



System Features^{*1}

- High Resolution Sensor**
 16.8 Megapixel sensor with 9 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**
 LVTTTL input allows exposure to start within 25 microseconds of the rising edge of the trigger.
- Focusing mode**
 Faster readout option, ideal for focus optimisation.
- Andor OEM optimisation**
 Compact and robust, Andor integration support, Andor quality enhancement, Andor post-sale support. Now also supported by 'Andor SDK'

Apogee Alta F16: Optimised for High Resolution Photometry

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. Cooling performance down to 45°C below ambient ensures optimal signal to noise for long exposure applications. A USB 2.0 interface offers the convenience of simple, robust connection to PC.

The Apogee Alta F16 features a 16.8 megapixel full frame sensor with micro-lenses and no anti-blooming. The lack of anti-blooming structures renders the F16 ideal for accurate photometric measurements over a wide dynamic range, and a large field of view. The exceptional performance of the Apogee Alta F16 makes it the perfect solution for many demanding astronomy applications.

Specifications Summary^{*1}

Array Size (pixels)	4096 x 4096 (16.8 Megapixel)
Pixel Size	9 x 9 μm
Sensor Size	36.8 x 36.8 mm (1359 mm ²) 52.1 mm diagonal
Pixel Well Depth (typical)	94,000 e ⁻
Dark Current^{*2}	0.007 e ⁻ /pixel/sec
Read Noise^{*3}	7.4 e ⁻ (RMS @ 0.87 MHz)
Maximum Dynamic Range	82.1 dB (12702:1)
Quantum Efficiency	65% maximum @650 nm 40% @450 nm

SPECIFICATIONS

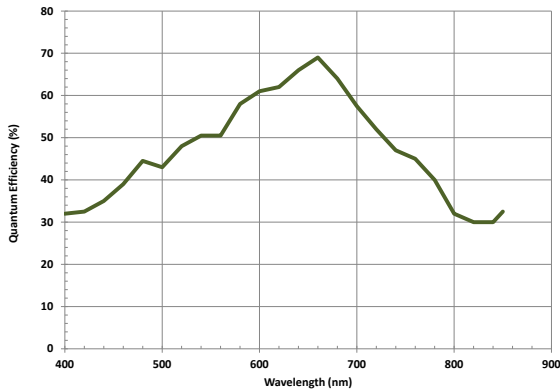
Technical Specifications^{*1}

Sensor Type	KAF-16801 (ON Semiconductor)
Active pixels	4096 x 4096 W x H (16.8 Megapixel)
Sensor Size	36.8 x 36.8 mm (1359 mm ²) 52.1 mm diagonal
Pixel Size	9 x 9 μm
Pixel Well Depth	94,000 e ⁻
Read Noise ^{*3}	7.4 e ⁻ (RMS @ 0.87 MHz)
Pixel Binning	1 x 1 to 8 x 4096 on chip
Quantum Efficiency ^{*4}	65% maximum @650 nm 40% @450 nm
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}	0.007 e ⁻ /pixel/sec
Blemish Specification	Grade 2 as standard, as per sensor manufacturer definition
Maximum Dynamic Range	82.1 dB (12702:1)
Linearity	Better than 99%
Frame Rate (fps) ^{*5}	0.05 Full frame (@0.87 MHz) 0.25 Full frame (@4.33 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	Up to 95 minutes (1.33 microsecond increments)

Quantum Efficiency (QE) Curve^{*5}

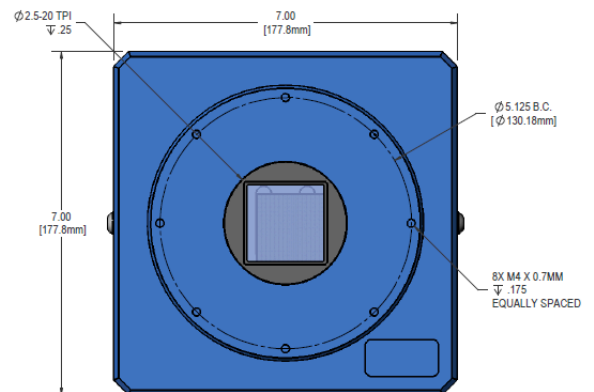
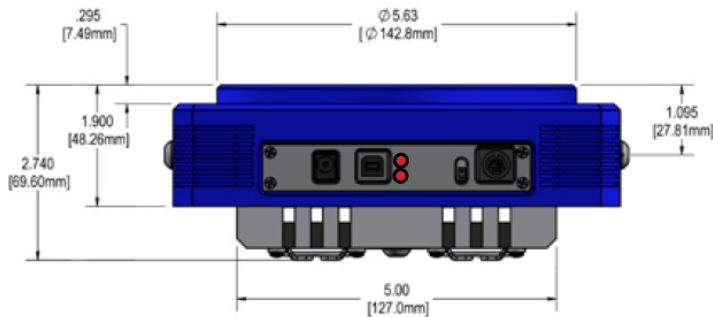


Size of CCD Imaging Area

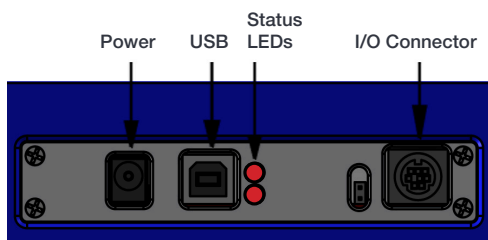
36.8 x 36.8 mm



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 Apogee Alta F16:

Step 1: Select your camera type



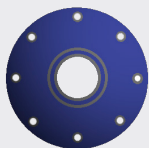
Camera

Description	Part Code
Apogee Alta F16 16.8 Megapixel Full frame CCD camera Grade 2 sensor and 63 mm Shutter	F16-2-D07-S63

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 filters and adapters.

Filters

A comprehensive selection of Astrodon filters are available.

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



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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Need more information? At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products. For a full listing of our local sales offices, please see: andor.com/contact



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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



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)

