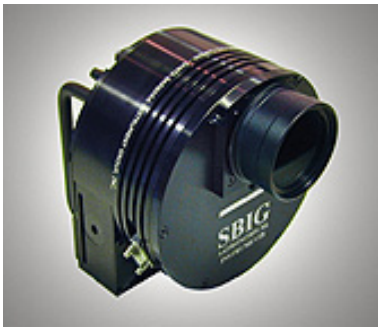
SBIG
ASTRONOMICAL
INSTRUMENTS
a division of Aplegen, Inc.

ST-10XME and ST-10XMEI

High Quantum Efficiency CCD Cameras



The Model ST-10XME is the flagship of the "ST" series of self-guiding CCD cameras from SBIG. The body is identical to the ST-7XME, ST-8XME, ST-9XME and ST-2000XM models with some slight modifications to accommodate the larger detector. Like other self-guiding cameras in the ST series, the ST-10XME contains two CCDs. In this case, the imaging CCD is an enhanced KAF-3200ME imaging detector from Kodak with 3.2 million pixels. The guiding CCD is the TC-237H with 657 x 495 pixels. The Model ST-10XMEI is essentially the same camera without the guiding CCD and some accessories. As of March, 2006, both the single CCD and dual CCD models come with the Remote Guide Head port for attaching an external guiding head. Both the ST-10XME and ST-10XMEI cameras use the same electronics and USB 1.1 interface that is as fast or faster than some competitors' USB 2.0. Moreover, the USB 1.1 interface is easily extended up to several hundred feet with commonly available and relatively inexpensive USB extenders whereas USB 2.0 is not. For a comparison of the ST-10XME and ST-10XMEI please refer to the chart below. See the table below for a comparison of the two versions.

The addition of a micro lens layer over the pixels of the CCD has significantly increased the quantum efficiency of the KAF-3200ME detector. The peak QE for this CCD is over 85%. Previously, this level of QE was achievable only through the expensive process of thinning the wafer and illuminating the image sensor from the backside. The QE for the blue wavelength of 400 nm is nearly double that of the 3200E and there is a 30% increase in QE over the 3200E (from 65% to 85%) at the important deep red H-alpha emission line.

Except for the increased QE, the CCD specifications remain the same as the 3200E: 2184 x 1472 pixels at 6.8 microns with the same low read noise and low dark current as the KAF-3200E CCD. The cosmetic grades also remain the same, a Class 2 CCD is free of column defects. This 3.2 megapixel CCD has a Full Frame Resolution of 2184 x 1472 pixels at 6.8 microns making it an ideal camera for wide field apochromatic refractors. The active imaging area is 17% greater than the ST-8E and the arrays contain approximately twice as many pixels. The imaging camera includes an electro-mechanical shutter, 16 bit analog to digital (A/D) converter, regulated temperature control with all of the electronics integrated into the CCD head. Communication to the PC is through the USB port with image data transfer at up to 425,000 pixels per second.

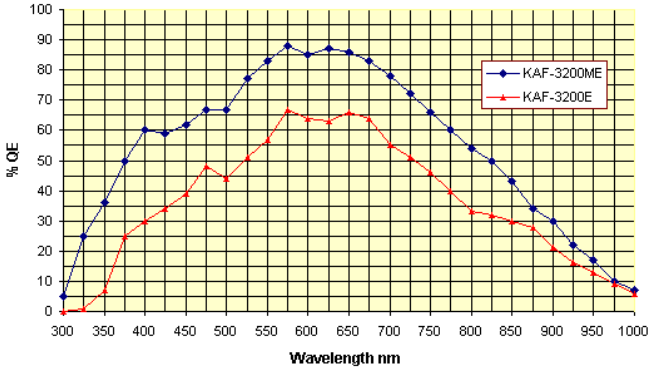
Features

KAF-3200E Image Sensor

The KODAK DIGITAL SCIENCE™ KAF-3200E Image Sensor is a high density, full-frame Blue Plus image sensor. It joins the family of Kodak Blue Plus sensors with improved quantum efficiency across the visible spectrum. Ultra-low dark current of less than 1e-/pixel/second at 0 degrees C (typical) allows moderate cooling for applications involving extended exposures. With an improved liquid cooling design, the ST-10XME cameras will reach approximately 45 degrees C below ambient temperature for best performance even in hot climates.

