FEATURES

- Flexible Platform
  - Sensor Evaluation Kit
  - Smart Camera Platform
  - Production Ready board-set
- High-performance CMOSIS sensors
  - Sensitivity: 5.56 V/lux.s
  - Dynamic range: 60 dB
  - Dark Noise: 8.6 e$^-$
  - High speed: 97.6* fps
  - 8M Pixel: 3360(H) x 2496(V)
  - Monochrome / Color
  - Global Shutter
  - 10 Bit Pixel Output
  - Multi-ROI support
- Altera Cyclone V SoC Processing
  - Customized Sensor Evaluation
  - Smart Camera Platform
- Can be customized for application Interface Options
  - Camera Link
  - Gigabit Ethernet
  - USB 2.0
- Programmable General Purpose I/O
  - 4 External GPIO Pins Available
  - Use as trigger / exposure inputs

Figure 1: **MityCAM-C8000**

(Compact Body, back plates removed to show 2 of the 3 boards in camera stack)

APPLICATIONS

- Machine Vision
- Embedded Instrumentation
- Motion Control
- Traffic Monitoring
- Security

DESCRIPTION

The MityCAM Sensor Evaluation Kits from Critical Link feature high performance CMOS image sensors from CMOSIS. The kit is available with an 8MP CMV8000 sensor, USB 2.0 interface and your choice of either Dual Camera Link or Gigabit Ethernet interfaces.

Combined with Critical Link's Machine Vision SDK software tools designed for our Altera Cyclone V SoC based processor card, the MityCAM Sensor Evaluation Kit makes sensor evaluation and integration quick and easy. The compact body model features a standard C mount lens while the board set only version allows quick and easy custom integration into your product with our Production-Ready hardware.

Detailed datasheets regarding the sensor performance curves for sensitivity, well depth, quantum efficiency and dark current, etc. may be located on the manufacturer's website [1] and within the CMV8000 datasheet [2].

*continuous output rates limited to camera link capacity (10-tap mode at 85 MHz clock rates), bursting to RAM is supported. Frame rates can be increase using reduced or multi-ROI features of the sensor.

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The block diagram in Figure 2 shows the structure of the MityCAM-C8000 Sensor Evaluation Kit utilizing the Dual Camera Link option.
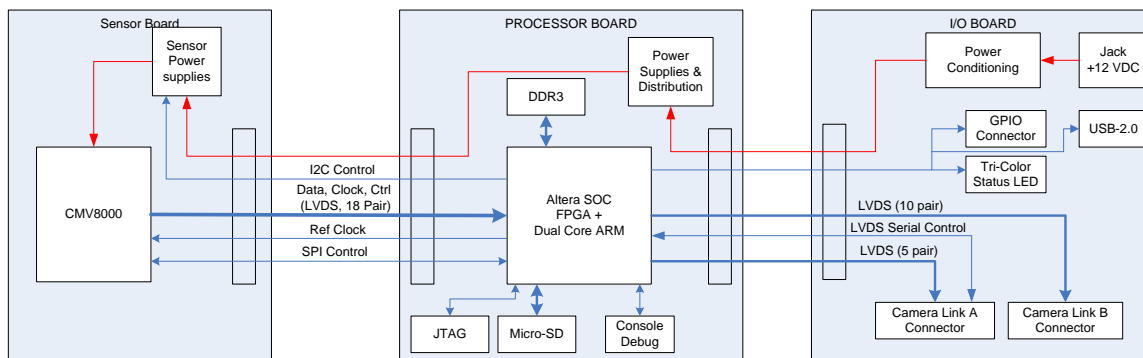

Figure 2: MityCAM-C8000 System Block Diagram, Dual Camera Link Option

TECHNICAL SPECIFICATIONS

A summary of the imaging performance of the MityCAM-C8000 family is included below.

