

NIS-Elements Software Guide

Version 1.5 rev 19 Jan 2015



for the iXon EMCCD Cameras

(covering iXon3, Ultra 897 and 888 models)

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INTRODUCTION

This document explains how to install and setup NIS-Elements for use with the iXon EMCCD Cameras (iXon₃, Ultra 897 and iXon₃ 888).

IMPORTANT INFORMATION ABOUT USING NIS -ELEMENTS

1. NIS-Elements upgrade period after September 1, 2011. This can be confirmed from “HASP Info”.
2. Supported Operating System – Windows 7 Professional SP1 (English/Japanese). Since NIS-Elements Version 4.00.00, Windows XP and Windows Vista are not supported.

TRADEMARKS AND PATENT INFORMATION

Andor®, the Andor logo, iXon Ultra and iXon₃ EMCCD and Solis are trademarks of Andor Technology. Andor is an Oxford Instruments company. NIS-Elements is a trademark of Laboratory Imaging Ltd. All other marks are property of their owners.

Front page image courtesy of Prof. Jan Liphardt and Dr. Alan Lowe, University of California, Berkeley, USA

REVISION HISTORY

Version	Released	Description
1.0	01 Oct 2012	Initial Release
1.1	28 May 2013	General updates to improve presentation and procedures throughout. Updated Minimum Exposure and Frame Rate data in Section 2.6-2.8.
1.2	26 Aug 2013	Added instruction on fan control through macro commands (Section 2.2).
1.3	12 May 2014	Added Software feature Matrix (Section 2.10) Updated presentation (All Sections)
1.4	21 May 2014	Minor edit to text in table for consistency (Section 2.10)
1.5	19 Jan 2015	Updated for iXon Ultra 888

SECTION 1: INSTALLATION OF NIS-ELEMENTS

1.1 'CLEAN' INSTALLATION (INSTALLING NIS-ELEMENTS TO RUN THE IXON EMCCD CAMERA FOR THE FIRST TIME ON A PC)

1. Download the latest hot-fix of NIS-Elements from the Nikon website (see links below).

NIS-Elements D

- **32-bit version**

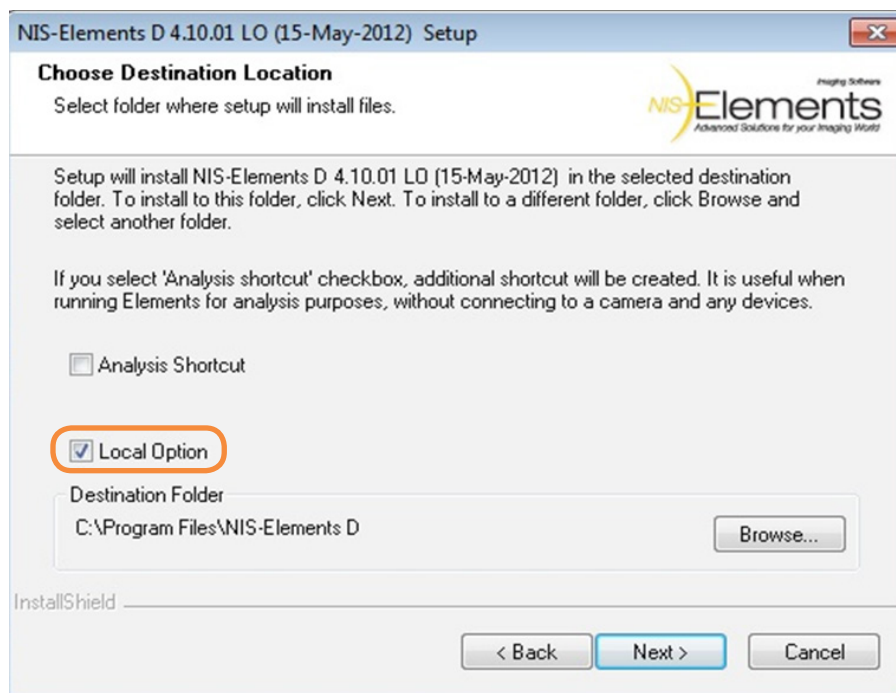
<https://www.nikon-instruments.jp/eng/service/download/DLDownload.aspx?CID=3&SID=198&RNO=55>

