Quantum Scientific Imaging 532 CCD Camera

Astronomy Now HOT Product

A new CCD camera from Quantum Scientific Imaging promises to compete with the best CCDs money can buy. Astrophotographer **Nik Szymanek** puts it through its paces.

Quantum Scientific Imaging is a US-based company producing high quality CCD cameras based on many of the popular CCD sensors from Kodak. For this review we borrowed their QSI 532 model, which features the Kodak KAF-3200ME sensor. This is a 14.85mm x 10.26mm blue-enhanced 3.2 megapixel CCD with microlens technology to improve sensitivity and is the same sensor as found in the popular SBIG ST-10 CCD camera.

The camera arrived packed in a rugged Pelican plastic moulded case that was of the highest quality, with a precision cut foam insert that held everything very snugly. My initial impressions of the camera were very good. The build quality was excellent and the camera looked superb with its dark blue metallic casing. A supplied CD contained installation instructions as well as a very comprehensive user guide, all with plenty of screen shots. I installed the camera drivers with no problems whatsoever and having the step-by-step instructions and pictures made the whole installation stress free. The CD contained a 'lite' version of *Maxim DL* with options to install drivers for either *Maxim DL* or *CCDSoft* (two of the most popular image processing packages used by CCD imagers). Also supplied were the mains power transformer and USB cable. The transformer came with a two-pin shaver-type plug but this could be unplugged from the unit and replaced with a standard three-pin plug cable, which I did.

The camera connected to my computer and *Maxim* software with no problems. The user will have to select a few options during software control but once this is done the camera is recognised and imaging can begin. The version of camera we received had an integral filterwheel and LRGB filters supplied, which was controlled by *Maxim* (or *CCDSoft*).

Getting started

My first task was to cool the camera using its thermoelectric cooler (a water cooling unit is available as an option for further cooling). The efficiency of the QSI 532 cooler amazed me. I choose an initial setpoint of –5 degrees Celsius and the camera attained that and stabilised in the quickest time I've ever seen in a CCD camera. Although the ambient temperature was relatively mild the camera was able to reach –20 degrees and stabilise with incredible efficiency. In all of my testing of the camera the setpoint temperature never wavered. I spent the next few hours building a library of dark frames that I was able to use during the calibration stages of image processing and for all the review images.

The QSI-532 is relatively small but quite solid, weighing in at around 950 grams so caused no problems when I attached it to my telescope using the supplied two-inch nosepiece. Both the power cable and USB connected with gratifying firmness to the camera.

For the review I used my Pentax 75mm SDHF refractor that delivered a field of view of 101 x 68 arcminutes and an image scale of 2.79 arcseconds per pixel. My first target was M31, the Andromeda Galaxy, which framed nicely on the CCD. I set a sequence of exposures through a clear filter and grabbed 100 minutes worth of exposures using autoguided five-minute sub-exposures. It didn't take long to become apparent that this camera has extraordinary sensitivity. The peak quantum efficiency for the KAF 3200ME sensor is a staggering 82 percent at around 600-nanometre wavelength making this camera a supreme performer for both RGB and hydrogen-alpha/narrowband imaging. Extremely low dark current and readout noise as well as a high dynamic range put this CCD in a class of its own. The quality of images produced and the timescale needed to obtain them was unprecedented, especially considering the mediocre skies from my Essex observatory.

I then took a sequence of RGB exposures of M31 for the colour information. I 'binned' the CCD to increase sensitivity even further (at the expense of resolution) and took a sequence of 30 minutes total per filter. This probably wasn't necessary as the extended sensitivity produced quite extreme sky light pollution gradients across the chip, which had to be removed during image processing.

For my next target I wanted to test the camera's sensitivity to hydrogen-alpha imaging and for this I installed my own Astronomik hydrogen-alpha filter that has a bandwidth of 13 nanometres centred on the 656 nanometre hydrogen-alpha line. This involved opening the front casing of the camera using one of the supplied Allen keys. The filter screwed directly into a vacant space on the filter carousel. Upon replacing the front cover and powering up the camera I became aware of a slight problem, reported very efficiently by the camera's own fault diagnostic system using a series of beeps and coloured LED lights on the back of the camera. It reported a problem with the filterwheel and, after a bit of head scratching, I contacted QSI who responded very quickly with some detailed suggestions. I reopened the casing and rechecked the clearances inside and manually rotated the carousel and that fixed it. Happily, this was the only problem encountered during all of the testing period.

The Andromeda Galaxy, photographed with the QSI 532 CCD camera, cooled to –25 degrees, through a Pentax 75mm SDHF refractor at f/6.6, from the author's observatory in West Horndon in Essex. The image is comprised of exposures of 100 minutes Luminance and 30 minutes RGB (binned 2x2). All images: Nik Szymanek.

A rear view of the QSI 532 CCD camera showing the camera status indicator, cooling fins, twin low-inertia cooling fans, optional water cooling ports and USB and power connections.

Next target

My target was the Orion Nebula. I made a sequence of test exposures because the supplied camera was a 'non anti-blooming gate' (non-ABG) model. Bright stars cause an overflow of charge on this type of CCD sensor that produces ugly vertical streaks in the final image. ABG cameras drain the excess charge away, alleviating this problem but at the cost of reduced sensitivity and invalidating the use of the camera for scientific imaging such as photometry. Through the hydrogen-alpha filter I was able to take 60-second exposures before blooming became a problem. I acquired an hour's worth of hydrogen-alpha exposures and then switched to 30-second exposures for red, green and blue colour images. The camera proved to be extremely sensitive at hydrogen-alpha wavelengths producing a very pleasing image of the Orion Nebula, especially considering the poor skies.

In summary, I can honestly say that this is the best CCD camera I've ever used. The quantum efficiency is outstanding, producing a camera that excels at both RGB and narrowband imaging. The performance, attention to detail, build quality, operation, documentation and sheer aesthetic quality make it a winner and a worthy contender to the competition. Highly recommended!

The famous Orion Nebula, imaged with the QSI 532 CCD and the same Pentax 75mm refractor as the M31 picture, but with an Astronomik hydrogen-alpha filter exposed for 60 minutes and RGB for 5 minutes.

The beautiful Rosette Nebula, brought to life by the QSI532 CCD. Taken through a Pentax 75mm refractor with an Astro Physics 0.67 reducer and 115 minute exposure with a hydrogen-alpha filter, and 60 minutes each with O [III] and hydrogen-beta filters.

Nik Szymanek is a world-renowned astrophotographer and regular contributor to **Astronomy Now.**

At a glance

QSI 532 CCD camera with Kodak KAF-3200ME sensor
CCD size: 14.85mm x 10.26mm with 6.8 micron pixels
Download time (USB2): 11 seconds
Cooling: –38 degrees Celsius below ambient
Quantum Efficiency: peak 82 percent
Read Noise: 7 electrons RMS
Cost: £3,599 (camera only); £3,995 (with integral filterwheel).
Available from: www.iankingimaging.com
Further information: www.qsimaging.com/500series.html