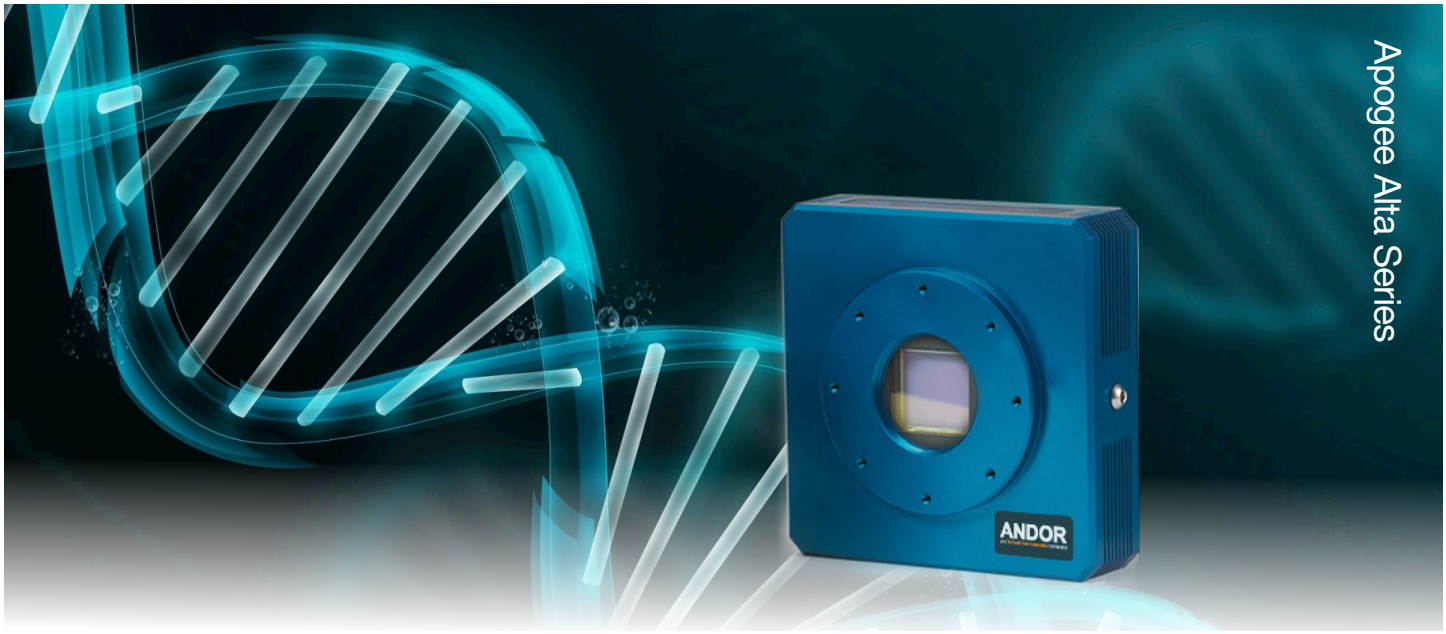
Alta F1

High Performance Cooled CCD Camera System

ANDOR
an Oxford Instruments company



System Features[*1]

- **High Resolution Sensor**
  0.4 Megapixel sensor with 9 µm pixels delivers a large field of view with high resolution.
- **Programmable TE cooling down to 50°C below ambient**
  Ideal for detection of weak chemiluminescence or astronomy images, enabling long exposure acquisitions with optimised 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 - 25 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 F1: Compact, 0.4 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 F1 has a 0.4 megapixel sensor with very high quantum efficiency. Low noise and large field-of-view are ideal for OEMs, biological sciences, spectroscopy and astronomy Cooling down to 50°C below ambient results in a low dark current contribution. These features combine to make the Alta F1 an exceptionally versatile performer.

Specifications Summary[*1]

Array Size (pixels)	768 x 512 (0.4 Megapixel)
Pixel Size	9 x 9 µm
Sensor Size	6.9 x 4.6 mm (31.9 mm^2) 8.3 mm diagonal
Pixel Well Depth (typical)	61,000 e^-
Dark Current[*2]	0.0234 e^-/pixel/sec
Read Noise[*3]	12.1 e^- (RMS @ 0.78 MHz)
Maximum Dynamic Range	74.1 dB (5041:1)
Quantum Efficiency	85% @600 nm 53% @400 nm

