Silicon Imaging MegaCamera™ SI-3170

3.2 Megapixel (2048 x 1536), 12-Bit Resolution High Definition Digital Camera

Silicon Imaging has introduced the world first 3.2 Million pixel High Definition CMOS all-digital camera capable of full 2048 x 1536 resolution on USB 2.0. Its ½" imaging format is ideal for use with standard lenses, microscopes and intensifiers. The entire micro-head package is 45 x 52 x 50mm and is small enough to be embedded in a biophotonic instrument or placed on a robot for machine vision inspection.

High-Definition CMOS Technology breakthrough

CMOS imagers are breaking technical barriers in noise, sensitivity and dynamic range. Driven by the growing demand for consumer Digital Still Cameras, CMOS sensors have been developed which surpass the performance characteristics of CCD's in many photonic, imaging and consumer applications. By utilizing a single highly integrated CMOS device, which incorporates Megapixel sensing areas, timing generation, and signal processing, Silicon Imaging has developed a compact high definition digital camera system.

12-Bit Pixel Clock Sampling – Sub-Pixel Accuracy

The MegaCamera™ uses a high quality 12-Bit digitizer to sample at its full resolution of 3.2Megapixels. Converting the pixel data directly to digital at the sensor head eliminates pixel-sampling jitter and enables accurate sub-pixel metrology, image analysis and improved live video reconstruction. Either 12-bit or 8-bit data can be selected for high-speed transfer into PC memory.

High Frame Rate Windowing & Digital Pan/Tilt/Zoom

A reduced size region of interest (windowing) enables high speed readout rates, making it ideal for motion analysis, auto-focus or object tracking. This feature can also be used for electronic pan, tilt and 16x digital zoom. For HDTV applications, the aspect ratio can be switched from the traditional 4:3 to 16:9 with 1920x1080 resolution.

All-Digital Interface – USB 2.0

Traditionally, 12 bit per pixel resolution and multi-tap cameras require a large number of parallel digital signals, which becomes cumbersome to cable and physically large to connect. The USB 2.0 specification provides transfers of up to 480mbps over a simple four wire low cost cable No external power supply is required. The maximum cable length is 5 meters, easily extended and multiplexed with low cost hubs.

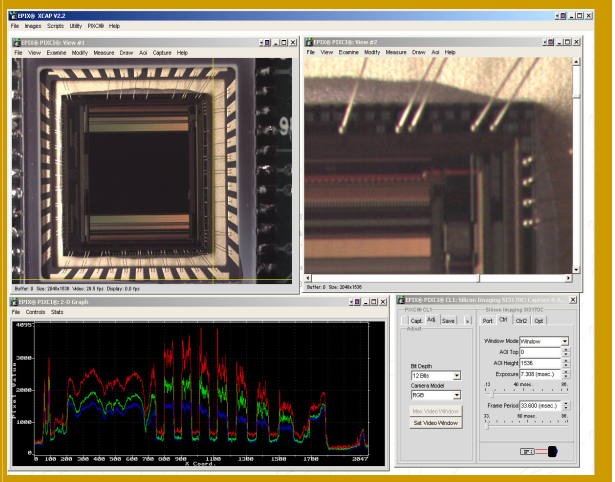
USB Capture & Control

The SI3170 is fully programmable through its USB 2.0 interface. These functions include sampling clock speed, region-of interest window, global gain, RGB gain, exposure, frame-rate and triggering modes. The camera can operate in live continuous or in single-shot capture. The capture event can be started from software command or hardware trigger.

Multi-Camera Operation

Through the use of low cost hubs, many cameras can operate with a single USB 2.0 host controller, multiplexing the data path. This greatly reduces the system cost when multiple single frame cameras are required on one system.

Silicon Imaging specialize in the design, manufacturing and marketing of high-definition digital cameras and image processing solutions for the machine vision, medical, scientific instrumentation, entertainment and surveillance markets. Silicon's focus has been to exploit the recent advancements in CMOS imagers and digital processors to develop a new generation of high definition products, which can outperform traditional video camera and processing systems at a lower cost.