Although the ST-10XE/XME camera is a perfect match to high quality refractors in high resolution mode, with 3.2 million pixels the ST-10XE/XME is easily adapted to a variety of focal lengths. The various binning modes of 6.8, 13.6 and 20.4 micron pixels allow you to match the focal length of a wide range of telescopes and lenses to this imaging camera.

Relative Quantum Efficiency
KAF-3200ME vs KAF-3200E



There are also half-frame and quarter-frame modes available for each resolution setting. Moreover, even when binned 2x2 or 3x3 the number of pixels is still comparable to the ST-7XE, ST-8XE and ST-9XE as the table to the right illustrates. For example, in addition to 2184 x 1472 at 6.8 microns, the user can elect to image at 1092 x 736 with 6.8 micron pixels or 1092 x 736 with 13.6 micron pixels. In "low" resolution, full

frame mode, the ST-10EXE/XME still operates much like a ST-9XE with 36% more pixels and 43% larger field of view! The various combinations of useable frame and pixel sizes makes this an extremely versatile camera.

	Full Frame	Half Frame	Quarter Frame
High Res (unbinned)	2184 x 1472 6.8 microns	1092 x 736 6.8 microns	548 x 370 6.8 microns
Medium Res (binned 2x2)	1092 x 736 13.6 microns	546 x 368 13.6 microns	275 x 186 13.6 microns
Low Res (binned 3x3)	728 x 490 20.4 microns	364 x 245 20.4 microns	184 x 124 20.4 microns

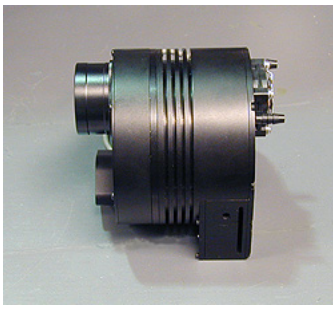
The file size of high resolution images can be reduced by about half by saving the images in SBIG compressed file format. The benefit of this format is that the compression is lossless, unlike JPEG and other compression techniques. The original file size and amount of compression varies somewhat depending on the content of the image and the resolution mode selected, but the information contained in the table below is typical.

Resolution Modes (Binning)	Pixel Array (Full Frame)	Uncompressed Image Size	Compressed Image Size
High Res Mode (1x1)	2184 x 1472	~6.4 Mb	~3.4 Mb
Med Res Mode (2x2)	1092 x 736	~1.6 Mb	~1.1 Mb
Low Res Mode (3x3)	728 x 490	~715 Kb	~500 Kb

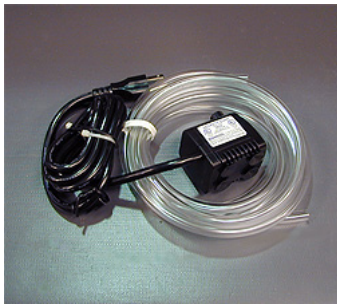
The ST-10XME camera utilizes SBIG's newest high speed analog and digital electronics with a USB interface to the PC. This new interface is up to 14 times faster than our older parallel interface, and in some cases faster than others' USB 2.0. The full frame download rate for the ST-10XE/XME is approximately 8.7 seconds. For finding and centering objects and for focusing, various binning or partial frame modes may be selected to significantly shorten the download time. For instance, in focus mode with a 20 x 20 pixel box the download time is about 0.5 seconds per frame. CCDOPS software also has an Auto Resolution feature that makes using this type of large array easier. The Model ST-10XME camera maintains similar performance, low noise and high QE as the ST-8XME camera. In fact, the ST-10XME has slightly less dark current and lower read noise than the ST-8XME. The dual CCD structure also allows the full range of existing accessories to work with the ST-10XME: The AO-7 Adaptive Optics System, CFW-8A color filter wheel, CFW-10 color filter wheel, camera lens adapters, etc., are all the same for the ST-10XME as the other ST series cameras.

