



**SYSTEM Performance**



***International Headquarters  
Andor Technology Limited  
Springvale Business Park  
Belfast***

## ***Congratulations.***

***You have selected one of the finest multichannel detectors available anywhere in the world today !***

***This high performance instrument has been individually built for you and tested in accordance with Andor's ISO 9001:2000 quality régime.***

***The documents in this folder are your individual assurance that your new multichannel detector has been rigorously tested and its performance recorded in detail. You can be confident that your detector meets Andor's exacting standards.***

***We hope you find use of our detector rewarding and we look forward to working with you again in the future !***

***Yours sincerely,***

***Andor Technology***

***PS Don't forget to fill in and return your Warranty Registration today. It helps us.... to help you!***

## System Overview

Description	Model	Serial Number
CCD Head ▽	DH720-25F-03	ICCD-3858
Controller Card	CCI-010	ICCD-3858
Power Supply Unit	--	--
Multi I/O Box	--	--
Image Intensifier Tube	V767OU-20	HB1164

## CCD Details

Manufacturer / Model No.	Size	Pixels	[Eff. Pixel Size]	Serial Number
e2v / CCD40-11	φ18	1024x128	26μm <sup>2</sup>	
e2v / CCD30-11	φ18	1024x256	26μm <sup>2</sup>	
e2v / CCD42-10	φ18	2048x512	13.5μm <sup>2</sup>	
e2v / CCD47-10	φ18	1024x1024	13μm <sup>2</sup>	
e2v / CCD77-00	φ18	512x512	24μm <sup>2</sup>	
e2v / CCD30-11	φ25	1024x256	26μm <sup>2</sup>	08151-06-14
e2v / CCD42-10	φ25	2048x512	20.25μm <sup>2</sup>	
e2v / CCD47-10	φ25	1024x1024	19.5μm <sup>2</sup>	

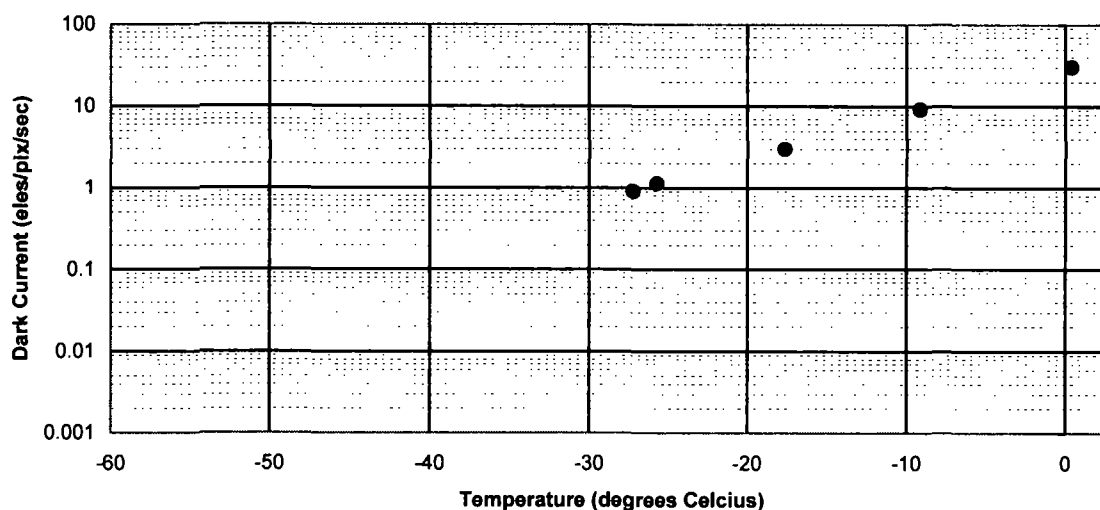
## PCI Card Details

Model		A/D Resolution	Readout Speed
CCI-010	(1 MHz)	16-bit	1, 2, 16, 32 μs per pixel
CCI-001	(62 kHz)	16-bit	16, 32 μs per pixel

## Summary of System Test Data Readout Noise and Base Mean Level

A/D Rate Digitization	Time ( $\mu$ s)	CCD Sensitivity $\blacklozenge$ 1 Electrons per A/D count	Single Pixel $\blacklozenge$ 2 Noise Electrons	Full Vert Bin $\blacklozenge$ 2 Noise Electrons	Base Level $\blacklozenge$ 3 Counts
1 MHz	1	10.0	22.07	22.16	462
500 kHz	2	10.0	21.69	22.01	487
62 kHz	16	7.0	7.08	9.67	114
31 kHz	32	3.5	6.90	10.26	178
Saturation Signal Per Pixel $\blacklozenge$ 4			588090	Electrons/Pixel	

## ICCD Dark Current



Minimum Dark Current Achievable $\blacklozenge$ 5 $\blacklozenge$ 6	0.9024	e <sup>-</sup> /pix/s @ -27.22°C (16°C cooling water)
Minimum Dark Current Achievable Using PSU	0.2278	e <sup>-</sup> /pix/s @ -37.25°C (16°C cooling water)
∇ Please refer to system's specification sheet for range of minimum temperature achievable with alternative cooling setup.		

