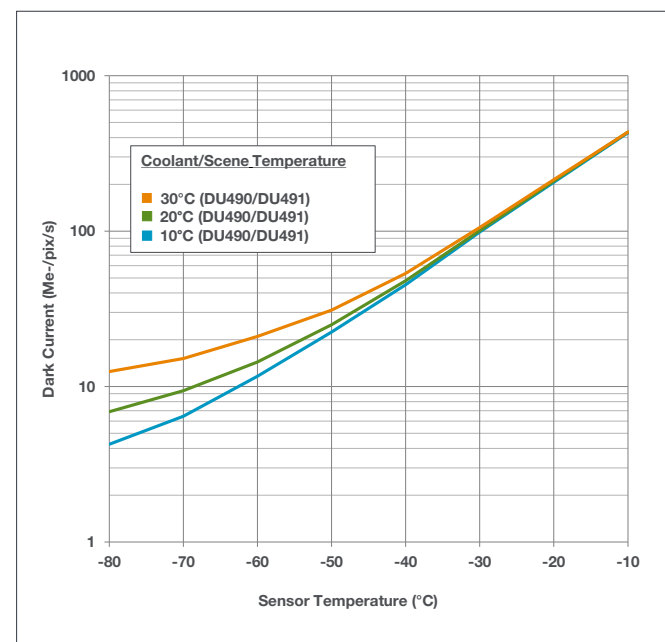| Feature	Benefit
0.8 to 2.2 µm	Operating wavelength range
Peak QE of > 70%	High detector sensitivity
TE cooling to -90°C [1]	Greatly minimised dark current from sensor without the inconvenience of LN_2
UltraVac™ [2]	Permanent vacuum integrity, critical for deep cooling and sensor performance
Single 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. I²C 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

Key Specifications [3]

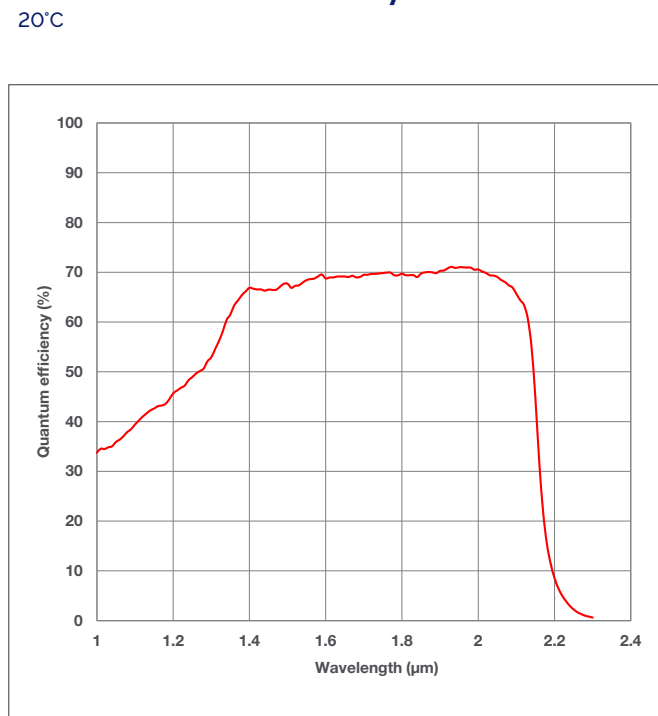| Model number	DU490A	DU491A
Sensor options	512 pixels, 25 µm pitch	1024 pixels, 25 µm pitch
Active pixels	512	1024
Pixel size	25 x 250	25 x 250
Cooler type	DU	
Wavelength range	800 nm - 2.2 µm	
Minimum exposure time [4]	1.4 µs	
Minimum temperatures [5] Air cooled Coolant chiller, coolant @ 16°C Coolant chiller, coolant @ 10°C, 0.75 l/min	-70°C -85°C -90°C	
Max spectra per second (100 kHz readout)	193	97
System window type	UV-grade fused silica, 'Broadband VUV-NIR', unwedged	
Digitization	16 bit	

