1. INTRODUCTION

This report contains a summary of the characterization data from the ZWO ASI294 CMOS camera purchased as a candidate for Steward Observatory guiders, particularly for 90prime at the Bok telescope.

The purchased camera is a ZWO ASI294MM Pro Cooled Monochrome Camera, model ASI294MM-P. It was operated using its USB3 interface to a PC running AzCam with an ASCOM driver. The cost was $1,480 through High Point Scientific (www.highpointscientific.com).

The sensor is a SONY IMX492 CMOS imager with 8288x 5644 0.0215 micron pixels. It was tested in 4x4 binned mode effectively with 2072x1411 8.6 um pixels. This is an image area of 17.819 x 12.135 mm.

For reference we note most existing Steward guide cameras have 512x512 pixels of 13.5 um size (although some cameras have had 15 um pixels). This is an image area of 6.912 x 6.912. The new camera has a larger image area by about a factor of 4.5.

2. DARK SIGNAL

The measured dark signal @ -12.9 C is 0.00065 e/pix/sec. For a 4x4 binned pixel this is 0.10 e/pix/sec or a dark signal noise of

A typical 60 second dark image is shown in Figure 2. Glow can be seen from an on-chip circuit on the upper left side.

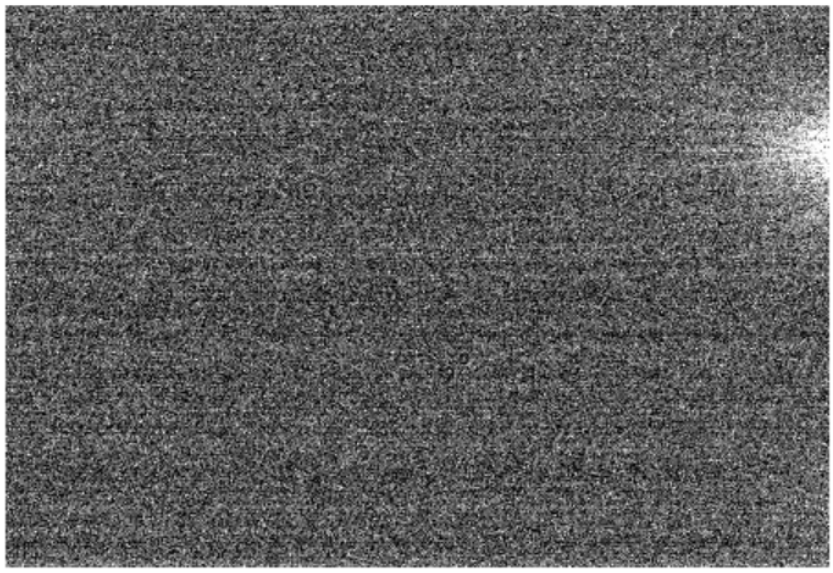


Figure 1. Dark image (60 sec)

3. READ NOISE

The measured read noise of the camera varies greatly with internal operating modes. The lowest value measured is about 1.7 electrons. Such low values are achieved using very high gain such as 0.1 e/DN. A more reasonable gain setting for guiding is around 1 e/DN with a measured read noise of 3.5 electrons.

4. QUANTUM EFFICIENCY

The sensor is back illuminated and optimized for blue light imaging. The measured QE is shown in Table 1 and Figure 2.

Wave	QE
350	0.273
360	0.368
370	0.404
380	0.538
390	0.666
400	0.762
420	0.841
450	0.836
500	0.840
550	0.750
600	0.644
650	0.496
700	0.364
750	0.287
800	0.212
850	0.137

Table 1. Measured camera quantum efficiency.