PERFORMANCE

	Min	Typical	Max	Units
Active Pixels	-	3360 x 2496	-	H x V
Pixel Size	-	5.5 x 5.5	-	W x H ; μm
Imaging Area	-	18.48 x 13.73	-	W x H ; mm
Dark current @ (25C die temp)		41.2		e-/pixel/sec
ADC resolution (10-bit mode)	-	10	-	bits
(12-bit mode)	-	12	-	
Read-out Noise (@104 fps)	-	8.6		e⁻
Peak Quantum efficiency @ 550nm	-	5.56	-	V/lux-s
Dynamic Range		60 dB		
Full Well Capacity	11,700	-	-	e⁻
Cooling Method		Forced Air		
Full Frame Rate	-	-	97.6*	Frames / s
Power Utilization	-	8.2	8.5	Watts
Compact Body Weight		19		oz.
		538		g
Power Input	10.8	12	24.5	V DC
*continuous frame rate limited by camera link output rate, see Readout Rates				

Table 1: MityCAM-C8000 performance

OPERATING AND STORAGE CONDITIONS

Ambient Operating Temperature Range	0 °C to 50 °C
Humidity	< 80%, Non-Condensing
Storage Temperature Range	-40 °C to 85 °C

Table 2: MityCAM-C8000 Operating and Storage Conditions

ELECTRICAL CONNECTIONS

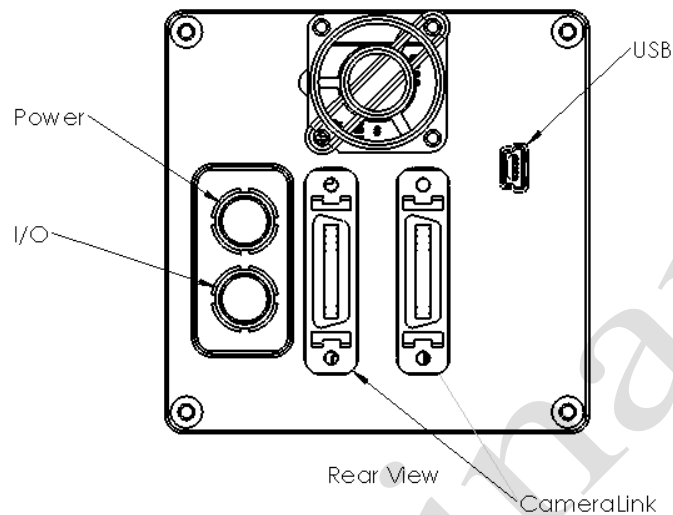The MityCAM Sensor Evaluation Kit has the following electrical connections on the back panel:

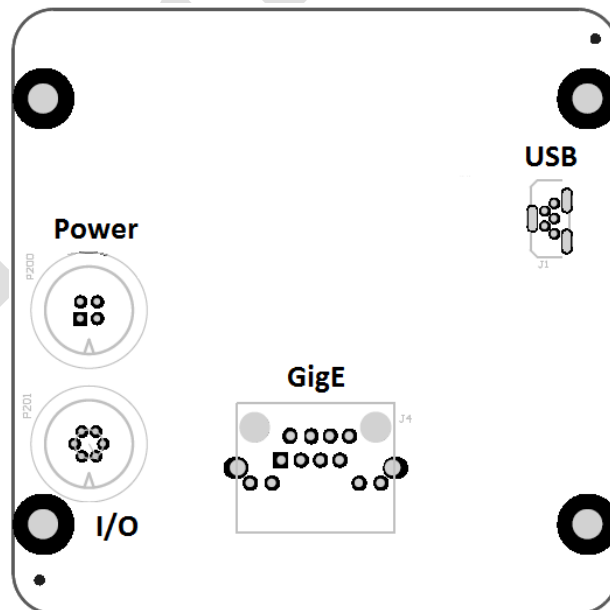**Figure 3: Input / Output Connections on Rear – Dual Camera Link version.**

Figure 4: Input / Output Connections on Rear – Gigabit Ethernet version.

High-Speed Interface Options
The MityCAM Sensor Evaluation Kit is offered with a number of high-speed interface options.