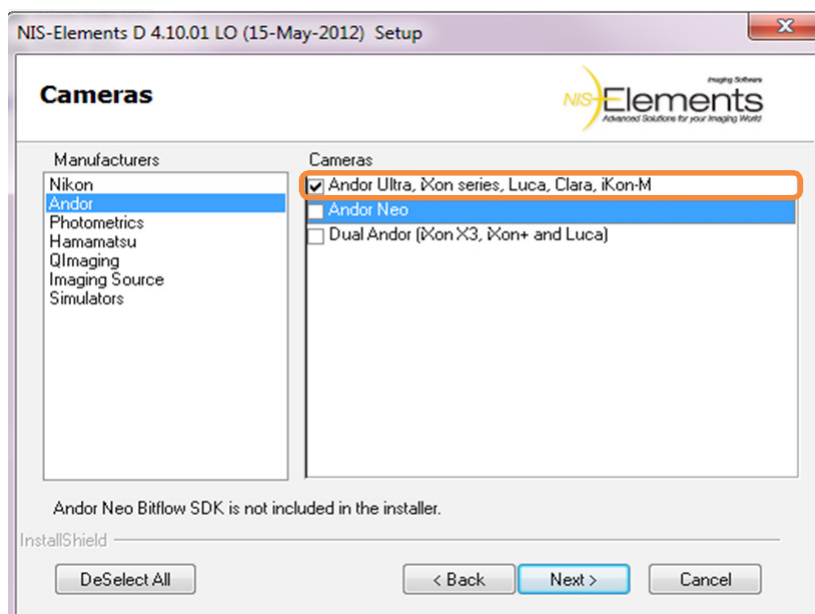
- **64-bit version**

<https://www.nikon-instruments.jp/eng/service/download/DLDownload.aspx?CID=3&SID=198&RNO=56>

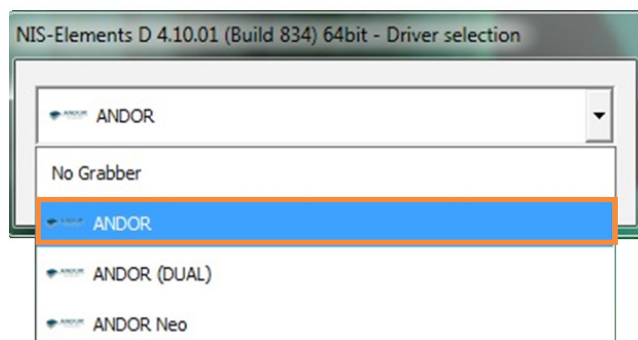
Run the **NIS-Elements D** hot-fix installation, selecting the Andor driver from the Local Option.

2. At the Image Source Selection, ensure the correct camera is selected e.g. **Andor iXon Ultra** or **Andor iXon₃** as shown below.





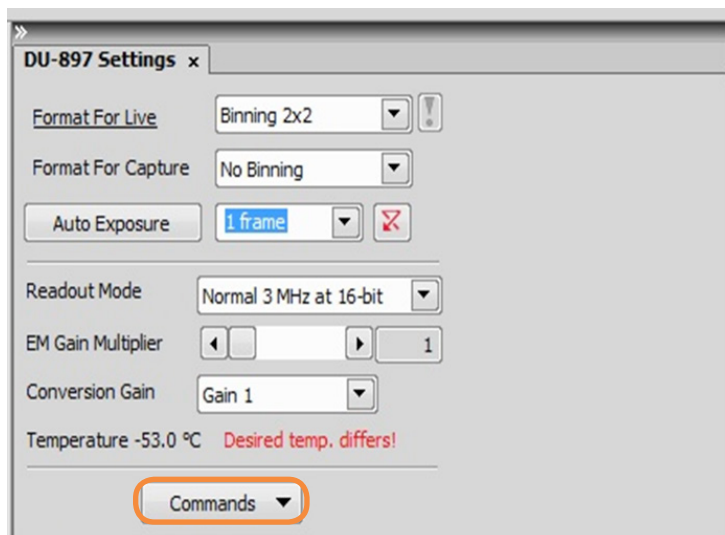
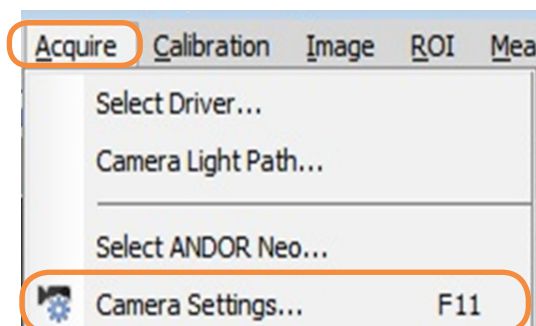
Once installed start the NIS-Elements application with the Andor driver.



