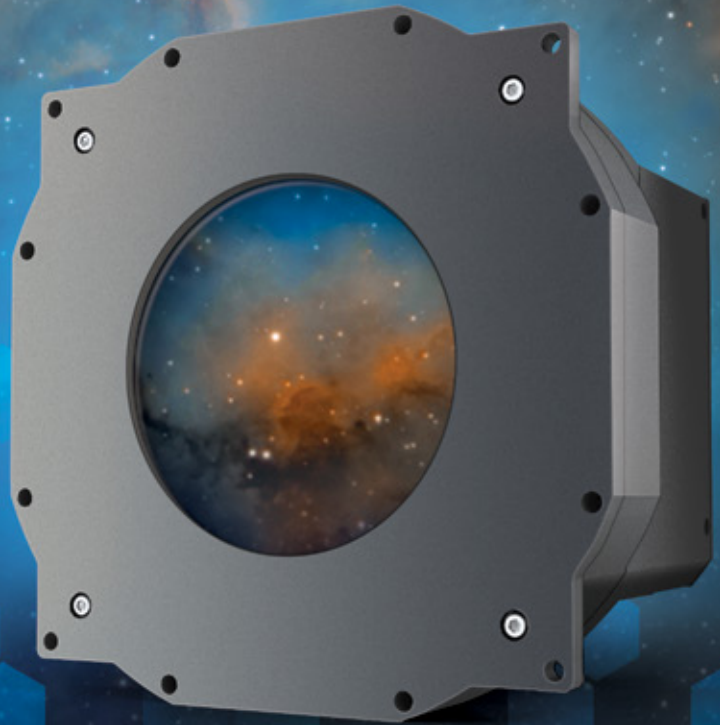


Kepler KL6060 sCMOS Camera

Large Format
Low Noise
High Frame Rate



Maximize Your Field of View with our New Large Format Kepler KL6060 sCMOS Camera



Extremely Large Area



High Frame Rate



High Sensitivity



High Dynamic Range



Back-Illuminated (BI) & Front-Illuminated (FI)



High Performance & Reliability

The New Low-Noise Cooled sCMOS Camera from Finger Lakes Instrumentation (FLI) Provides High Speed Imaging with an Exceptional Field of View

Available with a front-illuminated sensor or high-QE back-illuminated sensor, the Kepler KL6060 camera is capable of taking up to 19 frames per second, using the optional QSFP fiber interface. This affordable camera is a game-changing solution for Space Debris Detection and Space Situational Awareness applications and is ideal for universities or dedicated amateurs who want to capture every possible photon.

SPECIFICATIONS

	Back-Illuminated (BI)	Front-Illuminated (FI)
Array Size	37.7 Megapixels	
Resolution	6144 x 6144 with 10 micron pixels	
Array Diagonal	86.8 mm	
Full Well Capacity (e-)	95k	128k
Read Noise	3e-	4.6e-
Frame Rate (QSFP)	11 fps	19 fps
Dynamic Range (HDR)	90 dB	89 dB
Electronic Shutter Type	Rolling	
Options	QSFP Fiber Interface 90 mm Shutter Liquid Cooling	

High Frame Rates

The back-illuminated camera reads out at 14.288 microseconds per row (11 fps for full array). The front-illuminated camera reads at 8.533 microseconds per row (19 fps for full array). Faster imaging speed can be achieved by selecting a smaller region of interest. For example, by selecting a sub-array of 1,000 rows, frame rate increases by 6x.

High Dynamic Range (HDR)

The KL6060 is able to capture bright and dim objects in a single image. It achieves a remarkable 90 dB dynamic range by reading a single exposure twice – once in high gain and once in low gain. FLI's proprietary algorithms guarantee the merged 16-bit HDR image is exceptionally linear, enabling high-precision quantitative analysis. FLI's Pilot software allows you to preserve the original 12-bit images for future scrutiny, ensuring that your original data remains unchanged.

Optional QSFP Fiber Interface

When combined with the optional QSFP Fiber Interface, the KL6060 allows for long distance operation and isolation from electrical interferences. It also provides the highest data rates possible on the Kepler platform. Our PCIe interface supports customizable on-the-fly correction for Dark Signal Non-Uniformity and Photo Response Non-Uniformity at full data rates, including the ability for you to add the algorithms of your choice. Please contact FLI for details.

Reliable, Long-Life Performance

The Kepler KL6060 is designed for use in the most remote locations and eliminates the need to periodically pump down the chamber or service desiccant cartridges. Our proprietary chamber design, coupled with decades of manufacturing experience, ensure that your camera will have a long lifespan, regardless of location.