Dual Camera Link (J201 and J202) – 10-Tap Mode
The MityCAM-C8000 provides a dual camera link I/O adaptor that supports expanded 10-tap mode using an 85 MHz clock to output pixel depths of 8 bits (10 pixels per clock), 16 bits (5 pixels per clock), and 12 bits (6.6 pixels per clock) for full resolution images (3360x2496). Expanded 10-tap mode requires the use of both J201 and J202.

The Dual Camera Link interface can handle a maximum data rate of 6.8Gbps using 10-tap mode.

In addition, the MityCAM-C8000 supports base mode configurations for pixel depths of 16 bits (1 pixel per clock), 12 bits (2 pixels per clock), and 8 bits (2 pixels per clock).

Gigabit Ethernet (J4)
For the Gigabit Ethernet based MityCAM-C8000 option a standard RJ45 Ethernet connector is used, J4.

Power Input (P200)
The MityCAM Sensor Evaluation Kit has a single power input connector on the rear of the units. This 4-pin LEMO ECG.0B.304.CLN connector, P200, utilizes 2-positive power input pins and 2-ground connections as shown in Figure 5 and Table 3 below. Each kit includes an AC to 12V DC (1.25A) power adapter.
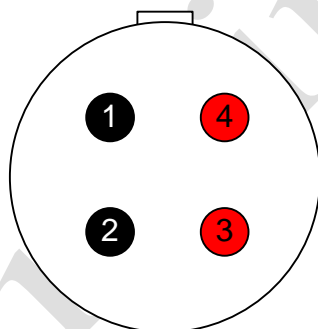
Figure 5: P200 Power Input Connector

Pin	Type	Description
1	GND	Ground
2	GND	Ground
3	PWR	+12 to +24 VDC
4	PWR	+12 to +24 VDC

Table 3: P200 Input power connector pin-out (P200)

Note that over voltage, under-voltage and reverse polarity protection is provided within the kit however care should be taken if a non-standard adapter is used. The mating connector is a LEMO FGG.0B.304.CLAD52 or similar connector.

USB 2.0 Interface (J1)
The MityCAM Sensor Evaluation Kit features a standard Mini-B type USB connector on the rear of the unit. This interface is used for development purposes (e.g., software and firmware updates, low level access to camera functions) and supports lower speed image acquisition via a Windows PC application provided by Critical Link.

General Purpose IO (P201)

A total of 4 general purpose IO are made available for the user via the P201 connector, LEMO ECG.0B.306.CLN, on the rear of the unit. The GPIO's utilize 5V logic levels and are ESD protected to standards exceeding JESD 22. Table 4 and Figure 6 show the pin-out for the GPIO interface connector. The GPIO signals are pulled up to +5V via a 1K Ohm resistor internally on the camera. A minimum voltage of 4.6V is required to drive the GPIO inputs to logic high, a maximum voltage of 0.15V is required to drive the GPIO inputs to logic low.
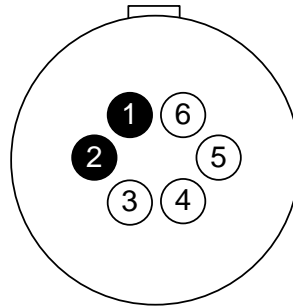

Figure 6: GPIO Interface Connector Pin Out (P201)

Pin	Type	Description	Altera SoC Pin
1	GND	Ground	
2	GND	Ground	
3	I/O	IO 3 - 5V Logic Level	B3B_RX_B27_N
4	I/O	IO 2 - 5V Logic Level	B3B_RX_B27_P
5	I/O	IO 1 - 5V Logic Level	B3B_RX_B39_N
6	I/O	IO 0 - 5V Logic Level	B3B_RX_B39_P

Table 4: GPIO connector pin-out (P201)

The mating connector is a LEMO FGG.0B.306.CLAD52 or similar connector.

IO pins can be driven as outputs using software interface commands, they can also be read as inputs. The embedded ARM software on the camera can be customized to capture transitions for asynchronous processing, if desired. In addition, Pin IO 0 can be used for external frame request signaling (hardware frame triggering). Pin IO 1 can be used for external exposure control signaling (hardware exposure control).

Table 5 shows the ESD protection specifications built into the MityCAM-C8000 for the GPIO pins.