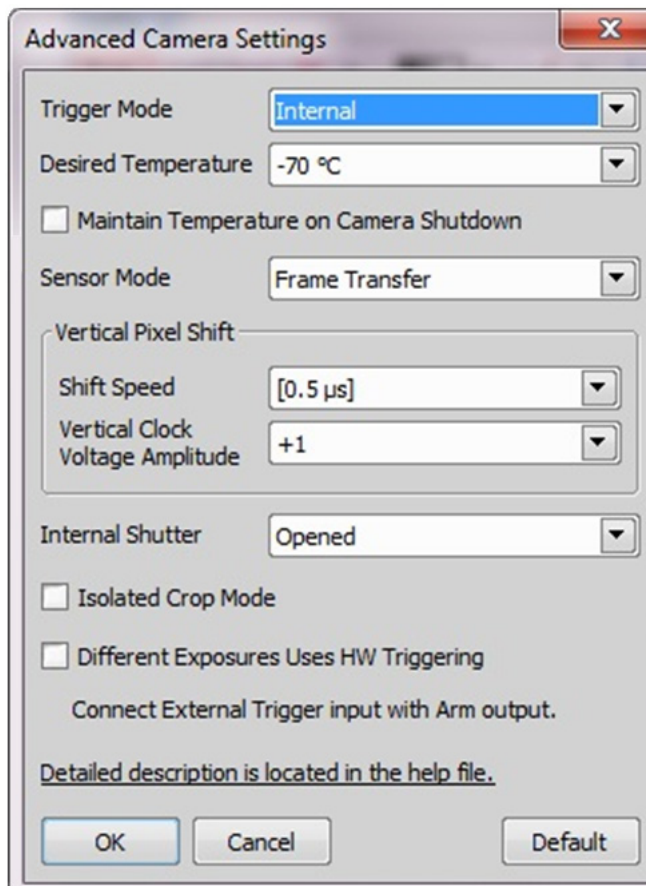
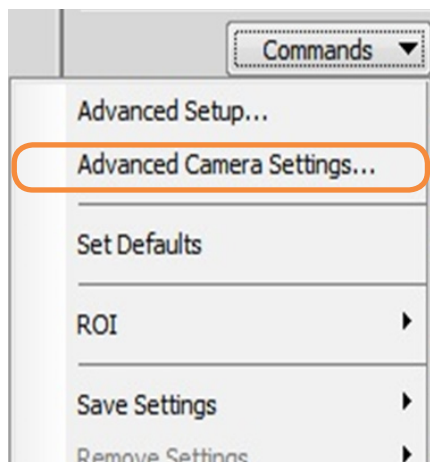
SECTION 2: USING NIS-ELEMENTS WITH THE IXON EMCCD CAMERA

2.1 SETTING THE ACQUISITION PARAMETERS

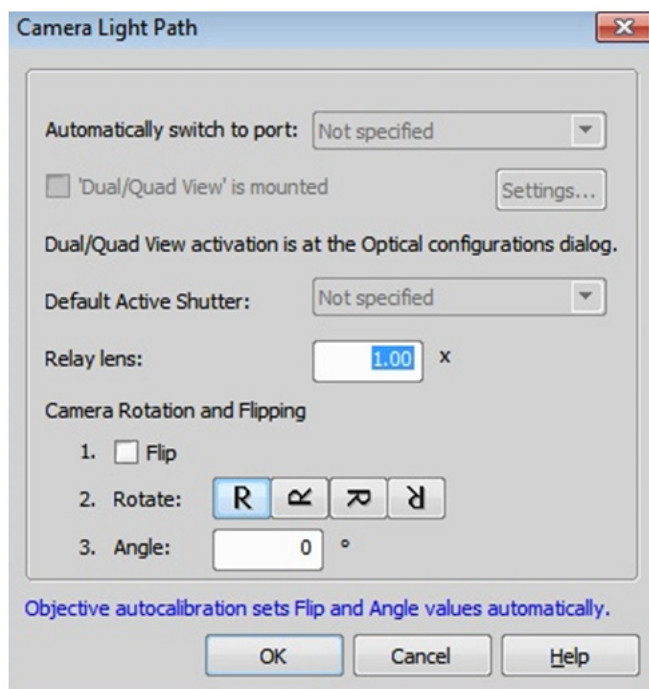
1. The NIS-Elements application will have been opened with the Andor driver as shown in **Section 1: Installation Instructions**.
2. To access camera settings and set up acquisition parameters, open the **Acquire** tab on the main toolbar and select '**Camera Settings...**', or automatically when the NIS- Elements application is opened the iXon EMCCD camera settings will appear docked on the right hand side of the main window.



- In order to set the trigger mode, temperature, vertical shift speed, sensor mode and cropped mode of the iXon Ultra and iXon₃ EMCCD camera click on **Commands** in the iXon Settings window and choose '**Advanced Camera Settings**'.



- If you need to rotate or flip the image on the iXon EMCCD Camera (e.g. multi-wavelength imaging), go to the **Acquire** tab and select '**Camera Light Path**'.



