

MicroLine Compact High-Speed Cooled CCD Cameras

Powered by ProLine Technology

Overview

Standard features of the MicroLine include a large aperture shutter, high transmission camera window, internal frame buffer, USB 2.0 connectivity, triple TEC cooling and **ultra-fast download speeds** of up to 12 megapixels per second!

Construction

Each component of the MicroLine camera is designed and manufactured for a long life in the most demanding conditions:

- All major components are CNC machined
- Highest quality electrical components & circuit boards
- Logo, serial number and focal plane indicators are laser-etched
- FLI designed photo-etched stainless-steel shutters are **field-serviceable** should they ever encounter damage
- Sensor is hermetically sealed from dust and moisture

Download Speeds

MicroLine features fast download speeds that simply leave the competition behind. Operating at speeds up to 12 megapixels per second, a KAI-11002 image (full-frame, bin 1) can be downloaded to your PC in just over **one second!**

Small Form Factor

At 3.7 x 3.7 x 5 inches (HWL), MicroLine is a small camera with big camera capabilities! The ML improves upon the highly successful MaxCam design in a number of key areas including cooling, download speeds, clear aperture, and sensor capability. The MicroLine imaging system will accommodate sensors as large as the Kodak KAI-16000. (For applications without an on-camera shutter, *the MicroLine will hold sensors as large as the Kodak KAF-4301E.*)

Cooling

The MicroLine's robust cooling design achieves a sustainable cooling performance of 50-55° deg C below ambient. The camera's CCD can be operated at -30° deg C with typical room temperatures and without the need for water cooling or special cooling sequences. Simply set the MicroLine cooling where you want it and the camera will do the rest – quickly and worry-free.

Internal Frame Buffer

Conventional imaging cameras move the image data directly from the image sensor to the USB port, making them susceptible to added artifacts due to PC processing tasks, processor speed, and other PC-related issues. The MicroLine avoids these issues with its internal frame buffer thus allowing an image to be quickly read out and downloaded to the PC. This allows the PC to take the image at whatever speed it is capable of without introducing any artifacts to the image.

System Compatibility and Mounting Options

The MicroLine line is compatible with all FLI imaging accessories including our Precision line of Color Filter Wheels and Digital Focusers. **MicroLine camera adapters are available for microscope, telescope and machine vision connectivity.** Mounting options include two M5 threaded holes (side), one ¼-20 threaded hole (side), two ¼-20 threaded holes (front), one 2.7" UNS24-2B thread (nose piece) and FLI's standard v-groove nose piece.



Product Details

FAST download speeds up to 12 mega-pixels/sec	External Triggering
On-board frame buffer standard	High Transmission camera windows (97%)
CCD over scan and binning capability (up to 16 x 16)	Custom window available with transmission below 200nm
Field upgradeable firmware	Low noise, 16-bit operation
USB 2.0 High speed serial Interfaces	Supported Imaging Sensors <ul style="list-style-type: none"> • Kodak Full Frame Color, Monochrome and Interline • E2V Technologies Full Frame Back-Illuminated • Fairchild Imaging Full Frame Back-Illuminated
Sensors available with or without cover slips	
Hermetically Sealed CCD Chamber	
Small, light-weight form factor for Medical & Research	

Specifications

CCD readout noise (Sensor and Speed Dependent)	As low as 5e~
Dark Current @ -30 deg C. (typical)	0.1 to 1 e-/pixel/sec (sensor dependent)
Anti-blooming	Available
Spectral sensitivity	200 - 1050 nanometers
Available number of pixels	Up to 16 mega pixels
Pixel size range	6.8 to 24 micron
Camera cooling	-55 deg C (below ambient) using a Triple TEC
48 mm shutter	25 msec open time using four stainless-steel blades
Power requirements	12V
Storage temperature range	-50°C to +100°C
Operation temperature range	-40°C to +50°C
Relative humidity operating range	95%
Standard Camera Weight	3.5 pounds
Standard Camera Dimensions	3.7" x 3.7" x 5.0" (Width x Depth x Height)
Standard Camera Connectivity	M5, ¼-20, 2.7" UNS24-2B and FLI V-Grove

MicroLine Models with Kodak Interline Sensors

<i>Model</i>	<i>Sensor</i>	<i>Peak QE</i>	<i>Pixel Size</i>	<i>Resolution</i>	<i>~ Download Time</i>
ML 11000M	KAI-11000M	51%	9 µm	4008 x 2672	1 sec
ML 16000	KAI-16000	50%	7.4 µm	4872 x 3248	2 sec
ML 4021	KAI-4021M	55%	7.4 µm	2048 x 2048	500 ms

MicroLine Models with Kodak Full Frame Sensors

ML 0261	KAF-0261E	58%	20 µm	512 x 512	250 ms
ML 402ME	KAF-0402ME	77%	9 µm	768 x 512	250 ms
ML 1001E	KAF-1001E	72%	24 µm	1024 x 1024	250 ms
ML 1603ME	KAF-1603ME	65%	9 µm	1536 x 1024	250 ms
ML 3200	KAF-3200ME	80%	6.8 µm	2184 x 1510	500 ms
ML 6303E	KAF-6303E	65%	9 µm	3088 x 2056	500 ms

MicroLine Models with E2V Back-Thinned Sensors

ML 4710-1-BB	CCD47-10-1-371	96%	13 µm	1056 x 1027	250 ms
ML 4710-1-UV	CCD47-10-1-373	73% @ 240nm	13 µm	1056 x 1027	250 ms
ML 77-1-MB	CCD77-00-1-358	93%	24 µm	512 x 512	250 ms

MicroLine Model with Fairchild Imaging Back-Thinned Sensor

ML 3041-1-BB	CCD3401	96%	15 µm	2048 x 2048	1 sec
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**Contact Gregory Terrance
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