



PRELIMINARY

The ProLine PL16803 has been the de facto standard for astrophotography since its release in 2006, and the Kepler KL4040 continues the tradition of excellence. Both cameras use a 4k x 4k sensor with 9 micron pixels. The difference is the ProLine uses a traditional CCD while the Kepler uses a Scientific CMOS sensor.

The table below is a comparison of the ProLine PL16803 and the Kepler KL4040 cameras, using a low flux value of 1 photon/pixel/second.

Signal-to-Noise Ratio
KL4040 vs. PL16803

Exposure (sec)	4040 SNR	16803 SNR
1 x 900	22.5	19.2
5 x 180	21.8	14.7
10 x 90	20.9	11.9

Summary: A Paradigm Shift

It is no surprise that the CCD's best performance is with a single long exposure. What may be surprising is the Kepler KL4040 has a better signal-to-noise ratio than the PL16803 even with a single long exposure. The signal-to-noise ratio of the KL400 is better than the PL16803 even when using short exposures that are stacked!

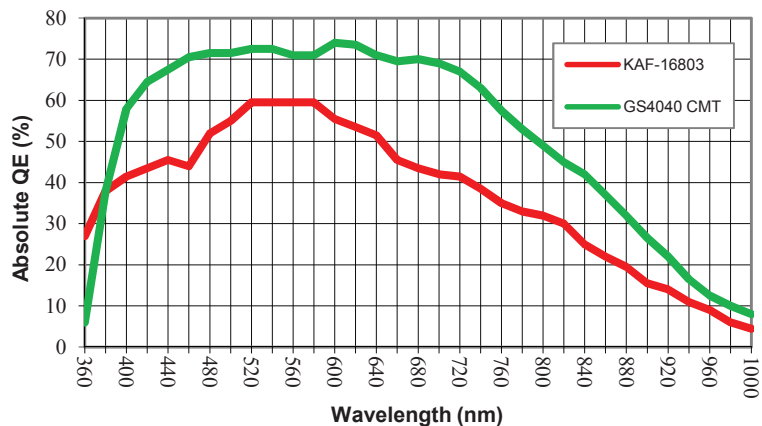
The benefit of taking multiple short exposures is the option to discard a bad exposure ruined by satellite trails, tracking errors, or bad seeing (etc.). Incredible low-noise images are now possible with a single long exposure or many stacked short exposures. The KL4040's superior performance allows it to be used for a wide range of applications and requirements.

Kepler KL4040 versus ProLine PL16803

	KL4040	PL16803
Sensor Type	Front illuminated CMOS	Front illuminated CCD
Active Pixels	4096 x 4096	
Pixel Size	9 x 9 microns	
Effective Area	36.9 x 36.9 mm	
Sensor Diagonal	52.1 mm	
Full Well Capacity	70000 electrons	100000 electrons
Frame rate (rolling)	23 fps HDR (QSFP V2)	11 seconds/frame
Read Noise (rolling)	3.7 e- HDR (800 MHz)	10 e- (1 MHz)
Dynamic Range	86 dB HDR	80 dB (1 MHz)
Peak QE	74%	60%
Cooling	Air (Optional Liquid)	
Dark Current	0.15 eps at -20C	0.005 eps at -33C
Interface	USB 3.0	USB 2.0
Interface (Optional)	QSFP ¹	NA
Data Bit Depth ²	16 bit	
Optional Mount	F-mount	
Video size	3.3"	
Subarray Readout	Yes	
Electromechanical Shutter	Optional 65mm	Standard 65mm
Ex Trigger In	Yes	
Ex Trigger Out	Yes	
Software	FLI Pilot	FLIGrab
SDK	Open Source	
List Price	\$15,995	\$10,995

¹ QSFP=Quad Small Form factor Pluggable: high speed fiber optic interface.

² 16-bit data is merged from two 12 bit converters.



Quality. Cooled. Cameras.

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