Alta F9000

High Performance Cooled CCD Camera System

ANDOR
an Oxford Instruments company

System Features[*1]

- **High Resolution Sensor**
  9.3 Megapixel sensor with 12 μm pixels delivers an exceptionally large field of view with high resolution.
- **Programmable TE cooling down to 45°C below ambient**
  Ideal for detection of weak chemiluminescence or astronomy images, enabling long exposure acquisitions with optimized signal to noise ratio.
- **USB 2.0 interface**
  Direct 'Plug and Play' simplicity of USB 2.0.
- **16-Bit digitization**
  High photometric accuracy.
- **High longevity shutter**
  Shutter during readout and take dark reference frames - 63 mm.
- **Programmable I/O port**
  Synchronization with intricate experimental set-ups.
- **Remote Triggering**
  LVTTL input allows exposure to start within 25 microseconds of the rising edge of the trigger.
- **Focusing mode**
  Faster readout option, ideal for focus optimisation.
- **Precision locking filter wheels optional**
  Choose from a range of Apogee family filter wheels with up to 17 positions.
- **Andor OEM optimisation**
  Compact and robust, Andor integration support, Andor quality enhancement, Andor post-sale support. Now also supported by 'Andor SDK'

Apogee Alta F9000: Compact, 9.3 Megapixel CCD

Ideal for OEM and astronomy applications, the Apogee Alta family has been a mainstay of high end imaging for many years, offering a wide range of full frame and interline CCDs. A USB 2.0 interface offers the convenience of simple, robust connection to PC.

The Alta F9000 uses a very large format 9.3 megapixel full frame sensor with anti-blooming gates, ideal for applications requiring large field of view, such as astrophotography, sky surveys and radiology. Cooling down to 45°C below ambient results in a low dark current contribution. These features combine to make the Alta F9000 an ideal solution for applications requiring both a large field of view and optimal signal to noise ratio, such as astrophotography, sky surveys and radiology.

Specifications Summary[*1]

Array Size (pixels)	3056 x 3056 (9.3 Megapixel)
Pixel Size	12 x 12 μm
Sensor Size	36.7 x 36.7 mm (1345 mm^2) 51.9 mm diagonal
Pixel Well Depth (typical)	94,000 e^-
Dark Current[*2]	0.0704 e^-/pixel/sec
Read Noise[*3]	16.1 e^- (RMS @ 2.90 MHz)
Maximum Dynamic Range	75.3 dB (5839:1)
Quantum Efficiency	64% @550nm 37% @400nm

SPECIFICATIONS

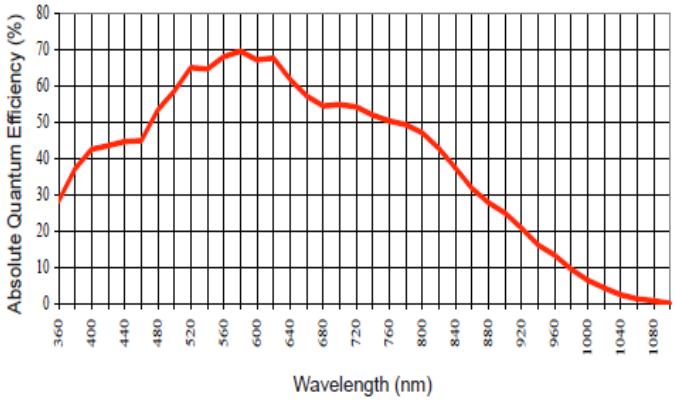
Technical Specifications[*1]

Sensor Type	KAF-09000 (ON Semiconductor)
Active pixels	3056 x 3056 W x H (9.3 Megapixel)
Sensor Size	36.7 x 36.7 mm (1345 mm^2) 51.9 mm diagonal
Pixel Size	12 x 12 µm
Pixel Well Depth	94,000 e^-
Read Noise [*3]	16.1 e- (RMS @2.90 Mhz)
Pixel Binning	1 x 1 to 8 x 3056 on chip
Quantum Efficiency[*4]	64% @550nm 37% @400nm
Cooling	Maximum cooling up to 45°C below ambient temperature; -20°C at 25°C ambient Thermoelectric cooler with forced air.
Temperature Stability	+/- 0.1°C
Dark Current[*3]	0.0704 e^-/pixel/sec
Blemish Specification	Grade S as per sensor manufacturer definition
Anti-blooming factor	>100x
Maximum Dynamic Range	75.3 dB (5839:1)
Linearity	Better than 99%
Frame Rate (fps)[*5]	0.29 Full frame (@2.90 MHz) 0.61 Full frame (@6.37 MHz, focusing mode)
Frame Sizes	Full frame, sub-frame
Digital Resolution	16-bit
Camera Window	UV-grade fused silica

General Specifications

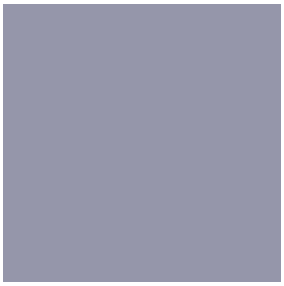
Interface Options	USB 2.0
Remote Triggering	LVTTL trigger input, expose strobe output
Peripheral communications	8 pin mini-DIN I/O connector
Image Sequencing	1 to 65535 image sequences under software control
Exposure Time	95 minutes (max) (1.33 microsecond increments)

