

# Kepler Cooled CMOS Cameras

## One Giant Leap Forward

### Higher Speeds, More Channels, New Sensors

Kepler is FLI's new series of cooled cameras, providing high throughput, high dynamic range, high quantum efficiency, and low noise.

FLI began shipping the Kepler KL400 and KL4040 cameras in 2018. Both models feature a high quantum efficiency, low-noise, high frame-rate cooled sCMOS sensor. The KL400 is one of the most sensitive cameras in existence (1.5 e- read noise, 95% QE). The KL4040 is a high QE front illuminated camera with a generous 52mm imaging diagonal. KL6060s feature a 37.7 megapixel, 87mm diagonal sensor, available front or back illuminated.

#### 16-Bit Performance

For maximum speed, some Kepler cameras provide a single read at 12 bits. For 16 bit dynamic range, Keplers read twice at two different gains. The two images are merged using FLI's proprietary algorithms to create an exceptionally linear 16 bit image.

#### Optional QSFP Fiber Interface

USB 3.0 is the standard interface for Kepler cameras. The optional QSFP interface offers maximum throughput, long distance, and electrical isolation.

#### Simplified Service

For customer convenience, Kepler's shutter, fans, and digital board have all been designed to be user-replaceable. Camera firmware is field-programmable from anywhere in the world.

#### Extreme Reliability

FLI's proprietary sealing technology guarantees a long trouble-free life with no need to change or service desiccant packs or periodically pump down the camera.



KL400 with Optional 45mm Shutter

#### Camera Applications:

Orbital Debris Detection  
ExoPlanet Research  
Photocell Inspection

#### Software Support

MicroManager  
MATLAB  
LabVIEW  
ASCOM



Kepler cameras include Pilot Control Software

Kepler Model	KL400 FI, KL400 BI	KL4040	KL6060 FI, KL6060 BI
Sensor Type	Front & Back illuminated	Front illuminated	Front & Back illuminated
Resolution	2048 x 2048	4096 x 4096	6144 x 6144
Pixel Size	11 x 11 microns	9 x 9 microns	10 x 10 microns
Imaging Area	22.5 x 22.5 mm	36.9 x 36.9 mm	61.4 x 61.4 mm
Sensor Diagonal	31.9 mm	52.1 mm	86.8 mm
Maximum Frame Rate	48 fps (24 fps HDR)	23 fps (QSFP V2)	19 fps (FI; HDR; QSFP)
Read Noise	1.5 e- (FI) / 1.6 e- (BI)	3.7 e-	3 e- (BI HDR)
Full Well Capacity (e-)	120000 (FI) ; 90000 (BI)	70000 e-	130000 (FI); 100000 (BI)
Dynamic Range (HDR)	96 dB (FI) / 93 dB (BI)	86 dB	90 dB (HDR)
Shutter	Rolling	Rolling; Rolling with Global Reset	Rolling
Peak QE	58% (FI) / 95% (BI)	74% (CMT)	72% (FI); 95% (BI)
Cooling	45°C Below Ambient	40°C Below Ambient	40°C Below Ambient
Dark Current @ -20C	0.2 eps (FI); 0.6 eps (BI)	0.15 eps	0.1 eps

Specifications subject to change without notice.