SPECIFICATIONS

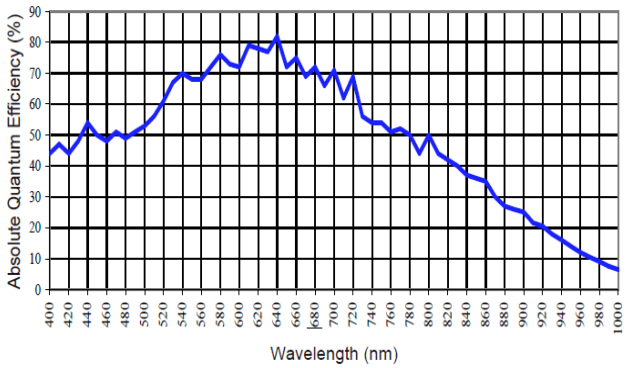
Technical Specifications[*1]

Sensor Type	KAF-0402 (On Semiconductor)
Active pixels	768 x 512 W x H (0.4 Megapixel)
Sensor Size	6.9 x 4.6 mm (31.9 mm^2) 8.3 mm diagonal
Pixel Size	9 x 9 µm
Pixel Well Depth	61,000 e^-
Read Noise [*3]	12.1 e^- (RMS @ 0.78 MHz)
Pixel Binning	1 x 1 to 8 x 512 on chip
Quantum Efficiency [*4]	85% @600 nm 53% @400 nm
Cooling	Maximum cooling up to 50°C below ambient temperature; -25°C at 25°C ambient Thermoelectric cooler with forced air.
Temperature Stability	+/- 0.1°C
Dark Current [*3]	0.0234 e^-/pixel/sec
Blemish Specification	Grade 2 as standard, as per sensor manufacturer definition
Anti-blooming factor	None
Maximum Dynamic Range	74.1 dB (5041:1)
Linearity	Better than 99%
Frame Rate (fps) [*5]	1.59 Full frame (@0.78 MHz) 5.18 Full frame (@5.01 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)

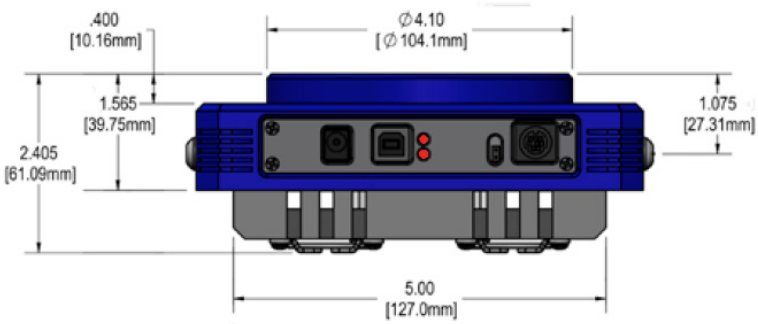
Quantum Efficiency (QE) Curve[5]

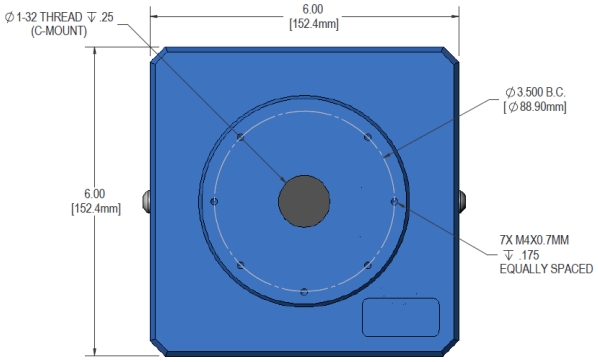


Size of CCD Imaging Area

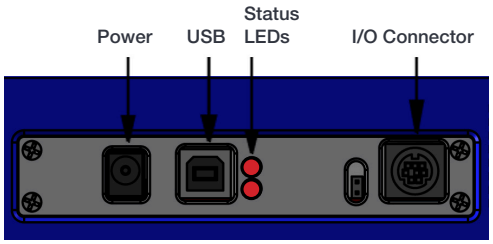
6.9 x 4.6 mm

Mechanical Drawings





Connections



Mechanical Specifications

Camera Housing	Aluminum, hard anodized (D01)
Camera Head Size	6”x 6”x 2.5” (15x15x6.25 cm)
Back Focal Distance	0.69” (1.75 cm) [optical]
Mounting	3.5” bolt circle. C-mount (1” 32 TPI thread). Optional Nikon F-mount or Canon FD.
Shutter	25 mm shutter.
Weight	3.1 lb. (1.4 kg)

CREATING THE OPTIMUM PRODUCT FOR YOU

How to customize the Apogee Alta F1:

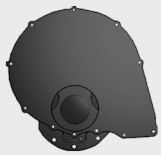
Step 1: Select your camera type

Camera

Description	Part Code
Apogee Alta F1 0.4 Megapixel Full frame CCD camera with grade 2 sensor and 25 mm Shutter	F1-2-D01-S25

Note: Please enquire for price and availability of Grade 1 sensor options.

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 filters 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.

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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)