2.2 FAN CONTROL FOR IXON ULTRA

The fan in the iXon Ultra cannot be controlled through the GUI and must be set through macro commands. There are two commands available when your iXon camera is connected:

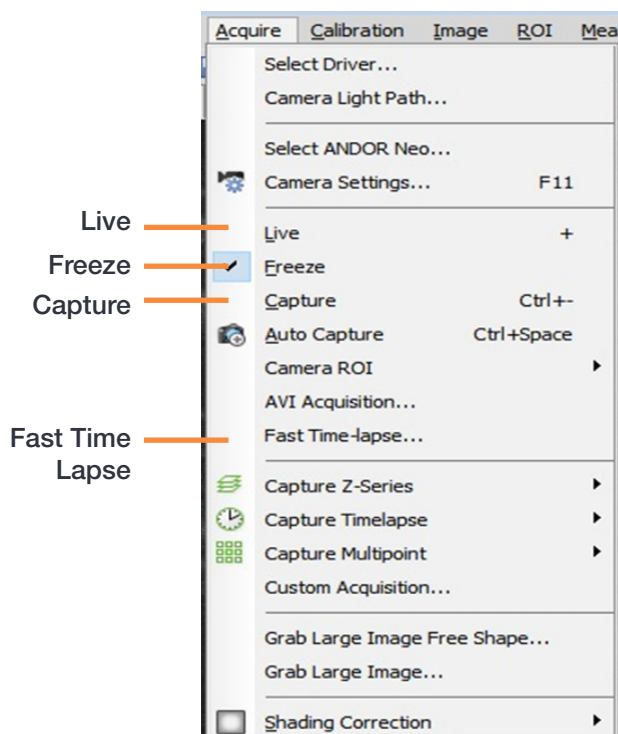
- CameraCmd_TurnFanOff()
- CameraCmd_TurnFanOn()

This feature is available since build 616 (3.10, SP2, HF2).

It is important that your iXon camera is not running live when you set these commands.

2.3 CONTINUOUS LIVE VIEW AND SNAPSHOT

- For a continuous live view choose live in the **Acquire** tab or press the 'Live' icon on the main toolbar.
- To acquire a snapshot choose '**Capture**' in the Acquire tab or press the '**Capture**' icon on the main toolbar.
- To stop the live mode choose '**freeze**' in the **Acquire** tab or press the '**Freeze**' icon on the main toolbar.
- If, when you go live you cannot see an image click on **auto-scale** to adjust the contrast settings.



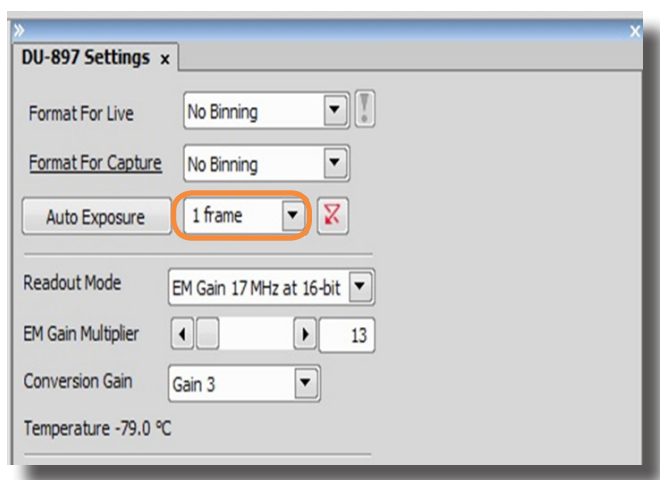
Live Freeze Capture



Auto-scale Always on Auto-scale once

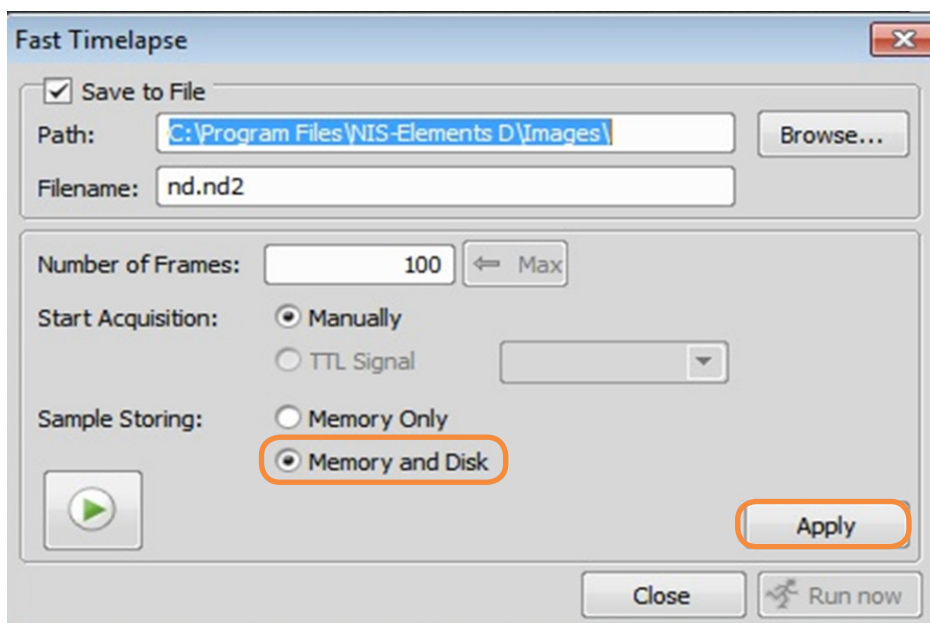
2.4 OBTAINING THE FASTEST ACQUISITION SPEEDS