	DU490A	DU491A
Dark current Me-/pixel/sec @ max cooling [6]	5	5
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]	≤10	≤ 20
Linearity	Better than 99%	
Insertion delay from external trigger	2.95 µs ± 0.1 µs	

Technical Information

System Dark Current vs Temperature [10]

Quantum Efficiency Curves [11]
20°C

Typical Setup

InGaAs Detector
Complementary Detector (e.g. iDus BR-DD)
Power Supply
USB 2.0
PC
Software CD
Spectrograph
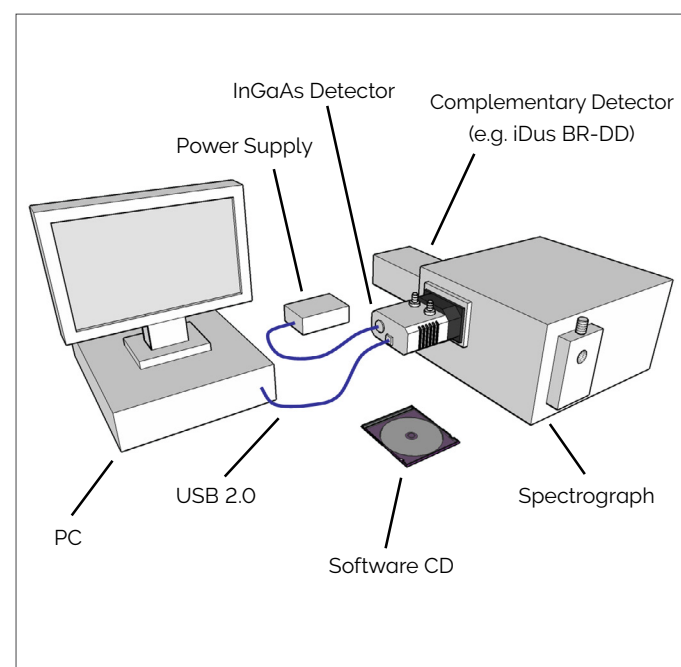
Have you found what you are looking for?

Need better QE between 1 and 1.7 μm?
The iDus InGaAs 1.7 μm series offer better than 85% Quantum Efficiency.

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 Kymera and Shamrock Czerny-Turner spectrographs. These instruments are available on request with gold or silver coated optics for optimized NIR operations.

Creating the Optimum Product for you

Step 1. Choose the sensor array size

Array Size

example shown

DU [490] A-2.2
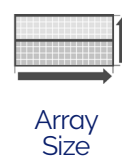
Description	Code
25 μm x 500 μm, 512 pixel array	**490**
25 μm x 500 μm, 1024 pixel array	**491**

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 Selector Tool.

Further detailed information on windows can be found in the technical note – How to Select a Window for your Camera.

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 options for ACC-XW-CHIL-160 (2x2.5 m or 2x5 m lengths)	**ACC-6MM-TUBING-2X2.5/ ACC-6MM-TUBING-2X5M**
SR-750 Adapter Flange for InGaAs detector.	**SR-ASZ-0033**
Shutter Driver for NS25B Bistable Shutter (not needed for Kymera/Shamrock)	**ACC-SD-VED24**
Bistable Shutter, Standalone (not needed for Kymera/Shamrock)	**ACC-SHT-NS25B**

Spectrograph Compatibility
The InGaAs series is fully compatible with Andor's Kymera and Shamrock spectrographs (193 - 750 nm focal lengths). Kymera and 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..