## Linearity and Uniformity

Linearity better than $\blacklozenge$ 7	1	% over upper 99% of intensity range
Response Uniformity better than $\blacklozenge$ 8	5.58	%

**Intensifier Characteristics**

▽ Intensifier Characteristic types are defined in the Table below using the last five letters in the box 'Model Number'.

Model Number	Gating Speed (ns)			Photo-Cathode	Input Window	Spectral Range	Phosphor	Spatial Resolution
	U	F	H/S					
18x-03	2	5	50	W	Quartz	180-850	P43	High
18x-04	2	5	N/a	W	Quartz	180-850	P46	High
18x-13	N/a	N/a	10	WR	Quartz	200-920	P43	High
18x-33	5	10	N/a	VIS	Glass	350-920	P43	High
18x-53	5	10	N/a	VIS*	Glass	350-920	P43	High
18x-63	2	5	N/a	HVS	Glass	265-740	P43	High
18x-73	2	5	N/a	VIH	Glass	358-915	P43	High
18x-83	N/a	N/a	100	UW	Quartz	180-850	P43	High
25x-03	3	7	80	W	Glass	180-850	P43	High

EBI ♦9	0.278612	Electrons/Pix/Sec
EBI Uniformity better than ♦10	0.022357	Electrons/Pix/Sec
Peak Quantum Efficiency ♦11	17.00	%
Maximum ICCD Gain (fastest readout speed)	191.80	Counts per Photoelectron
Spatial Resolution ♦12	FWHM	49.58 μm

**Optical Gating**

Irising ♦13	0.20	ns
Minimum Optical Gate ♦14	3.65	ns

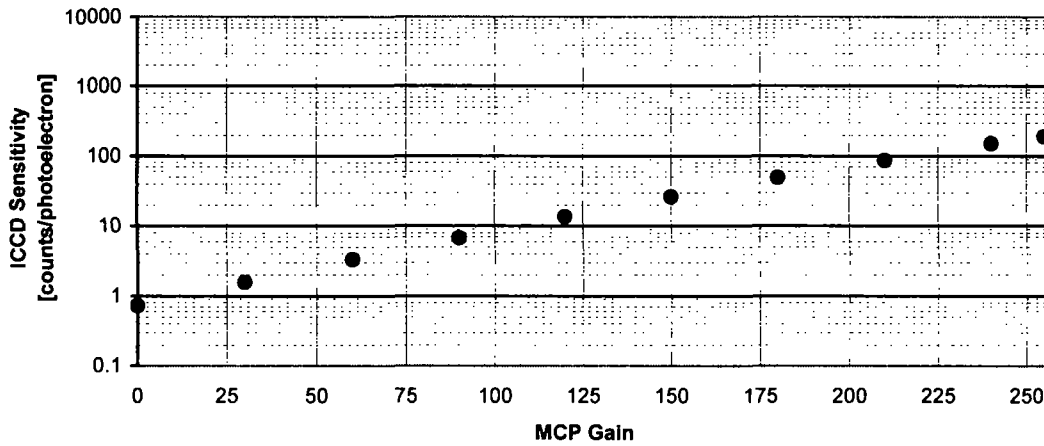
## Gating Characteristics

Gate I/P (TTL) (ns)	Optical Gate @ center (ns) ♦15	Intensity (% of CW) ♦16	Optical Gate @ edge (ns) ♦17	Intensity (% of CW) ♦16
1.5	1.3	38.6	1.7	42.8
2	3.7	54.3	3.6	53.6
2.5	4.4	61.3	4.4	61.4
3	5	66.5	5	66.8
3.5	5.2	71.8	5.1	72.9
4	5.5	81	5.4	82
4.5	5.5	85.8	5.5	87
5	5.6	91.7	5.7	92.6
5.5	5.6	94.6	5.7	94.4
6	6.1	97	6.2	97.8
6.5	6.6	98.7	6.7	98.7
7	7.1	98.8	7.1	98.8
7.5	7.5	99.7	7.6	99.7
40	39	100	39	100

Outside this range; subtract 1.02 ns from the TTL Gate Input to calculate the Optical Gate Width.