ESD Standard	Rating
Human-Body Model (A114-B)	15-kV
Machine Model (A115-A)	200-V
Charged-Device Model (C101)	1000-V

Table 5: GPIO ESD Protection Standards

Cooling

The MityCAM-C8000 Sensor Evaluation Kit features an integrated 25mm fan for the compact body style units with an integrated heat sink via the case body. When installed the fan can be enabled or disabled through the I2C based LED status light and fan controller. It can be accessed on I2C bus 1 at address 1100 010. The camera link serial interface and USB control interface provides a fan enable control command.

If the board set only version is utilized in your custom design proper cooling measures must be taken to ensure that the imaging sensor does not exceed the specified maximum temperature of **Table 2**.

Read-out rates

The maximum continuous read-out rates below are valid when the CMV8000 sensor is configured to output in 10-bit mode with an appropriately configured clock.

Table 6 Read Out Rates for 10-bit output mode

Array Size	Camera Link 10-tap	Camera Link Base Mode	GigE	USB
8Mpixels x 16 bits	47.5 fps	10 fps	TBD	0.7 fps
8Mpixels x 8 bits	95 fps	20 fps*	TBD	N/A
8Mpixels x 12 bits	N/A	20 fps*	TBD	N/A
*2 pixels per clock base mode configuration				

Burst Capture

Due to limitations of Camera Link, the camera cannot capture at the highest resolution and output at a full bit-depth. The camera can capture using the highest possible sensor clock first into RAM and then stream the data out an interface (Camera Link, USB, GigE) at a slower rate. In this mode the camera evaluation kit allows the user to capture 42 full-resolution frames at an effective frame-rate of 97.6 fps.

EXTERNAL DIMENSIONS – COMPACT BODY

For customers desiring a completed camera assembly, critical link offers a compact body arrangement that can be used for final application development as shown in the figure below.

Figure 7 Compact Body Camera Option Shown with example lens and small tripod, side view

Figure 8 Compact Body Camera Option Shown with example lens and small tripod, rear view
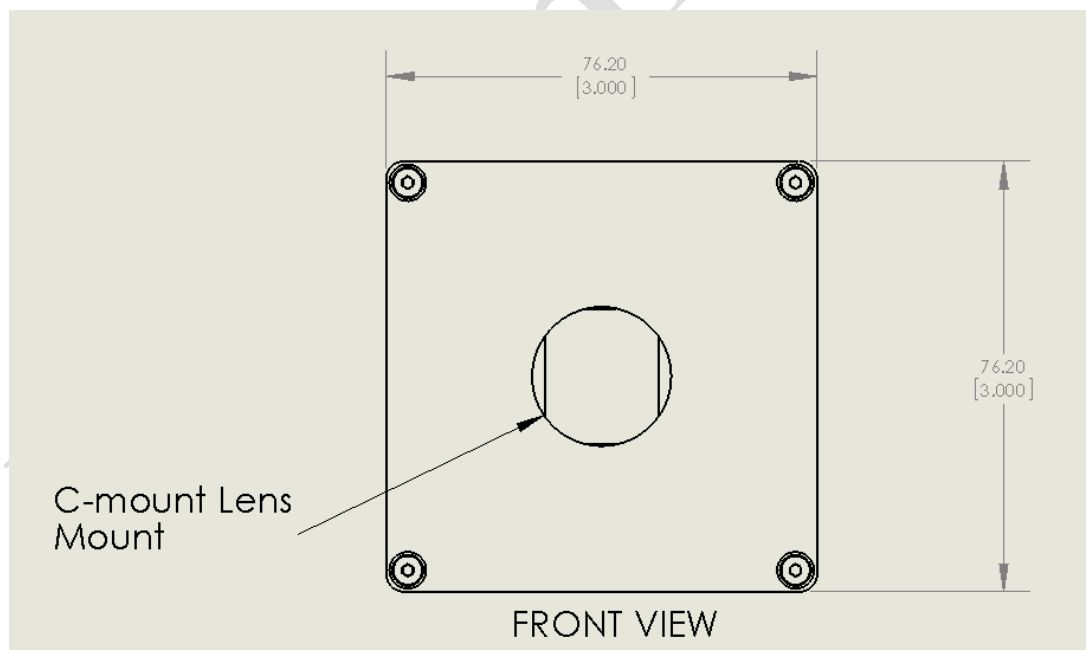
Unless otherwise noted, all dimensions are in mm [inches].

