

# ANDOR

an Oxford Instruments company

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## System Performance Booklet



## SYSTEM OVERVIEW

### COMPONENTS

Description	Model	Serial Number
Head	DU-897U-CS0-#BV	X-10936

### SENSOR DETAILS

Manufacturer / Model No.	Pixels	Description
E2V / CCD97-00-1-095	512x512, 16µm x 16µm	Back-illuminated CCD, Vis. optimized

### WINDOW VARIANT

Window Variant	Broadband VIS-NIR Wedged
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## SUMMARY OF SYSTEM TEST DATA

### SENSITIVITY & READOUT NOISE

System Readout Rate	Preamp setting	CCD Sensitivity ♦1 (electrons per A/D count)	Single Pixel Noise ♦2 (electrons)
17 MHz, 16-bit Single, EM amplifier	1	15.1	236
	2	9.03	134
	3	4.86	77.1
10 MHz, 16-bit Single, EM amplifier	1	15.6	136
	2	7.86	83.7
	3	4.66	62.6
5 MHz, 16-bit Single, EM amplifier	1	17.1	67.7
	2	8.18	45.5
	3	4.23	37.0
1 MHz, 16-bit Single, EM amplifier	1	17.0	24.7
	2	8.24	17.1
	3	4.27	14.7
3 MHz, 16-bit Single, Conventional amplifier	1	3.86	13.0
	2	3.00	11.5
	3	1.41	9.53
1 MHz, 16-bit Single, Conventional amplifier	1	3.88	6.95
	2	2.98	6.23
	3	1.39	5.20
0.08 MHz, 16-bit Single, Conventional amplifier	1	3.88	3.45
	2	2.97	3.18
	3	1.38	2.79

**PIXEL WELL DEPTHS & CLOCK-INDUCED CHARGE**

<b>Image Area Saturation Signal Per Pixel</b> (Fastest Horizontal Speed 16-bit EM amplifier)	185000	electrons / pixel
<b>Clock Induced Charge ♦3</b>	0.00227	events / pixel

**LINEARITY AND UNIFORMITY**

<b>Linearity greater than ♦4</b>	0.0000153	% over 16 bits
<b>Photon Response Non-Uniformity ♦5</b>	0.1	%

**CCD DARK CURRENT**

<b>Minimum Dark Current Achievable ♦6</b>	7.6E-05	electrons / pixel / sec
<b>@ Sensor Temperature of ♦7</b>	-99.46	°C and 16 °C water cooling
<b>Dark Signal Non-Uniformity</b>	0.007	electrons / sec

**DEFECTS**

**SPOT DEFECTS ♦8** (Centroid(X, Y) . No. of Pixels Affected, defect type)  
No spot defects.

**COLUMN DEFECTS ♦9** (Column No.)  
No column defects.

**TRAPS ♦10** ( Location(X, Y) )  
No traps.

**TEST CONDITIONS**

Readout Noise tested at	-75	°C with 16 °C water cooling
Base Mean Level	-75	°C with 16 °C water cooling
Blemishes tested at	-75	°C with 16 °C water cooling

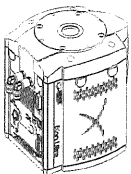





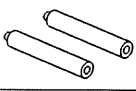




**SYSTEM PASSED FOR SHIPPING**

<b>Test Technician</b>	<b>Date</b>
Ian McGarry	21/06/2016

## NOTES

- ◆ 1 Sensitivity is measured in electrons per A/D count from a plot of Variance [Noise squared] against Signal.
- ◆ 2 RMS Readout Noise is measured for single pixel readout with the CCD in darkness at temperature indicated and minimum exposure time. Noise values will change with pre-amplifier gain selection [PAG].
- ◆ 3 CIC is measured in darkness with EM gain set to the operating maximum (1000x) at fastest Horizontal Shift Speed and second fastest Vertical Shift Speed. A threshold in counts above the base mean level equivalent to the number of electrons that would be output at the maximum EM gain is determined using the camera's sensitivity at these settings. The number of pixels with count values above that threshold is counted and this is converted to a number of events per total pixels on the sensor.
- ◆ 4 Linearity is measured from a plot of exposure vs. counts up to the saturation point of the system. Linearity is expressed as a percentage deviation from a straight line fit. This quantity is not measured on individual systems.
- ◆ 5 RMS (root mean square) deviation from the average response of the CCD in full resolution image operation illuminated with uniform white light (defects not included).
- ◆ 6 Dark current falls exponentially with temperature. However, for a given temperature the actual dark current can vary by more than an order of magnitude from device to device. The devices are specified in terms of minimum dark current achievable rather than minimum temperature.
- ◆ 7 Minimum temperature achieved for thermoelectric (TE) cooler set to maximum value with water cooling.
- ◆ 8 White/black spots have signals >25% above/below the average (25% contrast) with uniform illumination across the sensor. A hot spot can be up to 3 pixels in size. For Grade A devices, hot spots are counted if they exhibit >50 times the maximum specified dark current at the test temperature indicated.
- ◆ 9 A column is considered defective if >10 pixels are affected, or if the column exhibits >2 times the maximum specified dark current at the test temperature indicated. White/black columns have ≥10 white/black spots with uniform illumination across the sensor.
- ◆ 10 Traps are pixels which absorb charge as it is clocked through the defective area. When the light source is switched off, the signal from the trap appears to drop off more slowly than the signal from the surrounding pixels.

ENI-00650 Rev 2 Issue Date 29/11/12 Under EC-01432	<h1>iXon Ultra Packing List</h1>	
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Sales Order: 523175		Date: 22 <sup>nd</sup> June 2016	Packer: Pined	
Item	Part Number / Description	Qty.	Checklist	
			Y	N
	ESD Bag <input checked="" type="checkbox"/> Model No. <u>DU-897U-CSO-#BU</u> Serial No. <u>X-10936</u>	1	✓	
	PS-90 Power Supply	1	✓	
	Country Specific Power Lead	1		
	ASE-01188 3m USB Cable	1	✓	
	ACZ-03463 iXon Ultra 4 BNC connectors Multi-I/O Cable	1	✓	
	MEC-06489 Coolant pipes (4 barbs)	2	✓	
	Mounting Posts	2	✓	
	C-mount cap (including O-ring)	1	✓	
	iXon Ultra Software: SDK2 Version: <u>Linux</u> <input checked="" type="checkbox"/> Solis Version: <input type="checkbox"/> Other:	1	✓	
	User Manual	1	✓	
	Performance Sheet	1	✓	