Quantum Efficiency (QE) Curve[5]

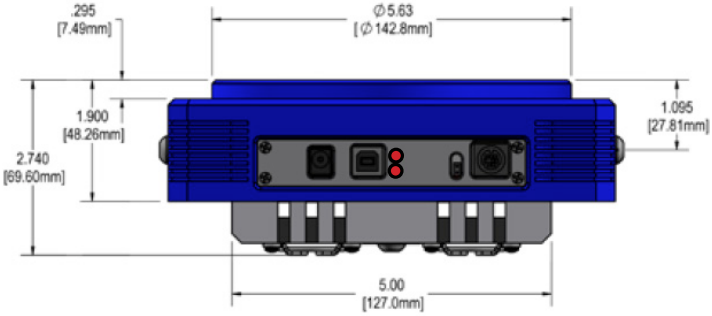


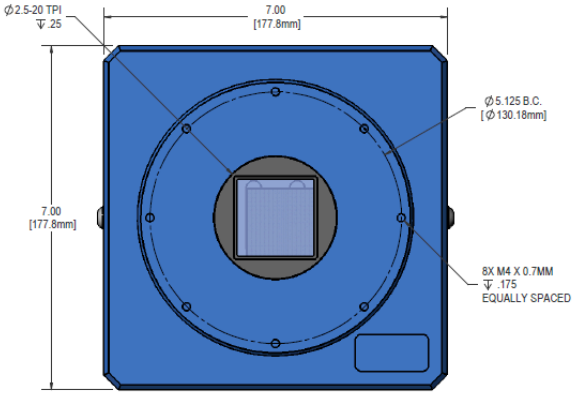
Size of CCD Imaging Area

36.7 x 36.7 mm

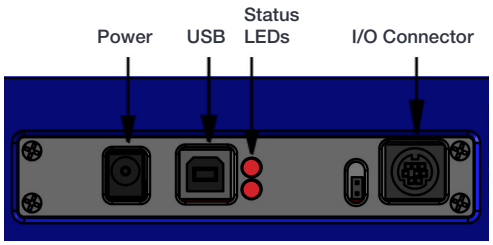


Mechanical Drawings





Connections



Mechanical Specifications

Camera Housing	Aluminum, hard anodized (D07)
Camera Head Size	7”x7”x2.55” (17.8x17.8x6.48 cm)
Back Focal Distance	1.005” (2.56 cm) [optical]
Mounting	5.125” bolt circle. 2.5” 20 TPI thread. Optional Nikon F-mount or Canon EOS/EF or FD mount.
Shutter	63 mm shutter.
Weight	4.2 lb. (1.9 kg)

CREATING THE OPTIMUM PRODUCT FOR YOU

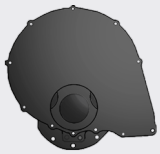
How to customize the Alta F9000:

Step 1: Select your camera type

Camera

Description	Part Code
Apogee Alta F9000 9.3 Megapixel Full frame CCD camera Grade S sensor and 63 mm Shutter	F9000-S-D07-S63

Step 2: Please indicate which adapters and accessories are required



Adapters & Accessories

A wide range of mounting adapters and accessory options are available for the Alta. Please refer to the links below for further information on filter wheels, filters and adapters.

Filter Wheels

Filter wheels available with up to 17 filter positions. Please refer to Apogee Filter Wheels

Filters

A comprehensive selection of Astrodon filters and filter sets are available to complement your selected filter wheel Please refer to Apogee Filters

Lens Adapters and flanges

Select the required camera mounting option for your application, from our range of lens, telescope and slip-fit faceplate adapters. Please refer to Apogee Adapters

Step 3: Please indicate which software you require

Software

The Alta also requires at least one of the following software options:

Description	Ordering Information
Windows SDK for Apogee	Please download from the Apogee Downloads Page
ASCOM Camera and Filter Wheel Driver	Please download from the Apogee Downloads Page
Linux Driver CD	Please download from the Apogee Downloads Page
Maxim DL Pro Software CD	MAXIM-DL/PRO-SW
MicroManager	Please see https://micro-manager.org/wiki/Apogee

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Footnotes

1. Figures are typical unless stated otherwise
2. At minimum temperature
3. Readout noise is for the entire system. It is a combination of sensor readout noise and A/D noise.
4. Quantum efficiency of the sensor at 25°C, as supplied by the sensor manufacturer.
5. Assumes internal trigger mode of operation and minimum exposure time.

Front page image M101, the Pinwheel Galaxy courtesy of Greg Morgan. Check out other astounding images captured with Apogee cameras at the Andor image gallery

OXFORD INSTRUMENTS
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PC 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 1GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of a sustained rate of 40MB/s
- Windows (7, 8, 8.1 and 10) or Linux (please contact us for specific build compatibility

Operating and Storage Conditions
- Operating Temperature: 0 to 40°C
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C
- Altitude up to 2000 m

Power Requirements
- 100-240V, AC 50-60Hz, or via alternate 12V input from user's source.
- 40W maximum power consumption (shutter open and cooling maximum)