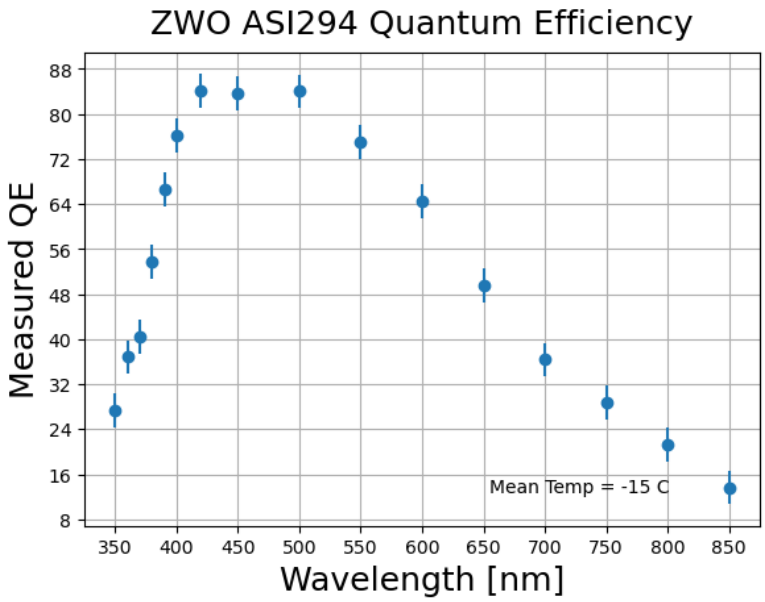
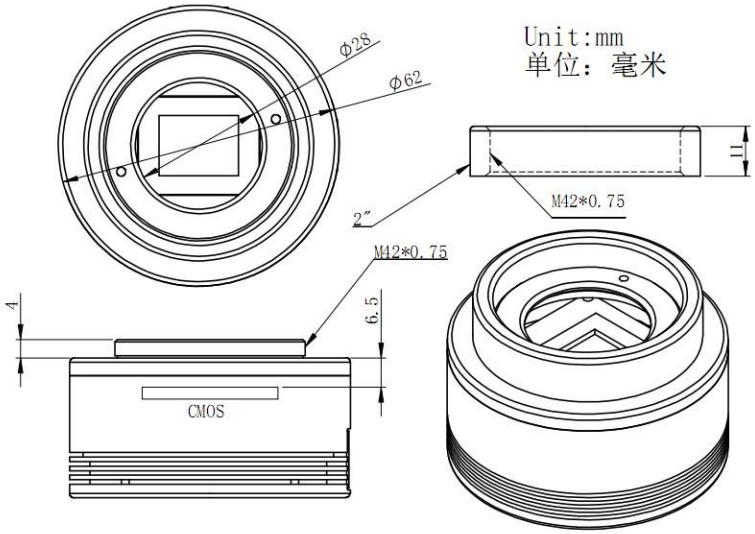
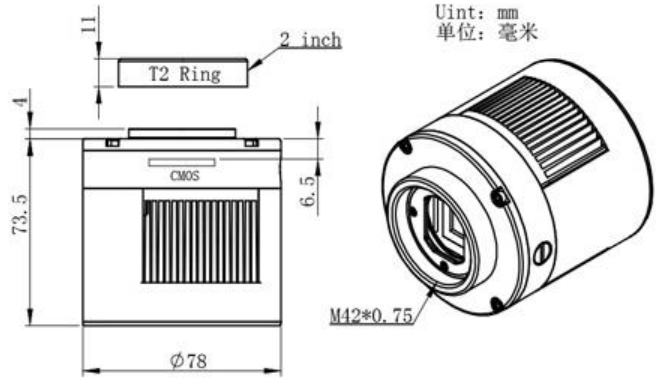
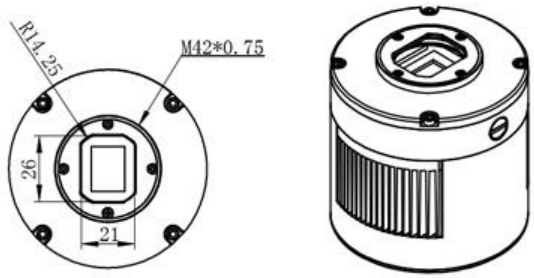


Figure 2. Measure camera quantum efficiency uncorrected for camera window transmission.

5. MECHANIC DRAWINGS








Cooled Cameras
External Device Connecting Drawing
USB Hub For accessaries
12V Power Adapter
USB2.0 OUT
USB3.0 IN
DC 12V- 3A
USB2.0 Cable
ASI Pro/Cool Camera
USB3.0/USB2.0 Cable
EFW mini
Accessaries
Computer USB3.0/USB2.0 Port