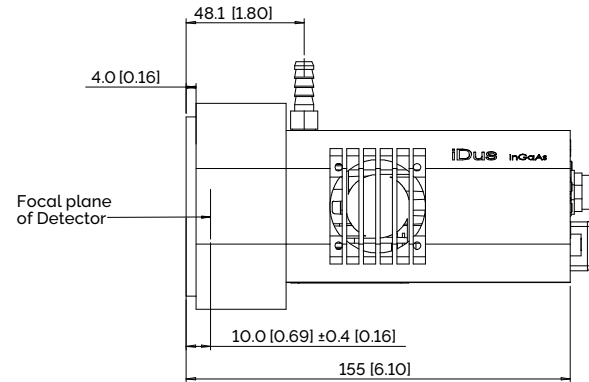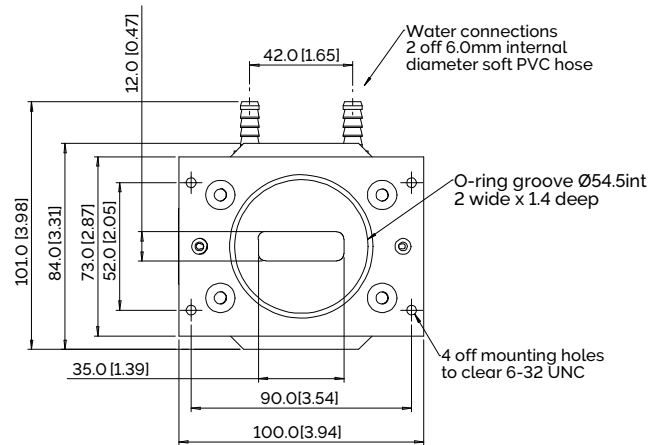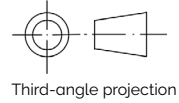### Step 4. Select the required software

Software

The InGaAs requires one of the following software options:
Solis for Spectroscopy
A 32-bit and fully 64-bit enabled application for Windows (8.1 and 10) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export.
Control of Andor Kymera and Shamrock spectrographs and a very wide range of 3rd party spectrographs is also available, see list in Spectrograph Compatibility.
Andor SDK3
A software development kit that allows you to control Andor sCMOS cameras from your own application. Available as a 32-bit or 64-bit library for Windows (8.1 and 10) and Linux. Compatible with C/C++, LabVIEW, MATLAB and Python.
Third party software compatibility Drivers are available for a variety of third party imaging packages. See Andor website for detail: andor.oxinst.com/third-party-software-matrix

Product Drawings

Dimensions in mm [inches]

Third-angle projection

Water connections
2 off 6.0mm internal
diameter soft PVC hose

42.0 [1.65]

12.0 [0.47]

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

48.1 [1.80]

4.0 [0.16]

Focal plane
of Detector

iDus InGaAs

10.0 [0.69] ±0.4 [0.16]

155 [6.10]

■ = position of pixel 1,1

Weight: 2 kg [4 lb 8 oz]

Fire SMB
External trigger SMB
Shutter SMB
Power
I²C
USB 2.0

Rear connector panel

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
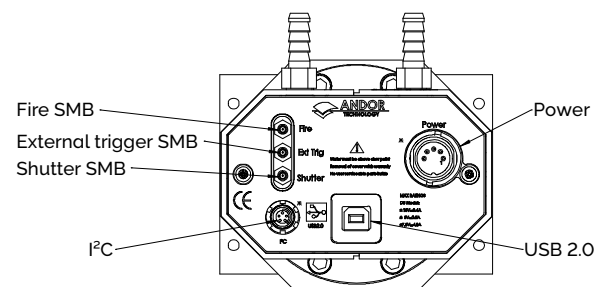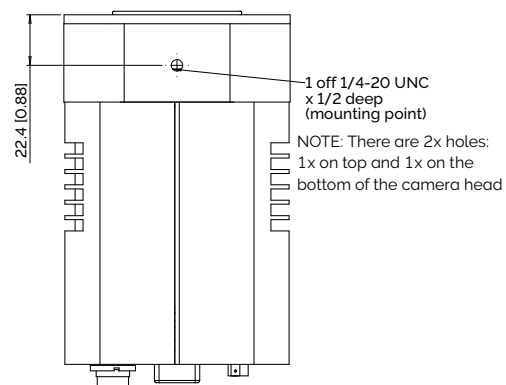
Connecting to the InGaAs

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

Our Cameras for Spectroscopy

Spectroscopy-based diagnostics in the fields of Material Science, Chemistry, Life Science or Fundamental Physics & Optics rely on the capture and analysis of optical and chemical signatures with a high degree of precision.