FEATURES

- 2048 x 1536 Resolution (3.2 Million Pixels)
- ½" Imaging Format, 3.3um Pixel
- 12 Bits per Pixel
- USB 2.0 interface
- High speed Windowing
- Fast Progressive Rolling Shutter
- 126*u*seconds to 30 seconds Integration
- Triggered Image Sequence Capture
- Programmable Gain, Clock, Shutter & ROI
- Monochrome & Color Bayer RGB Models
- Integrated power supply
- C-Mount with 7mm adjustable back-focus

SI-3170 MegaCamera™ Specifications

Sensor:

Active Pixels	2056 (H) x 1544 (V)
Optical Imaging Format	½"
Pixel Size (pitch)	3.3um x 3.3um
Pixel Type	CMOS Active Pixel
Aspect Ratio	1 : 1
Spectral Response	400 ~ 1100 nm (see curve)
Dynamic Range	66dB (Vsat/Read Noise)
Fill Factor	38%
Fill Factor with MicroLens	80% (used with RGB version only)
Sensitivity	2 Lux @ F1.0 (monochrome, AGC=on)
Linearity (5-70%)	+/- 2.5% SAT
QE @ 540nm	0.58 e-/photon
Read Noise	20 e-
Dark Current Noise	< 3e- per 1/30sec @ 295ºK
Saturation Capacity	35,000 e-
Conversion Gain	36.0 uV/e-
Vsat	2.7 V
Shutter	Rolling Shutter
Shutter Speed / Integration	Variable, 4 to 4091 Line times
Readout	Progressive Scan, Full-Frame, windowed, Live, Long Integration & Single-Shot

A/D Conversion & Sampling Clock Synthesizer

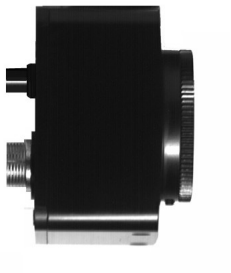
A/D Conversion	50Mhz (Nominal)
Vertical Resolution	12 Bit
Pixel Clock Frequency	20 ~ 50Mhz Programmable
Adjustment Method	USB command Protocol
A/D SNR	67.5dB
Output Noise	0.2 LSB rms

Digital Video Output: 12 Bit USB 2.0

Readout Rate	50 MHz @ 12 Bit (8 Bit transfer optional)
Readout Format	12 Bit Dual Channel, (Ports A, B, C)
Frame Rate .	TBD Note: USB 2.0 frame rates are dependent on the host controller of the PC.
Signal-to-Noise	> 60dB (fc=20MHz, Gains=1.0)
Cable	Industry standard USB 2.0 cable – 2m

Triggering

Trigger Signals	Trigger in/Trigger out/Gnd
Trigger Connection	Tajimi RO3-PB3M 3Pin Round



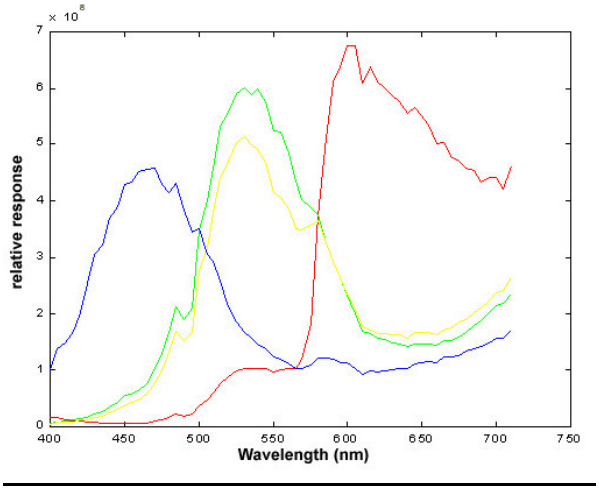
Communication:

Command Communication	Over USB cable during blanking
GP Asynchronous Triggers	3 (LVDS)
High Speed Shutter	126usec ~ 30msec
Long Integration	n-Frame Times
Region-of–Interest	24x6 to 2056x1544 in 24x6 steps
R,G,B Independent Gains	4 Settings ea (1x, 1.2x, 1.5x, 2x)
Overall Gain	3 Settings (1x, 2x, 4x)
Setting Timing	Next top of Frame

Mechanical

Lens Mount	C-Mount, 7mm built in extension
Enclosure Size	45mm W x 52mm H x 50mm L
Weight	12 oz.
Camera Mount	¼" x 20 standard tripod mount

Color Response Curve



ORDERING INFORMATION

SI-3170M-USB or 3170RGB-USB	**3.2MP Digital Camera with USB interface and integrated 2M Cable, GUI control software**
SDK-USB	**Software Development Kit – Camera Control and Data Capture**