FIRST light

ZWO ASI034MC
colour USB 2.0 camera

A low-cost camera that will get you off to a great start in Solar System imaging

WORDS: MARTIN LEWIS

VITAL STATS

- Price £118.80
- Sensor 0.25-inch
  Colour Aptina CMOS
  ASX340CS.
- Pixels 728x512 pixels
  (5.6µm across)
- Size 62mm diameter,
  28mm long without
  nosepiece
- Connections USB 2.0
- Weight 110g
- Extras 1.25-inch
  nosepiece, USB 2.0
  lead, software CD
- Supplier 365Astronomy
  www.365astronomy.com
  Tel 020 3384 5187

ZWO was founded only
four years ago but already
sells a wide range of
digital video cameras
manufactured in-house, all designed
for astronomical use and particularly
the imaging of Solar System objects.
The ASI034MC is its entry-level USB
2.0 digital imaging camera, boasting
high sensitivity and high speed in a
low-cost colour camera package.

Digital video cameras such as the ASI034MC
enable you to capture a stream of short-exposure
frames of bright objects, which — using free software
such as RegiStax or AutoStakcer! — you can then
sort through, select and stack the best frames
to create an averaged image relatively unaffected
by the turbulence in Earth’s atmosphere.

Before connecting the camera to your computer
for the first time, you need to install a driver.
This is supplied on a CD that also contains a primitive
interface program called AMCap; ZWO itself suggests
using the much better freeware programs SharpCap
or FireCapture for camera control. These programs
allow you to control the exposure, gain, colour,
balance, format and many other camera settings.

We tested the camera with FireCapture, a popular
feature-rich program specifically designed for
a selection of common astronomy-related digital video
cameras, including the full range of
ZWO devices. Like the ZWO cameras,
FireCapture is a product designed by
astronomers for astronomers, and it
is being continually improved and
enriched. Online tutorials are available
to help you get up to speed with the
program if you are unfamiliar with it.
In all of our tests, the camera gave
no issues when driven with the latest version
FireCapture running on an old Windows XP laptop.

Framing the night

We connected the camera to a 8.75-inch Newtonian
scope and — using a Barlow lens to boost the image
scale — we captured the planets Venus and Jupiter in
bright twilight. We were impressed by the camera’s
high speed when not limited by the exposure time.
The interface is USB 2.0 rather than USB 3.0, but
despite this we achieved frame rates of 75fps (frames
per second) at full frame. With a reduced frame
size, known as ‘region of interest’ setting, the
frame rate can be pushed higher, rising to 260fps
for a frame size of 320x240 pixels.

A quarter Moon hanging high in the southern sky
was our next target. The ASI034MC has a chip size
of 728x512 pixels and it is generally recommended
to have a larger chip than this with more pixels when
imaging the Moon or Sun, even so the camera

CMOS OVER CCD

Unlike many competing planetary cameras,
ZWO’s ASI034MC uses an Aptina CMOS chip
rather than a more common CCD chip.
CMOS chips used to be the noisiest and
less-sensitive cousins of CCDs, but recent
improvements in technology have
advanced CMOS chips to the point where
their noise and sensitivity levels can be
comparable or even better than CCDs.
In addition CMOS chips are faster and
cheaper to make than CCDs and usually
run at lower power consumption. Cameras
based on the sensitive Sony ICX618 CCD
chip were — until recently — the most
favoured ones for Solar System imaging.
We found the ASI034MC’s noise
levels and sensitivity similar to that
of ICX618-based colour cameras.
We also found its speed similar or
better than USB 2.0 cameras using
that chip, especially as the ASI034MC
has the ability to reduce the frame size
to increase the frame rate further.
For the ASI034MC it is the low price for
such a well-performing Solar System
camera that is the real stand-out feature.
Metal Body with 1.25-Inch Adaptor

The camera body is an attractive circular design made of machined and anodised aluminium, which keeps the weight down and makes the camera robust. The heat-finned body is threaded at the front with an M42x0.75mm T-thread. The supplied 1.25-inch adaptor screws into this, enabling you to connect a telescope.

Pixel Arrangement

At 728x512 pixels, the chip is larger than a typical 640x480 planetary camera, and uses pixels that are 5.6μm across. This is a common pixel size among planetary imaging cameras and means that if you want to upgrade the camera at a later date you can use your same Barlow lens without the image scale changing.

Infrared/Ultraviolet Filter Coverglass

The camera has an infrared/ultraviolet-blocking filter fitted just in front of the chip, which is useful for a colour camera as it helps to improve image detail. The fact that it is built-in saves you having to buy a separate filter. It also protects the chip from dust and dirt.
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COLOUR CHIP

A colour chip is ideal for those starting out with planetary imaging as you don’t need to buy separate red, green and blue filters and take separate videos through them. This keeps the cost down and makes the task of taking images and post-processing much simpler and quicker.

SKY SAYS…

Now add these:

1. ZWO five-position filter wheel with 1.25-inch eyepiece holder
2. ZWO 1.25-inch CCD LRGB filter set
3. ZWO 60mm finder and guidescope with non-rotating helical focuser

GAMMA CONTROL

The ability to set the camera gamma, often absent in commercially available digital video cameras, is a welcome feature in the ASI034MC. This allowed us to drop the contrast when imaging the Moon, enabling us to capture details in darker lunar areas without burning out adjacent brighter areas.

► Saturn stacked from a 60-millisecond exposure at 16fps

► Right: Jupiter stacked from a 26-millisecond exposure at 37fps; far right: Venus from a 0.7-millisecond exposure at 75fps

► performed well and we got some nice smooth lunar images that showed plenty of detail at the terminator. We used the camera’s gamma adjustment to good effect here, enabling us to cope with the large brightness range for different features at the terminator.

Saturn was our final object to image but this was low in the south even at its highest altitude; it is always a tough planet to successfully image due to its low surface brightness. Low surface brightness requires longer exposures and this often leads to significant blurring by the atmosphere, especially at low altitude. Although a relatively sensitive camera, we had to push the gain up a bit higher than for other targets to keep the exposure times reasonable. At these higher gains we started to notice increased levels of noise in this camera compared to ZWO’s more advanced models.

As a result, longer runs were needed to gather more frames allowing us to bring the noise down to acceptable levels and generate a good image.

The ASI034MC is a tremendous value colour planetary imaging camera with astonishing performance for the price. If you want a low-cost camera to get you started with Solar System imaging then it comes highly recommended.

VERSIT

BUILD & DESIGN

CONNECTIVITY

EASE OF USE

FEATURES

IMAGING QUALITY

OVERALL

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