Accessories

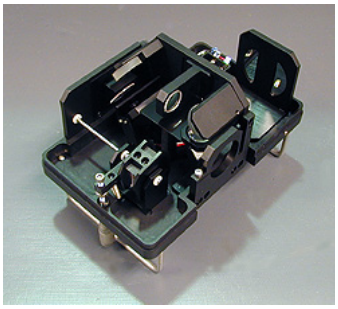
Extra carousel available for additional specialty filters or UBVRI sets



Integrated CFW8A design mates to camera housing to form single unit



Submersible water pump and tubing for additional cooling performance



Self-Guided Spectrograph uses the tracking CCD to keep object on slit

SBIG
ASTRONOMICAL INSTRUMENTS
a division of Aplegen, Inc.

Each ST-10XME camera system includes:

- Rugged camera body with new high speed analog and digital electronics
- New High QE Class 1 KAF-3200ME imaging CCD with no column defects
- Built-in TC-237H CCD autoguider with 2.7X the area and 10X the sensitivity of an ST-4
- High speed USB interface (425,000 pixels/sec).
- New Remote Guide Head Port
- New I2C bi-directional expansion port
- Standard accessory / telescope port
- User rechargeable desiccant plug
- Shutter
- 2" Nosepiece
- Cooling Fan - on/off controlled by software
- New heat exchanger design with water cooling capability
- Tripod mount 1/4-20 threaded side plate
- Adjustable t-thread ring
- 15 foot USB cable (third party USB extenders available for up to 500 meters!)
- Telescope interface cable (for autoguiding)
- Universal Power supply
- SBIG's CCDOPS version 5 camera control software
- Software Bisque's CCDSoftV5 camera control and image processing software
- Software Bisque's TheSky version 5, level II
- Operating Manual
- Custom design Pelican carrying case with pre-cut foam for your camera and accessories
- One Year Warranty Parts and Labor
- Demo CD-ROM with sample images and software

Each ST-10XMEI camera includes:

- Rugged camera body with new high speed analog and digital electronics
- New High QE Class 1 KAF-0261E imaging CCD with no column defects
- High speed USB interface (425,000 pixels/sec)
- New Remote Guide Head Port
- New I2C bi-directional expansion port
- Standard accessory / telescope port
- User rechargeable desiccant plug
- Shutter
- 2" Nosepiece
- Cooling Fan - on/off controlled by software
- Tripod mount 1/4-20 threaded side plate
- Adjustable t-thread ring
- 15 foot USB cable (third party USB extenders available for up to 500 meters!)
- Universal Power supply
- SBIG's CCDOPS version 5 camera control software
- Software Bisque's TheSky version 5, level II
- Software Bisque's CCDSoftV5 camera control and image processing software
- Operating Manuals on CD-ROM
- One Year Warranty Parts and Labor

Comparison Chart	ST-10XMEI	ST-10XME
High QE KAF-3200ME CCD	Class 2	Class 2
Column defects allowed	None	None
High Speed USB Interface	I	I
Internal shutter for automatic dark frames	I	I
Internal ROM for CFW8A control	I	I
Regulated thermoelectric cooling with fan	I	I
Universal Power Supply	I	I
USB Cable	I	I
Adjustable t-thread interface block	I	I
2" nosepiece with t-thread base	I	I
CCDOPS ver.5 software on CD-ROM	I	I
CCDOPS ver.5 manual on CD-ROM	I	I
Camera Operating Manual	I	I
TheSky v.5, level II software on CD-ROM	I	I
TC-237H Tracking CCD (657x495 at 7.4u)	$395	I
Custom Pelican Carrying Case	$169	I
Water Cooling Heat Exchanger	$99	I
ST-7RC Adapter and Relay Cable	$9	I
Printed Camera Operating Manual	$15	I
Printed CCDOPS ver.5 Manual	$15	$15
1.25" nosepiece	$49	$49

Santa Barbara Instrument Group, a division of Aplegen, Inc. | 147-A Castilian Drive, Goleta, CA 93117
t 805.571.7244 | f 805.571.1147 | w www.sbig.com | e sbig@sbig.com

SBIG ASTRONOMICAL INSTRUMENTS
a division of Aplegen, Inc.

ST10ME.082211