IMAGING

Andor's DZ436 cameras are designed primarily with scientific imaging in mind. The 2048 x 2048 array and 13.5µm square pixels provide high resolution and dynamic range and the camera is equally effective for both low and high light imaging. It is ideally suited to biomedical imaging and astronomy applications. The system boasts negligible dark current with thermoelectric cooling down to –100°C. The DZ436 can be ordered with an integrated shutter and lens attachment.

• Min operating temp of -100°C with TE Cooling	…. Negligible dark current without the aggravation or safety concerns associated with LN_2
• UltraVac™ [1]	…. Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year.
• Single window design	…. Delivers maximum photon throughput
• Large area format	…. Excellent for applications such as DNA chip reading, microscopy and astronomy
• Peak QE of 95%	…. High detector sensitivity
• Back illuminated sensor	…. Offers the best price/performance options
• Anti-reflection coated window	…. Broadband AR coating for optimum imaging performance in the visible region
• 13.5□m x 13.5□m pixel size	…. Optimized pixel size for dynamic range and high resolution
• Andor-MCD software	…. Friendly Windows user interface offers system integration, automation and advanced data manipulation facilities

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• **Camera Overview**

Active Pixels	2048 x 2048
Pixel Size (WxH; □m)	13.5 x 13.5
Image Area (mm)	27.6 x 27.6
Pixel Well Depth (e^-, typical)	100,000
Register Well Depth (e^-, typical) [2]	600,000
Max full frames per sec @ 1MHz digitization (typical)	0.2
Read Noise (e^-, typical)	7.5 @ 1 MHz

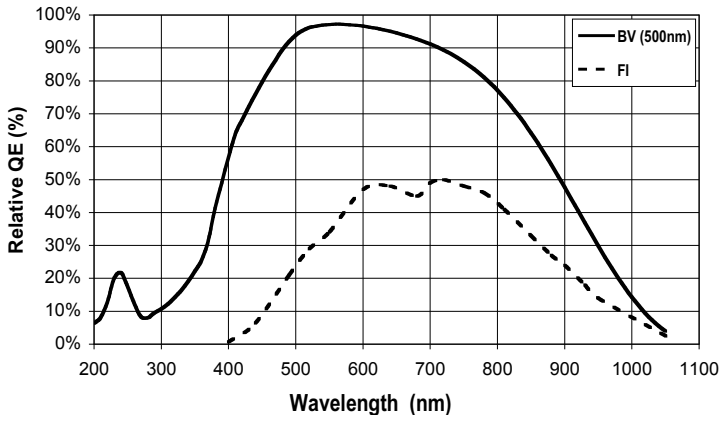
System Characteristics

Dummy Pixels [3]	50, 50, 0, 0
Linearity (%, maximum) [4]	1
Vertical Clock Speed (μs)	112
Sensitivity (e^-/count) @ 1&2, 16, 32 μs	2, 1.4, 0.7
Camera window type	Single quartz window, broadband AR coating as standard

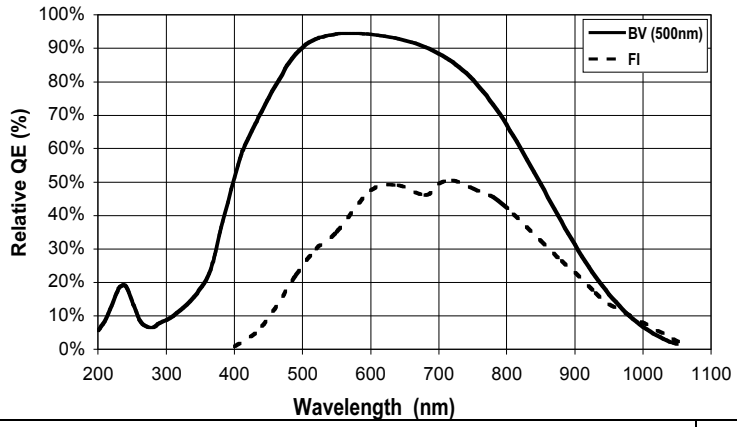
Noise

System Readout Noise (typical; e^-) [5]	*Typical*	*Maximum*
31 kHz pixel readout rate	2.5	4
1 MHz pixel readout rate	7.5	10