Gain Setting ♦18



Response Defects

<b>White/Black Spots ♦19</b>		( X , Y )																																																
<b>80 - 160µm</b>	<b>55 - 80µm</b>																																																	
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<b>Traps ♦21</b> Column numbers indicated.	<input type="checkbox"/>	<input type="checkbox"/>																																																

No Glow Spots allowed. ♦22



**Test Conditions**

<b>Readout Noise tested at</b>	-20	°C With	16	°C Cooling Water
<b>Base Mean Level measured at</b>	-20	°C With	16	°C Cooling Water
<b>Blemishes tested at</b>	-20	°C With	16	°C Cooling Water

**Additional Comments**

**System Passed for Shipping**

**Signed**

**Date**

**A.P. Lloyd-Hirst**

**18<sup>th</sup> June 2009**

<b>Hardware</b>	<b>HEADBOARD</b>	<b>DDG</b>	<b>GATER</b>
<b>Serial #</b>	17428	901	18433
<b>Shipping Software</b>	<b>SOLIS</b>	<b>SDK</b>	
<b>Version #</b>	--	--	
<b>Testing Software</b>	<b>SOLIS</b>	<b>SDK</b>	
<b>Version #</b>	4.12.30003.0	--	



**Performance Notes**

- ◆1 CCD Sensitivity is measured in photoelectrons per A/D count from a plot of Total Noise against Signal. This quantity is not measured on individual systems.
- ◆2 Readout Noise is measured for both single pixel (SP) and fully vertically binned (FVB) with the CCD in darkness @ -20°C and minimum exposure time using 1,2,16 & 32 $\mu$ s per pixel readout. Note that the nominal gain changes for readout at 32 $\mu$ s per pixel.
- ◆3 Average electronic DC offset for CCD @ -20°C and minimum exposure time under dark conditions.
- ◆4 Saturation signal per pixel is reported in electrons for conditions of partial illumination of the sensor. Note: a fully illuminated sensor will have a lower saturation level
- ◆5 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.
- ◆6 Minimum temperature achieved for thermoelectric (TE) cooler set to maximum value with water cooling. For normal operation (with an ambient air temperature of 20°C), the minimum air-cooled temperature is typically 25°C higher (15°C for models without PSU).
- ◆7 Linearity is measured from a plot of Counts vs. Signal over the upper 99% of the intensity range. Linearity is expressed as a %age deviation from a straight line fit. This quantity is not measured on individual systems.
- ◆8 RMS (root mean square) deviation from the average response of the ICCD in fully binned operation illuminated with uniform white light. Pixel or column defects have not been included in the calculation.
- ◆9 Equivalent Background Illuminance. Measured with 15°C coolant circulating. The temperature of the photocathode closely follows the temperature of the ICCD head / coolant. EBI increases by ~x2 for a 5°C increase in temperature. The photoelectrons referred to are those generated in the intensifier photocathode.
- ◆10 RMS (root mean square) deviation of Equivalent Background Illuminance for fully binned operation.
- ◆11 Refers to photocathode Quantum Efficiency. This quantity is measured by the tube manufacturer.
- ◆12 The limiting resolution of an ICCD is defined as the FWHM of a single photoelectron event, measured at high gain. The reported value is the average of multiple EBI events from the centre and the edges of the tube.
- ◆13 There is a time delay between the center and the edge of the tube turning ON and OFF - the center lags behind the edge. We define 'irising' as the time delay between the center and the edges achieving 63% of final peak values.
- ◆14 The FWHM of a time-stepped profile through a pico-second laser pulse. For the minimum optical gate, values at the edge and centre of the tube are averaged. The minimum optical gate is when the signal is above a specified percentage of the signal achieved using a 500ns gate pulse.
- ◆15 FWHM (Full Width Half Maximum) of optical gate averaged over the central section of the ICCD.
- ◆16 Expressed as a %age of a signal level recorded with the same source but with 500 ns gate width.
- ◆17 FWHM (Full Width Half Maximum) of optical gate averaged over both edges of the ICCD.
- ◆18 Sensitivity is expressed in terms of counts recorded on the CCD sensor per photoelectron generated in the photocathode of the intensifier.
- ◆19 Spots which have signals >25% above/below the average (25% contrast) with uniform illumination across the sensor.
- ◆20 Columns whose signals are >10% above/below the average (10% contrast) in binned operation with uniform illumination across the sensor.
- ◆21 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.
- ◆22 A glow defect is a spot on the intensifier that emits continuously, independent of gating and gain.

Thur 5/26/11 Diana's setup re-arranged  
[http://www.andor.com/photonics\\_accessories/cables/](http://www.andor.com/photonics_accessories/cables/)

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Mr Scott Phillips 206.280.5597

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Imaging Camera Sales

Mr Chris Campillo

209.740.7936

[c.campillo@andor.com](mailto:c.campillo@andor.com)

Spectroscopy Sales

Mr Gary Hancock

636.236.8709

[g.hancock@andor.com](mailto:g.hancock@andor.com)

Existing Andor cable:

D26N030D26N

This is identified on their web site as

“3M Detector Cable / S”

Other “detector cables” listed on this page include

CABL-D26N050D26L “5M Detector Cable 45”

and

CABL-D26N100D26N “10 M Detector Cable /”