- To acquire the fastest speeds with the iXon EMCCD camera, the shortest exposure must be set for each ROI.
- If the image size is altered always ensure that **'1 frame'** is selected in the **Settings** window under the **exposure** tab. This will automatically select the shortest exposure for the ROI defined and therefore the fastest speeds will be acquired.

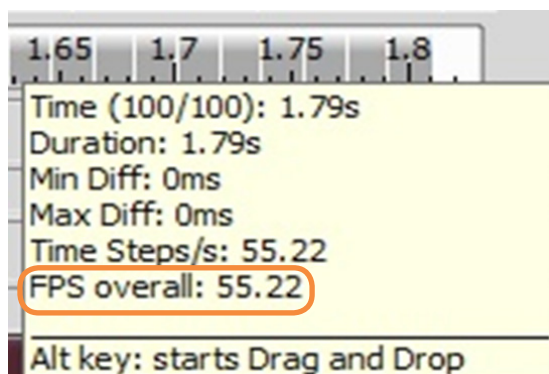


2.5 SETTING UP A KINETIC SERIES

- To set up a kinetic series go to the **Acquire** tab on the main toolbar and choose **'Fast-Time lapse'**.
- Choose this method instead of the 'AVI Acquisition' to achieve the fastest speeds with the iXon EMCCD camera. This is where you choose to save your kinetic series and input the number of frames/time-points you wish to acquire
- Always choose the 'Memory and Disk' option for sample storing.
- Press **'Apply'** and **'Run Now'** to start acquiring images.



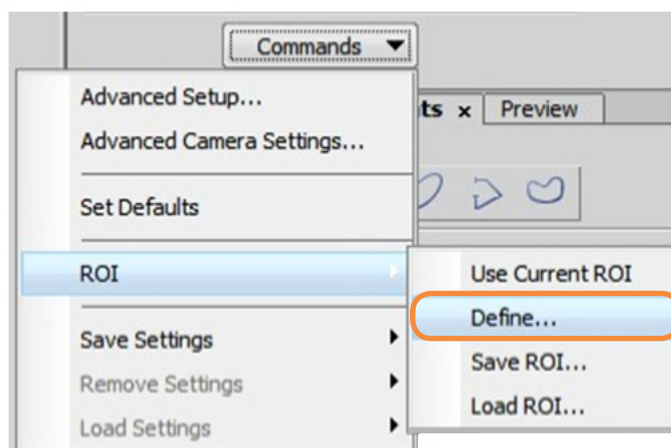
- The acquired kinetic series/time lapse experiment automatically opens in the main NIS-Elements window once the acquisition is complete.
- In order to view the time it took to acquire the series and the maximum frames per second just hold the mouse over the bottom of the movie and a window appears with this information