Andor's range of detectors offer a wide range of sensitivity, time-resolution and sensor formats to best suit specific experimental conditions from UV to SWIR, nanosecond to hours time resolution, high photon flux to single photon with super dynamic range and resolution.

High Sensitivity & Dynamic Range

- ✓ Long exposure
- ✓ High sensitivity UV-SWIR
- ✓ Large pixel well depths
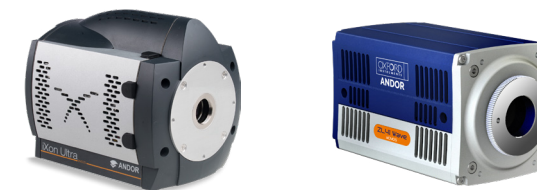- ✓ High resolution matrix

iDus CCD & InGaAs | Newton CCD & EM

ns to µs Time-Resolution

- ✓ Nanosecond gating
- ✓ High sensitivity down to single photon
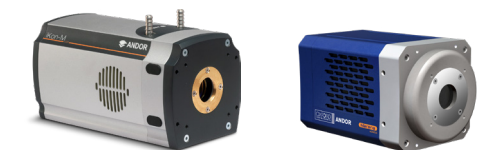- ✓ On-head DDG with ps accuracy

iStar CCD & sCMOS

kHz Spectral Rates

- ✓ µs to ms time-resolution
- ✓ High sensitivity down to single photon
- ✓ High resolution matrix

Newton CCD & EMCCD | iXon EMCCD | ZL41 Wave sCMOS | Marana sCMOS

Extended Multi-fibre Spectroscopy

- ✓ Large area sensors
- ✓ Ultrafast sCMOS and EMCCD options
- ✓ High sensitivity down to single photon

iKon-M CCD | iXon EMCCD | ZL41 Wave sCMOS | Marana sCMOS | iStar CCD & sCMOS

Learn more about our detector range **here**.

Learn more about our spectrograph solutions **here**.

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.oxinst.com/contact**

Our regional headquarters are:

Europe
Belfast, Northern Ireland
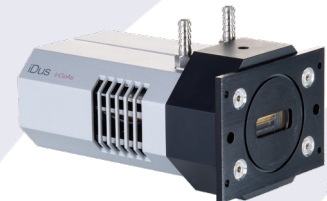Phone +44 (28) 9023 7126
Fax +44 (28) 9031 0792

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Fax +1 (860) 290 9566

Japan
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Phone +81 (3) 6744 4703
Fax +81 (3) 3446 8320

China
Beijing | Shanghai | Guangzhou
Phone +86 (400) 678 0609
Fax +86 (10) 5884 7901

Items shipped with your camera:
1x 2 m BNC - SMB conection cable
1x 3 m USB 2.0 cable Type A to Type B
1x Set of hex keys (7/64" & 3/32")
1x Power supply (PS-25) with mains cable
1x Individual system performance booklet
Electronic copy of user guide and software (if ordered)

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 (8.1 and 10) or Linux

Operating and 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

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. Grade 1 sensor from supplier. For further information on blemish specifications refer to: andor.oxinst.com/learning/view/article/ccd-blemishes-and-non-uniformities
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.

μManager   EPICS   Windows10 Compatible   LabVIEW   MATLAB

Windows is a registered trademark of Microsoft Corporation.
Labview is a registered trademark of National Instruments.
Matlab is a registered trademark of The MathWorks Inc.

bsi. ISO 14001 Environmental Management   EMS91062

bsi. ISO 9001 Quality Management   FM40523

CE

SInGaAs22SS 0924 R1