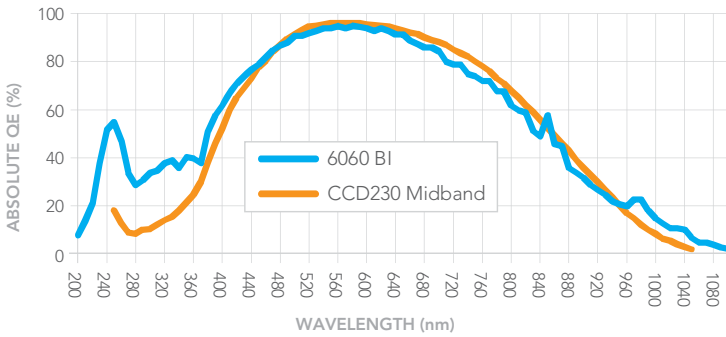
Support & Service

Each of our Kepler cameras are built for long-lasting sustainability and come standard with unrivaled service and support. They are field-programmable with the capacity to easily upgrade firmware and re-program from anywhere in the world. In addition, our shutters, power boards, and fans are simple field replacements, with no need for expensive, time-consuming transport back and forth from the factory. Our cameras are installed in observatories worldwide — many in remote mountaintop locations — from Antarctica to Fairbanks and Finland. See the back page of this brochure for a sampling of our satisfied customers.

IMAGE CREDIT: The Melotte 15 image used in this brochure is courtesy Tolga Gumusayak, taken with an FLI Kepler KL4040 camera.

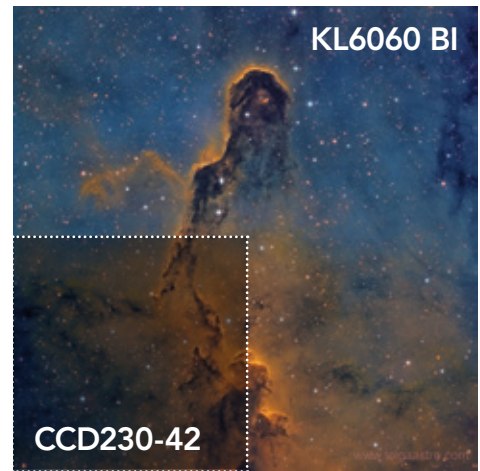
Back-Illuminated sCMOS vs. Back-Illuminated CCD

QUANTUM EFFICIENCY: KL6060 BI VS. CCD230 BI MIDBAND



DARK CURRENT: At operating temperature, the KL6060 has ~1/3 the dark current of the popular CCD230-42 or CCD42-40 back-illuminated sensors.

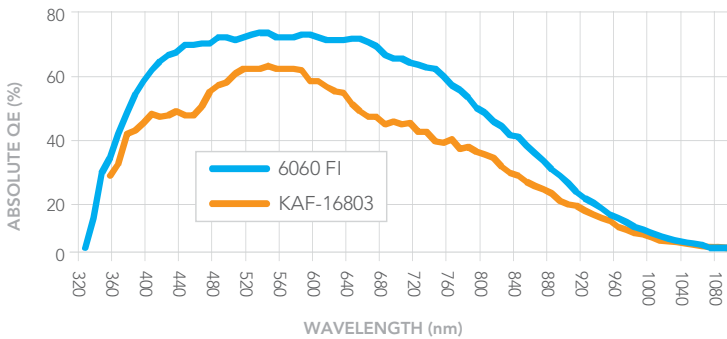
READ NOISE: The KL6060 BI has ~1/4 of the noise of the CCD230-42 running at 500 kHz (about 11 seconds readout time), but the KL6060 BI delivers 11 frames per second.



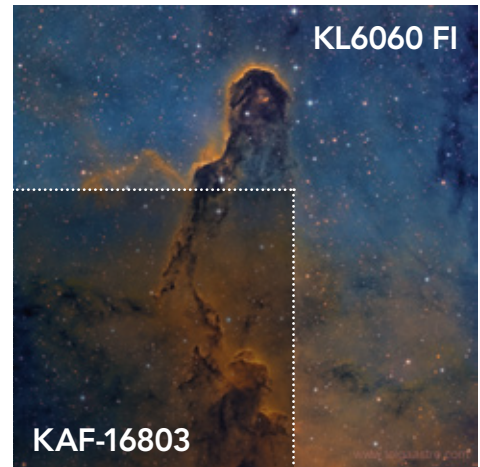
FIELD OF VIEW: With a diagonal of 86.8 mm, the KL6060 BI is comparable to the massive CCD230-84. The KL6060 sensor has 4X the FOV of the CCD230-42 and 5X the FOV of the CCD42-40.

