



New Product Announcement

QHY533M/C

Available April 2022



SENSOR FEATURES

Overview

With the advantage of low noise and high-speeds, CMOS technology has revolutionized astronomical imaging. The QHY533M/C is a new generation of back-illuminated CMOS cameras with 3.76um pixels in the the same family as the sensors used in the flagship models QHY600 and QHY268, featuring zero amplifier glow, low noise and high sensitivity. The IMX533 is a 9-megapixel, 15.97 mm diagonal (11.29 mm square) CMOS image sensor with 3003 x 3003 pixels at 3.76um, 14-bit A/D and is available in both monochrome and color. **QHYCCD is now accepting orders. Production of the QHY533M begins this month.**

Back-Illumination

One benefit of the back-illuminated CMOS structure is improved full well capacity. This is particularly helpful for sensors with small pixels. In a typical front-illuminated sensor the embeded wiring structure reflects some of the photons and reduces the efficiency of the sensor. In the back-illuminated sensor the light is allowed to enter the photosensitive surface from the reverse side. In this case the sensor's embedded wiring structure is below the photosensitive layer. As a result, more incoming photons strike the photosensitive layer and more electrons are generated and captured in the pixel well. This ratio of photon to electron production is called quantum efficiency. The higher the quantum efficiency the more efficient the sensor is at converting photons to electrons and hence the more sensitive the sensor is to capturing an image of something dim.

Zero Amplify Glow

Like the larger QHY600 and QHY268 cameras, the QHY533 models exhibit zero amplifier glow, no matter how long the exposure.

Large Image Buffer

The QHY533 has a large 1 GB image buffer for reliable image transfer at high rates using USB 3.0. The camera produces 27 FPS in 8-bit mode or 18 FPS in 16-bit mode.

True Raw Data

Some consumer digital cameras have a RAW image output, but typically it is not completely RAW. Some evidence of noise reduction and hot pixel removal is still visible on close inspection. This can have a negative effect on the image for astronomy such as the "star eater" effect. However, QHY Cameras offer TRUE RAW

IMAGE OUTPUT and produces an image comprised of the original signal only, thereby maintaining the maximum flexibility for post-acquisition astronomical image processing programs and other scientific imaging applications.

MECHANICAL DESIGN

Solid Build Quality

Although the QHY533 has a 1-inch optical format sensor, like the QHY183, it nevertheless uses a similar body size, style and build quality as the larger APS-C sized QHY268 camera.

Dual-Stage TE Cooling

In addition to dual stage TE cooling, QHYCCD implements proprietary technology in hardware to reduce dark current to its lowest possible value, less than 1/1000th of an electron at -20C.

Anti-Dew / Anti-Frost Technology

Based on almost 20 years of cooled camera design experience, QHY has implemented full frost and dew control solutions. The optical window has built-in dew heaters and the chamber is protected from internal humidity condensation. An electric heating board for the chamber window helps prevent the formation of dew on the external surface of the window and the sensor itself is kept dry with our desiccant tube socket design for control of humidity within the sensor chamber.

Mechanical Interface

QHY533M (mono, left) and QHY533C (color, right) have different interface designs to accommodate their different anticipated uses. Both versions come with an additional adapter for mounting to a tripod. This makes it easier to shoot with a DSLR lens.



QHY533M



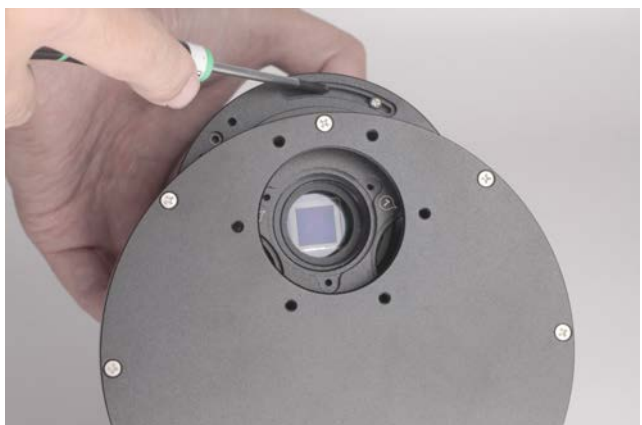
QHY533C

NOTE: QHY is also designing a front piece adapter for a standard nosepiece. Front plate may appear different in production models.

The QHY533C color camera will include a free Adapter Kit E that provides 55mm back-focus and M48 thread interface and/or direct connection to a Nikon or Canon lens adapter (sold separately). At the same time, the QHY533C has female C-Mount threads allowing direct mounting of C-Mount lenses.