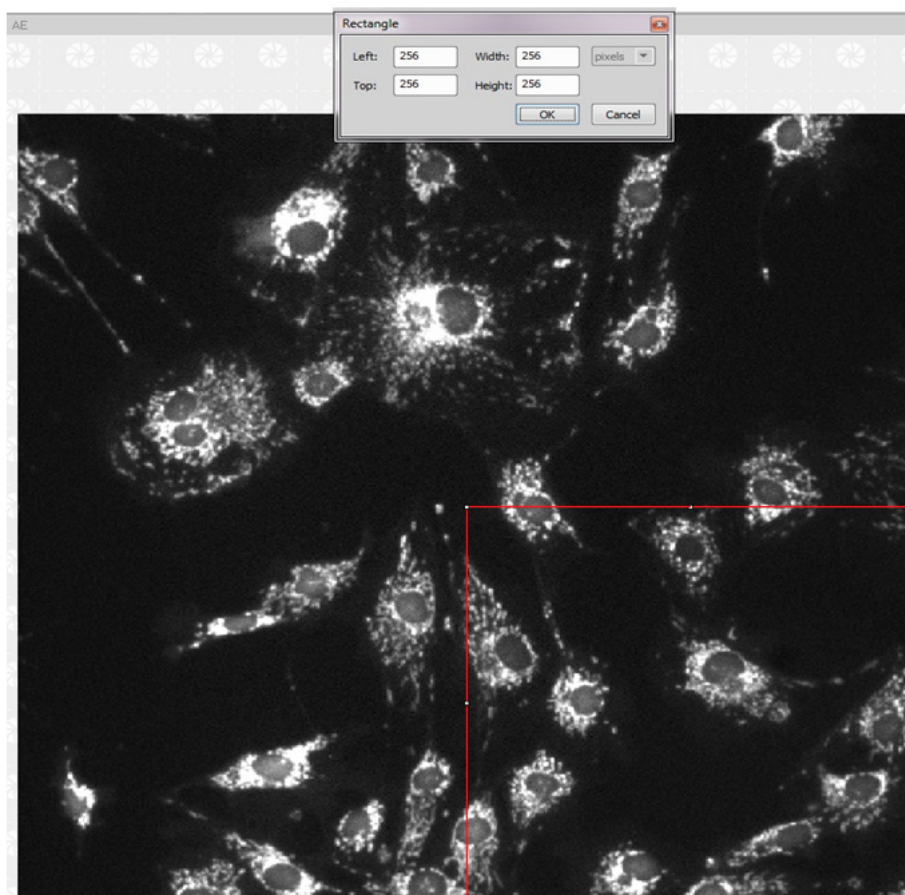
2.6 SETTING A CUSTOM REGION OF INTEREST (ROI) IN NIS-ELEMENTS

To define a custom ROI follow the instructions below:

1. Go Live to see the full field of view and acquire an image. To define the ROI go to '**Commands**' in the iXon EMCCD camera Settings window and select '**ROI**' and '**Define**'. This will open a new window where you can set the height and width of the new image size.



2. When you have chosen the width and height position for the ROI of interest, press **OK** and the window will reduce to the size of the selected ROI.



2.7 SETTING THE EXPOSURE FOR A ROI

When achieving the maximum speeds with the iXon EMCCD camera you must ensure the minimum exposure is set for each ROI that you choose. By default, in most software packages the minimum exposure will appear if you input zero or in the case of NIS-Elements when you choose '1 Frame' in the exposure setting list.

2.8 iXon Ultra 897 AND 888 FRAME RATES IN NIS-ELEMENTS

The frame rates for the iXon Ultra 897 and 888 in NIS-Elements are consistent with Solis (Figures 1 and 2).

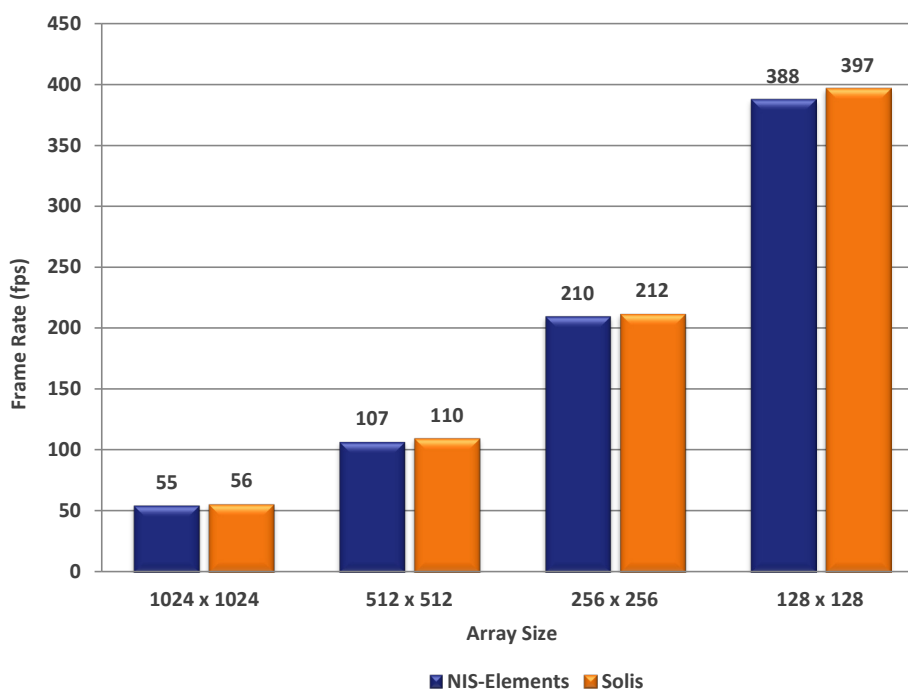


Figure 1: Comparison of the Frame Rates of the iXon Ultra 897 for different ROI sizes

