



System Features^{*1}

- High Resolution Sensor**
 1.0 Megapixel sensor with 13 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 and 43 mm options.
- 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.
- 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 F47: Compact, 1.0 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 F47 has a back-illuminated full frame megapixel CCD with exceptionally high quantum efficiency and without anti-blooming structures to further improve sensitivity. The standard midband coating (MB) has the highest peak in the visible. The UV-enhanced option (UV) has the highest QE in the UV region.

Cooling down to 50°C below ambient results in a low dark current contribution. These features combine to make the Alta F47 an exceptionally versatile performer, and an ideal solution for many astronomy or physical science applications.

Specifications Summary^{*1}

Array Size (pixels)	1024 x 1024 (1.0 Megapixel)	
Pixel Size	13 x 13 μm	
Sensor Size	13.3 x 13.3 mm (177 mm ²) 18.8 mm diagonal	
Sensor Coating	Midband (MB)	UV Enhanced (UV)
Pixel Well Depth (typical)	95,000 e ⁻	89,000 e ⁻
Dark Current^{*2}	0.5273e ⁻ /pixel/sec	0.5273e ⁻ /pixel/sec
Read Noise^{*3}	10.4 e ⁻ (RMS @ 0.68 MHz)	10.7 e ⁻ (RMS @ 0.68 MHz)
Maximum Dynamic Range	79.2 dB (9135:1)	78.4 dB (8138:1)
Quantum Efficiency (%)		
@500nm	96	65
@400nm	52	57

SPECIFICATIONS

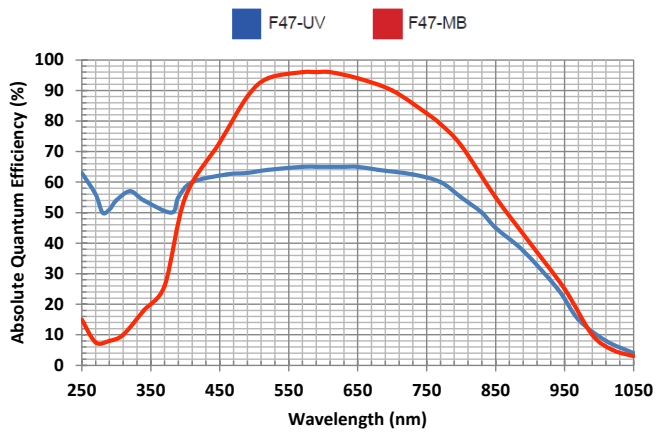
Technical Specifications^{*1}

Sensor Type	CCD47-10 (E2V) MB: with midband coating; UV: with UV enhanced coating
Active pixels	1024 x 1024 W x H (1.0 Megapixel)
Sensor Size	13.3 x 13.3 mm (177 mm ²) 18.8 mm diagonal
Pixel Size	13 x 13 μm
Pixel Well Depth	MB: 95,000 e ⁻ UV: 89,000 e ⁻
Read Noise ^{*3}	MB: 10.4 e ⁻ (RMS @0.68 Mhz) UV: 10.7 e ⁻ (RMS @0.68 Mhz)
Pixel Binning	1 x 1 to 8 x 1024 on chip
Quantum Efficiency ^{*4}	>90% @550 nm 52% @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}	All: 0.527 e ⁻ /pixel/sec
Blemish Specification	Grade 1 as standard, as per sensor manufacturer definition
Anti-blooming factor	None
Maximum Dynamic Range	MB: 79.2 dB (9135:1) UV: 78.4 dB (8318:1)
Linearity	Better than 99%
Frame Rate (fps) ^{*5}	0.65 Full frame (@0.68 MHz) 3.3 Full frame (@3.41 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	LVTTTL 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}