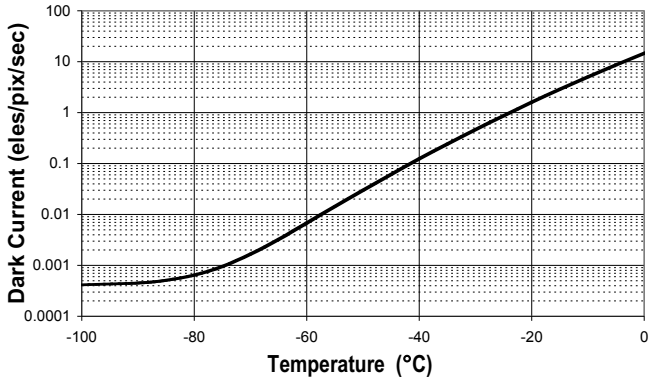
Quantum Efficiency at Room Temp [6]



Quantum Efficiency at –100 °C



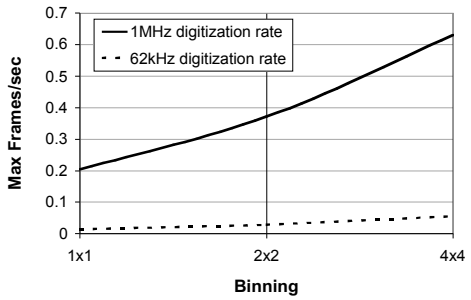
Dark Current [7]



Minimum Temperature (°C)

	External PSU PS157
Re-circulator (RC180) *(ambient air @ 20°C)*	-90
Water-cooled *(@ 10°C, 0.75 l / min)*	-100

Max Frames per sec [8]



Power Requirements [9]

(for kHz [MHz] operation)		No Auxiliary Cooling Connector		Auxiliary Cooling Connector	
No cooling	slot	2.4A	[3A]	2.4A	[3A]
	connector	-	-	-	-
TE cooler on	slot	1.5A	[1.5A]	0A	[0A]
	connector	-	-	0.9A	[0.9A]
Total		3.9A	[4.5A]	3.3A	[3.9A]

(Power drawn from +5V power supply; Our optional external power supply (PS150) is recommended for maximum cooling performance. This unit plugs into the mains)

Computer Requirements

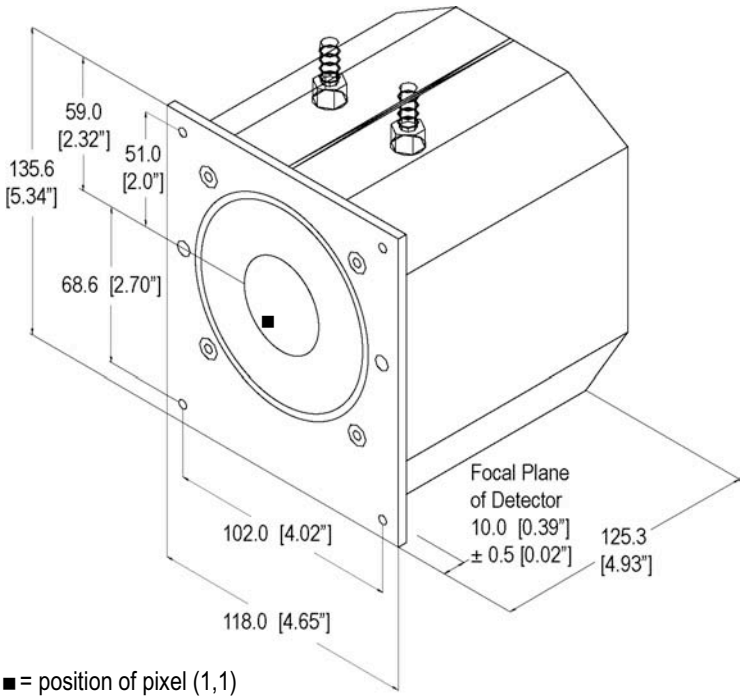
Minimum:	**Also:**
800MHz Pentium + 256Mbytes RAM	• PCI-compatible computer
Windows 2000 or XP operating system	• PCI slot must have bus master capability
	• Available auxiliary internal power connector
Recommended:	• 25 Mbytes free hard disc
2.4GHz Pentium (or better) + 512 Mbytes RAM	