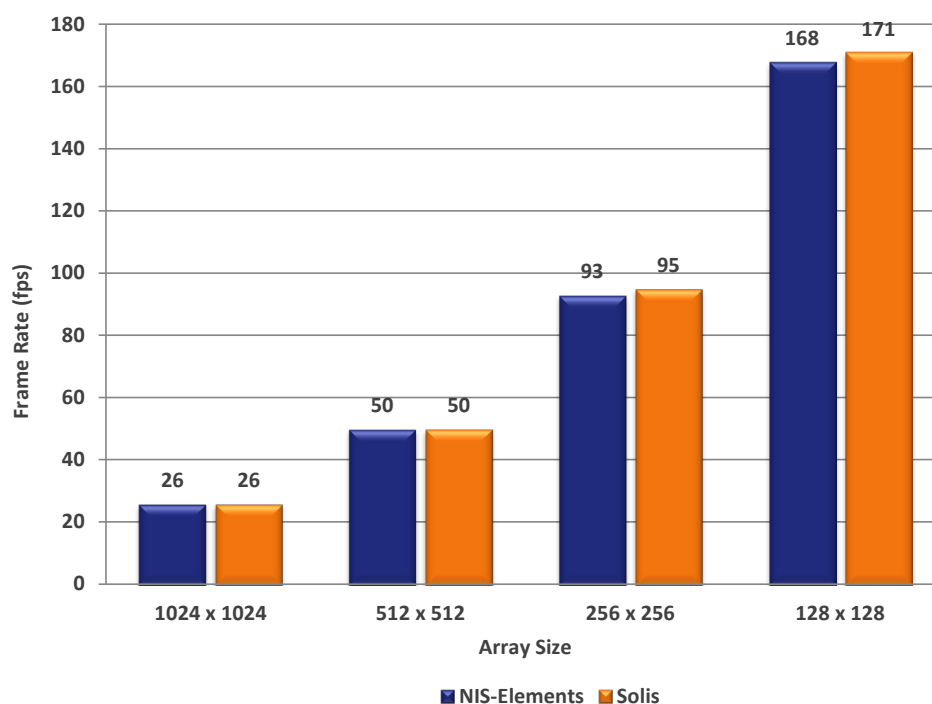


Figure 2: Comparison of the Frame Rates of the iXon Ultra 888 for different ROI sizes

2.9 CROP MODE FRAME RATES IN NIS-ELEMENTS

In order to achieve even faster speeds with the iXon EMCCD camera an Optomask can be used to optically mask part of the sensor and fool it into thinking it is smaller than its actual size. For this option to be functional, the “isolated crop mode” must be enabled in **Advanced Camera Settings** tab in the Acquire window.

The crop mode frame rates for the iXon Ultra 897 and 888 in NIS-Elements and Solis are shown in figures 3 and 4..