Front-Illuminated sCMOS vs. Front-Illuminated CCD

QUANTUM EFFICIENCY: KL6060 FI VS. ON SEMI KAF-16803



READ NOISE: The read noise of the KL6060 FI is 1/3 the noise of the KAF-16803 running at 8 MHz (about 3 second readout time), but the KL6060 FI delivers 19 frames per second.



FIELD OF VIEW: The KL6060 FI sensor has 3X the area of the KAF-16803 and 50% more FOV than a KAF-4320.

Our Customers

Abastumani Observatory (Georgia)
Academia Sinica (China)
Adiyaman University (Turkey)
Adler Planetarium
Aerospace Corporation
Aiglon College (Switzerland)
Air Force Research Laboratory
AIX Marseille Université (France)
American Museum of Natural History
Anadolu University (Turkey)
Andor Technology (UK)
Andrushivka Observatory (Ukraine)
Appalachian State University
Argonne National Lab
Arizona State University
Artem Observatory (Russia)
Auburn University
Austin College
Australian Astronomical Observatory
Australian Defence Science & Technology Organisation (DSTO)
Australian National University
Azdeniz University (Turkey)
Baader Planetarium (Germany)
Baku State University (Azerbaijan)
Ball Aerospace
Ball State University
Beijing Institute of Technology (China)
Beijing University (China)
Binghamton University
Boeing
Boston University
Brigham Young University
Butler University
California Institute of Technology
Carl Zeiss Jena
Carlton University (Canada)
Carnegie Institution for Science
Carnegie Observatories
Catholic University of America
Centro de Estudios de Física del Cosmos de Aragón (Spain)
Center for Research and Advanced Studies of IPN (Mexico)
Charité - Universitätsmedizin Berlin (Germany)
China Academy of Space Technology
CICESE (Mexico)
City College of New York
Civil Aviation University (China)
Colby College
Connecticut College
Colgate University
Collepardo Observatory (Italy)
Colorado State University
Columbia University
Copernicus Foundation for Polish Astronomy
Cornell University
CSIR - Council for Scientific and Industrial Research (South Africa)
Cukurova University (Turkey)
Dartmouth College
DESY Deutsches Elektronen Synchrotron (Germany)
Drexel University
Duquesne University
Durham University (UK)
Edmund Optics
Embry-Riddle Aeronautical University
Emirates Mobile Observatory (Abu Dhabi)
Emory University
EOS (Australia)
ETH Zürich (Switzerland)
European Molecular Biology Laboratory (Germany)
European Neuroscience Institute
European Southern Observatory (Germany)
Food & Drug Administration
Florida International University
Fordham University
Freie Universität Berlin (Germany)
Fudan University (China)
Geneva Observatory (Switzerland)
George Washington University
Georgia Institute of Technology
Georgia Public Health Lab
Getty Museum
Gissar Observatory (Tajikistan)
Goodrich
Guang Xi University (China)
Harvard University
Hefei Institute (China)
Helmholtz Centrum Geestacht (Germany)
Hitachi
Horiba
Howard Hughes Medical Institute
Humboldt University of Berlin (Germany)
Institute of Molecular and Cell Biology (Singapore)
Institut d'Astrophysique de l'Université de Liège (Belgium)
Institut de Planetologie et Astrophysique de Grenoble (France)
Institute of Astronomy, Hawaii
Institute of Fluid Physics (China)
Institute of Mechanics, Chinese Academy of Sciences (CAS)
Institute of Physics (CAS)
Instituto de Astrofísica de Andalucía (Spain)
Instituto de Astrofísica de Canarias (Spain)
Instituto de Estudios Espaciales de Cataluña (Spain)
IPICYT (Mexico)
ITT Space Systems
IUCAA Pune University (India)
Japan Aerospace Exploration Agency (JAXA)
Jenoptik
Jet Propulsion Laboratory
Johns Hopkins University
Karlsruhe Institute of Technology (Germany)
Kitab Observatory (Uzbekistan)
Konkoly Observatory (Hungary)
Kopernik Observatory and Science Center
Korea Astronomy and Space Science Institute (KASSI)
Krasnojarsk Observatory (Russia)
Langkawi National Observatory (Malaysia)
Las Campanas Observatory (Chile)
Las Cumbres Observatory Global Telescope Network
Lawrence Berkeley Lab
Lawrence Livermore National Laboratory
LG Electronics (South Korea)
Lick Observatory
Liebniz Institute for Plasma Science (Germany)
Lockheed Martin
Lohrman Observatory (Germany)