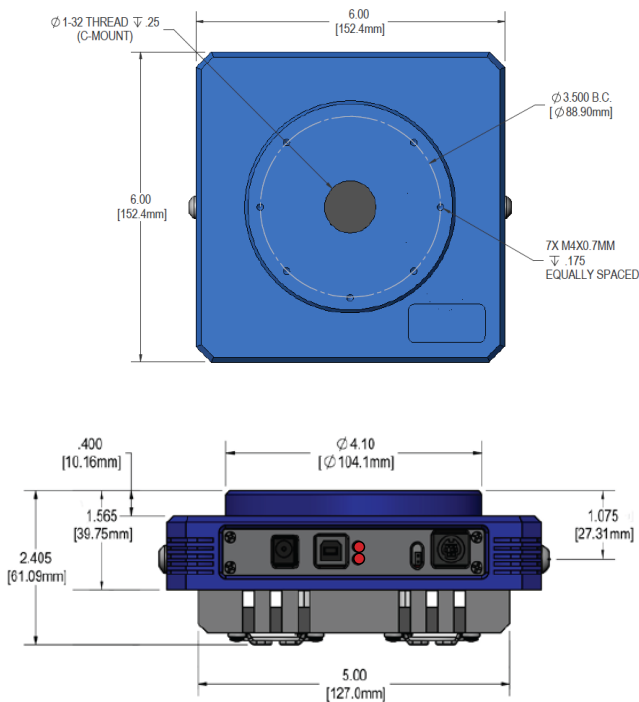
Size of CCD Imaging Area

13.3 x 13.3 mm

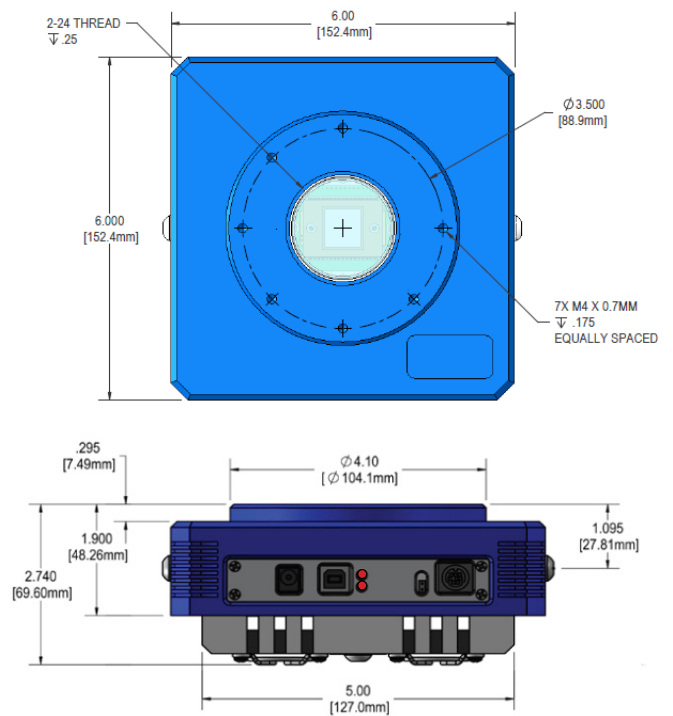


Mechanical Drawings

D01 (25 mm Shutter)



D02 (43 mm Shutter)



Mechanical Specifications

Camera Housing	Aluminum, hard anodized (D01 with 25 mm shutter; D02 with 43 mm shutter)
Camera Head Size	Aluminum, hard blue anodized. 6"x6"x2.5" (15x15x6.35 cm)
Back Focal Distance	D01: 0.69" (1.75cm) D02: 1.025" (2.6 cm) [optical]
Mounting	D01: 1" 32 TPI thread D02: 3.5" bolt circle. 2" 24 TPI thread Optional Nikon F-mount or Canon EOS/EF or FD mount.
Shutter	(D01 with 25 mm shutter; D02 with 43 mm shutter)
Weight	3.1 lb. (1.4 kg)

CREATING THE OPTIMUM PRODUCT FOR YOU

How to customize the Apogee Alta F47:

Step 1: Select your camera type

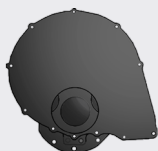


Camera

Description	Part Code
Apogee Alta F47 1.0 Megapixel Full frame CCD camera Grade 1 sensor, midband coating and 43 mm Shutter	F47-MB-1-D02-S43
Apogee Alta F47 1.0 Megapixel Full frame CCD camera Grade 1 sensor, UV-enhanced coating and 43 mm Shutter	F47-UV-1-D02-S43
Apogee Alta F47 1.0 Megapixel Full frame CCD camera Grade 1 sensor, midband coating and 25 mm Shutter	F47-MB-1-D01-S25
Apogee Alta F47 1.0 Megapixel Full frame CCD camera Grade 1 sensor, UV-enhanced coating and 25 mm Shutter	F47-UV-1-D01-S25

Note: Please enquire for price and availability of Grade 0 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 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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Europe

Belfast, Northern Ireland
Phone +44 (28) 9023 7126
Fax +44 (28) 9031 0792

Japan

Tokyo
Phone +81 (3) 6732 8968
Fax +81 (3) 6732 8939

North America

Concord, USA
Phone +1 (860) 290 9211
Fax +1 (860) 290 9566

China

Beijing
Phone +86 (10) 8271 9066
Fax +86 (10) 8271 9055

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)