Operating & Storage Conditions

Operating Temperature	0°C to 30°C ambient
Relative Humidity	< 70% (non-condensing)
Storage Temperature	-25°C to 55°C

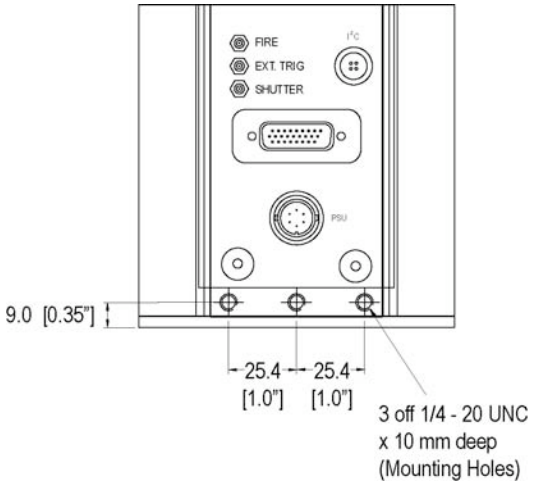
DW436

Dimensions in mm unless otherwise indicated.



■ = position of pixel (1,1)

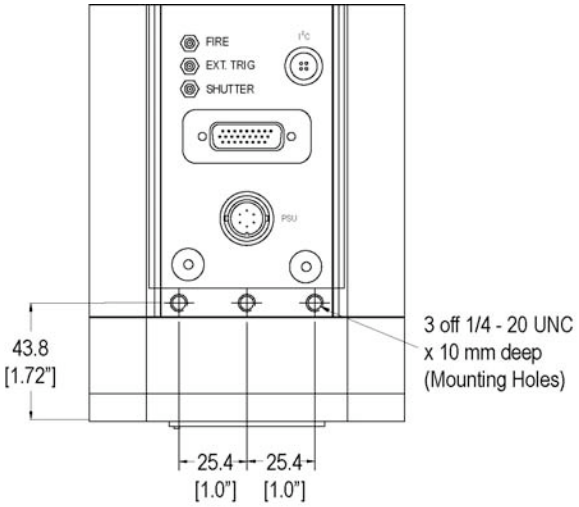
Weight: 3.5 Kg [7.8 lb]

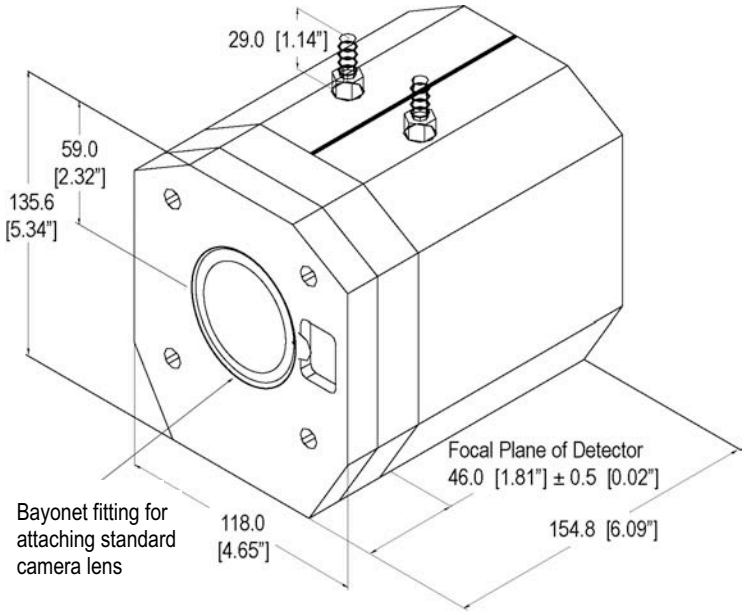


Required Cable Clearance at back:

Exit connector type	Clearance
Standard	140 mm
45° angle	50 mm
90° angle	40 mm

DW436 – Ordered with optional integral shutter and lens mount





Weight: 4.6 Kg [10.2 lb]

Ordering Information

To order this camera and/or the various options, quote model numbers:

DZ436- **BV** back illuminated – AR coated for optimal performance in the visible region
FI standard front-illuminated device

The DZ436 requires one of the following controller card options:

CCI-001 PCI Controller card with 16-bit 62KHz & 31KHz pixel readout rate options
CCI-010 PCI Controller card with 16-bit 1MHz, 500KHz, 62KHz & 31KHz pixel readout rate options

The DZ436 also requires one of the following software options:

Andor-MCD – a ready-to-run Windows 2000 or XP -based package with rich functionality for data acquisition and processing
Andor-SDK-CCD – a DLL driver and software development kit that let you create your own applications for the Andor Camera. Available for Windows 2000 or XP and Linux.

The following accessory is recommended for use with the DZ436:

PS155 Power Supply Module for achieving the lowest temperatures

The following accessories are available for use with the DZ436:

RC180 200W Re-circulator for enhanced cooling performance
OPTION-C2-LMS-CEF Canon EF lens mount with integral shutter
OPTION-C2-LMS-NF Nikon F lens mount with integral shutter
OPTION-C2-MGF2 Magnesium fluoride window

Contact Andor to discuss your custom requirements (Contact details on back page)

NOTE - Specifications are subject to change without notice.

1 Assembled in a state-of-the-art Class 10,000 cleanroom facility, Andor's UltraVac™ vacuum process combines a permanent hermatic vacuum seal (no o-rings), with a stringent protocol to minimize outgassing, including use of proprietary materials. Outgassing is the release of trapped gases that would otherwise prove highly problematic for high-vacuum systems.

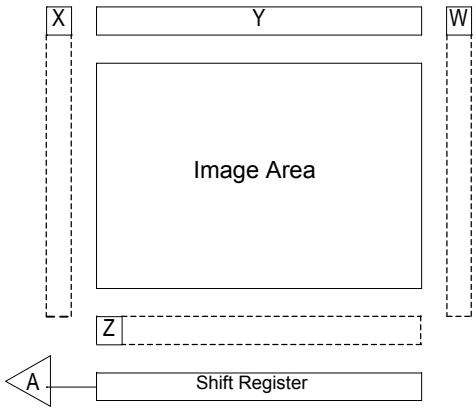
2 The register well depth that is actually accessible by the CCD system is dependant on the gain setting.

3 Chip manufacturers may include a number of pixels or elements that are neither active nor part of the shift register. Andor refers to these pixels as dummy pixels and represents them in a 4-part notation (*W,X,Y,Z*), where:

W = dummy pixels to the right of the shift register (non-amplifier end)
X = dummy pixels to the left of the shift register (amplifier end)
Y = dummy pixels at the top of the image area
Z = dummy pixels between the shift register and the image area.

A = position of output amplifier

It should be noted that the elements can be made up of either pixels, rows or columns.
The diagram shows what is seen when looking at the front of the CCD.



4 Linearity is measured from a plot of Counts vs. Signal up to the saturation point of the system. Linearity is expressed as a percentage deviation from a straight line fit.

5 System Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -50°C and minimum exposure time under dark conditions.

6 Quantum efficiency of the CCD sensor is measured by the CCD Manufacturer.

7 The graph shows typical dark current level as a function of temperature for back illuminated CCDs. Systems are specified in terms of minimum dark current achievable. The dark current measurement is averaged over the CCD area excluding any regions of blemishes.

8 The max frames per second for imaging CCDs is the maximum speed at which the device can acquire images in a standard system. The graph shows the frame rate for both 1MHz and 62kHz digitization rates for a range of binning combinations. It also assumes internal trigger mode of operation. Note that higher frame rates are achievable by using crop mode.

9 These power requirements are the maximum load that will be drawn from the computer for the camera head and controller card combined.

Need more information? Contact us at:

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