The QHY533M monochrome camera has a threaded interface that can be directly connected to the small filter wheel. Concurrent with the release of the QHY533M, QHYCCD will offer a special version of the CFW3 filter wheel that can be assembled directly to the camera by the user without opening the filter wheel cover or removing the carousel. Due to the short back focus design, when the QHY533M is connected to the CFW3 filter wheel, a Nikon or Canon lens adapter may be added to connect a camera lens to the filter wheel and achieve infinity focus.

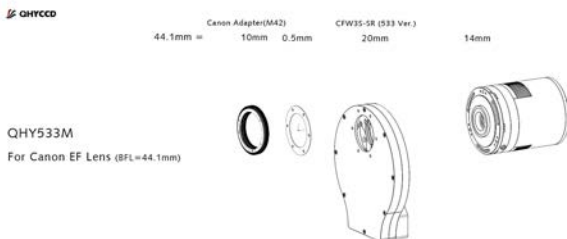
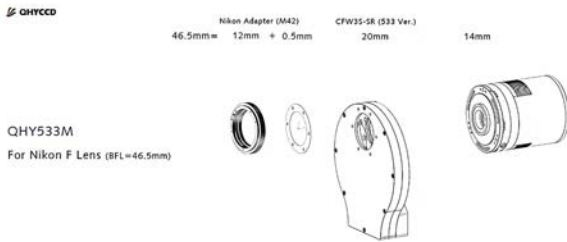
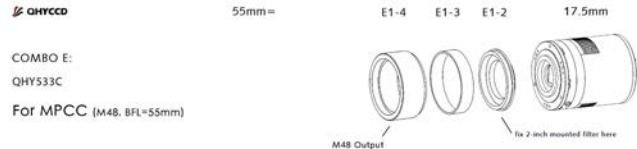
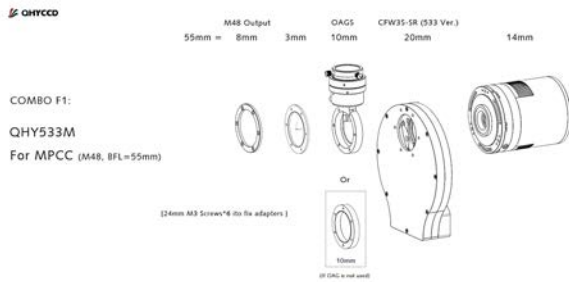


Orientation Adjustment

The QHY533M uses threads to connect to the QHYCFW3S. Since the sensor has a square aspect ratio, its orientation may not matter to the user. However, if the user wants to change the orientation of the camera so that the x and y axis of the sensor align with the telescope's RA and Dec, for example, the user can adjust the front plate of the 533M to rotate the orientation of the camera to his/her liking.

New Adapter Kit

The new E1 Adapter Kit will allow direct connection via M48 threads and provides 55mm of backfocal distance. In the alternative, a Nikon or Canon DSLR lens adapter may be attached (lens adapters sold separately).



QHY533M with CFW + OAG or Camera Lens

QHY533C w/ 55mm adapter or Camera Lens

PRELIMINARY SPECIFICATIONS (TYPICAL)

Model	QHY533M / QHY533C
CMOS	Sony IMX533M / IMX533C
Mono / Color	Both available
Illumination	Back Illuminated
Pixel Size	3.76 μm
Pixel Array	3008 x 3028 (Incl. black and overscan)
Total Pixels	9 million
Optical Format	Typical 1-inch
A/D	14-bit
Ful Well Capacity	58ke-
Frame Rate	27 FPS @ 8-bit, 18 FPS @ 16-bit
Read Noise	1.3e- to 3.4e-
Dark Current	0.0005e-/pixel/sec at -20C
Exposure time	30us to 3600s
Unity Gain	68
Amp Glow Suppression	Zero Amp Glow
Shutter	Electronic rolling shutter
Computer Interface	USB 3.0
Image Buffer	1 GB DDR3
Cooling	Dual Stage TE
Temperature Delta	-30C in continuous mode w/exp <1 sec
Temperature Delta	-35C in continuous mode w/exp > 1sec or in single frame mode
Coatings	AR+AR
Anti-frost	Sealed cavity with desiccant drying tube connector
Anti-dew	Chamber window heating elements
Back Focus	17.5mm (+/- 0.5 mm)
Weight	845 g
Dimensions	90 mm Diameter x 107 mm