Los Alamos National Laboratory
Lowell Observatory
Macquarie University (Australia)
Maidanak Observatory (Uzbekistan)
Marine Biological Laboratory
Mauna Kea Observatory
Max Planck Institute (Germany)
Mayaki Observatory (Ukraine)
Mayo Clinic
McDonald Observatory
Memorial University of Newfoundland (Canada)
Miami University
Middlebury College
Millkovo Observatory (Russia)
Mississippi State University
MIT
MIT Lincoln Laboratory
Mondy Observatory (Russia)
Montana State University
Mt. Sinai School of Medicine
NASA Ames
NASA Goddard
NASA Johnson
National Astronomical Observatories of China
National Astronomical Research Institute of Thailand/NARIT
National Institute of Aeronautics and Space (Indonesia)
National Institute of Health
National Renewable Energy Laboratory
National Taiwan University
National University of Ireland
Nauchny Observatory (Ukraine)
Naval Ordnance Test Unit
Naval Research Laboratory
New Mexico State University
New Mexico Tech
New York State Dept. of Health
New York University
Nikon
NIST
Northrop Grumman
Northwestern Polytechnical University (China)
Northwestern University
Novosibirsk State University (Russia)
Observatoire de Ouakaimeden (Morocco)
Observatorio Astronomico Nacional (Bolivia)
Observatory Hamburg (Germany)
Olympus
Oxford University (UK)
Palomar Observatory
Paul Scherrer Institute (Switzerland)
Pennsylvania State University
Physical Research Lab (India)
Pontificia Universidad Católica de Chile (China)
Princeton University
Pulkova Observatory (Russia)
Purdue University
Purple Mountain Observatory (China)
Qatar Foundation
Raytheon
Reial Acadèmia de Ciències i Arts de Barcelona (Spain)
Rheinisch-Westfälische Technische Hochschule (Germany)
Rochester Institute of Technology
Royal Melbourne Institute of Technology (Australia)
Sandia National Laboratories
Sanglok Observatory (Tajikistan)
Scripps Research Institute
Seoul National University (South Korea)
SETI Institute
Shan Dong University (China)
Shanghai Institute of Technical Physics
Shanghai Observatory (China)
Shumen University (Bulgaria)
Siding Spring Observatory (Australia)
Siemens
Simon Fraser University (Canada)
SLAC National Accelerator Laboratory
South African Large Telescope (SALT)
St. Francis Xavier University (Canada)
Stanford University
STFC (UK)
Sydney University (Australia)
Tarleton University
Technical Universities of Darmstadt, Dresden, and Ilmenau (Germany)
Technion University (Israel)
Tel Aviv University (Israel)
Tenagra Observatories
Terskol Observatory (Russia)
Texas A&M University
Texas State University
The Ohio State University
Tiraspol Observatory (Moldova)
Tubitak National Observatory (Turkey)
Turksat University (Turkey)
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Universitat de Valencia (Spain)
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University College Dublin (Ireland)
University Observatory Munich (Germany)
University of Bern (Switzerland)
University of Bradford (UK)
University of Calgary (Canada)
University of Garmers (Germany)
University of Jena (Germany)
University of Lethbridge (Canada)
University of Munich (Germany)
University of the Pacific
University of Quebec at Montreal, UQAM (Canada)
University of Newcastle (UK)
University of Queensland (Australia)
University of Toronto (Canada)
University of the Virgin Islands
University of Warwick (UK)
University of Western Australia
University of Western Ontario (Canada)
Ustice Observatory (Czech Republic)
UPJS Institute of Physics (Slovakia)
US National Park Service
Ussurijsk Observatory (Russia)
Utah State University
Uzhgorod Observatory (Ukraine)
VA Hospital San Francisco
Victoria University of Wellington (New Zealand)
Virginia Tech
Washington and Lee University
Washington University in St. Louis
Wayne State University
Western Kentucky University
Wheaton College
Whitehead Institute of Biomedical Research
Whitman College
Williams College
Xi'an Institute of Optics and Precision Mechanics of CAS (XIOPM)
Xi'an University of Technology (China)
Xidian University (China)
Yale University
YBJ Observatory (Tibet)
Yunnan Observatory (China)
Zvenigorod Observatory (Russia)