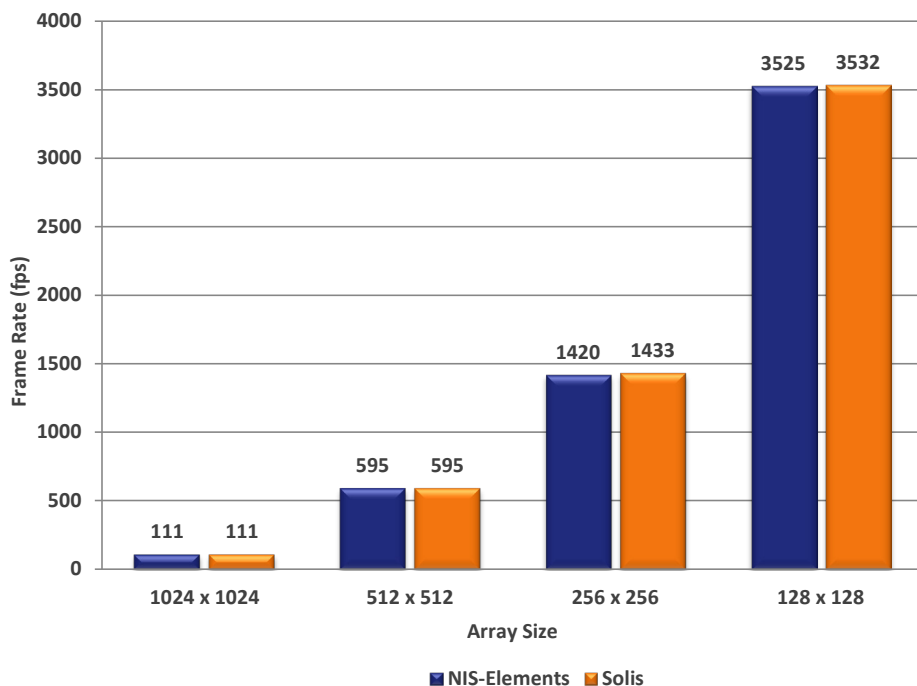


Figure 3: Comparison of Cropped Mode Frame Rates (fps) for the iXon Ultra 897

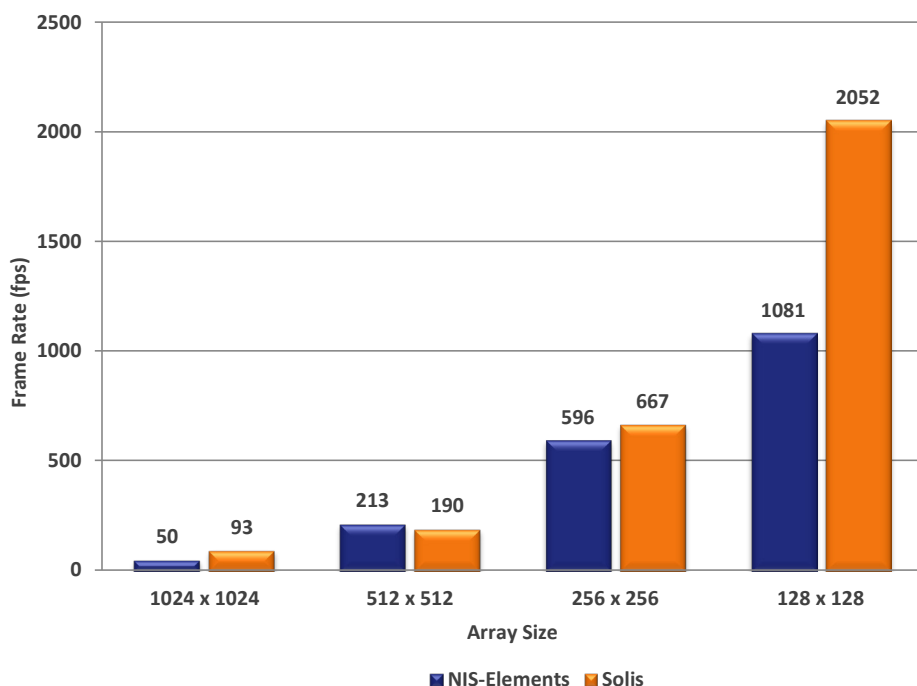


Figure 4: Comparison of Cropped Mode Frame Rates (fps) for the iXon Ultra 888

2.10 IXON ULTRA 897 AND 888 FEATURE MATRIX IN NIS-ELEMENTS

	Present
Trigger Modes	
Internal	✓
External	✓
External Exposure	✓
Software Trigger	✓
Fast External	✗
External Start	✗
Acquisition Modes	
Single image	✓
Continuous - camera acquires until aborted	✓
Kinetic Series - Frame number and Rate Control	✓
Accumulate mode - specify number and rate to accumulate images	✗
Fast Kinetics - Increase frame rate for user defined rows (requires masked area)	✗
Readout Modes	
Imaging - Full Image Readout from Sensor	✓
Overlap - also called Frame Transfer (Selected modes only)	✓
Full Vertical Binning (FVB)	✗
Multi Track - User defined depth of vertically binned rows at user defined spacings	✗
Crop mode (Corner tethered and Optically Centered)	✓
ROI - Arbitrary size region anywhere on sensor	✓
Camera Binning - User Defined	✓
Readout Parameters	
Exposure Time	✓
EM Pixel Readout Rate - 17MHz, 10MHz, 5MHz, 1MHz	✓
Conventional Pixel Readout Rate - 3MHz, 1MHz, 0.08MHz	✓
Pre Amp Gain - 1,2 and 4	✓
Vertical Shift Speed (3.3µS, 1.7µS, 0.9µS, 0.5µS and 0.3µS)	✓
Vertical Clock Amplitude (Normal, +1,+2, +3, and +4)	✓
Electron Multiplying Mode - Real gains from x2 to 300, - Real gains (x1000 in extended mode)	✓
Optaquire	
Enable Specific Mode	✗
Add/Delete user defined mode	✗
iCam	
Change Exposure Time during acquisition - (Limitations apply, see manual)	✗
Change EM gain and control	✓

	Present
Metadata	
Timestamp Clock (current timestamp reading on camera) +/- 10ns and time of subsequent frames	✓
For USB cameras FIFO fill level recorder in Meta data	✗
Image Processing	
Spurious Noise Filter (Median, Level above, Interquartile Range) -on camera correction	✗
Data Averaging Filter	✗
Shutter Control*	
Open/Closed/Auto (open on power up)	✗
Fan Control**	
High, Low, Off	✗
Operating System Support	
Windows 7 & 8, 32-bit & 64-bit	✓
Recommended Application Features	
Image Flip - Horizontal and Vertical (conventional and EM registers readout raw data in a different order by default)	✓
Image Rotation - 90 degrees clockwise, 90 degrees anticlockwise	✓
Image Streaming to disk at all sustained frame rates	✓
Supported File formats should contain all acquisition information in header	✓

* Auto mode cannot be selected

**No fan Control