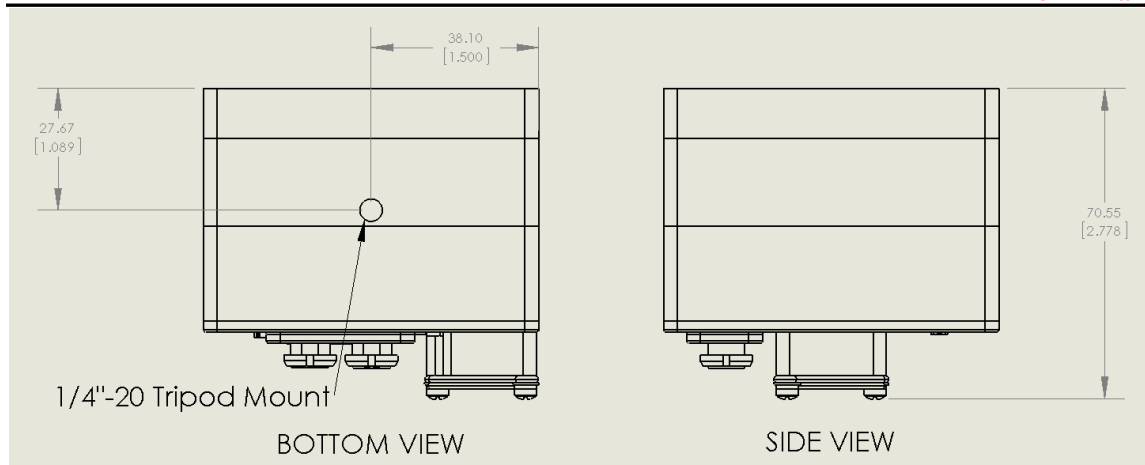**Figure 9: Compact Body with 'C' Mount Lens Mount - Front View**

Figure 10: Compact Body with 'C' Mount Lens Mount – Bottom and Side View

EXTERNAL DIMENSIONS – BOARD SET ONLY

Please contact your Critical Link representative at this time for detailed drawings based upon the board set only MityCAM-C8000.

ORDERING INFORMATION

The following table lists the standard configurations for the MityCAM-C8000 Sensor Evaluation Kit. For shipping status, availability, and lead time of these or other configurations please contact your Critical Link representative.

The necessary input AC/DC power adapter is provided with each MityCAM-C8000 model.

Table 7: Standard Model Numbers

Model	Sensor	High Speed Interface Option	Color/ Mono	Enclosure Type
MityCAM-C8000-CM-C-S	CMV8000	Dual Camera Link	Mono	Compact Body
*MityCAM-C8000-CM-B-S	CMV8000	Dual Camera Link	Mono	Board Set Only
*MityCAM-C8000-GM-C-S	CMV8000	Gigabit Ethernet	Mono	Compact Body
*MityCAM-C8000-GM-B-S	CMV8000	Gigabit Ethernet	Mono	Board Set Only
*MityCAM-C8000-CC-C-S	CMV8000	Dual Camera Link	Color	Compact Body
*MityCAM-C8000-CC-B-S	CMV8000	Dual Camera Link	Color	Board Set Only
*MityCAM-C8000-GC-C-S	CMV8000	Gigabit Ethernet	Color	Compact Body
*MityCAM-C8000-GC-B-S	CMV8000	Gigabit Ethernet	Color	Board Set Only

*Please contact your Critical Link account representative for further information on the availability of these options.

REVISION HISTORY

Date	Change Description
24-Jul-14	Initial preliminary revision.
18-Sep-14	Updated power supply requirements. Updated model numbers. Prep for general consumption.
24-Oct-14	Sensor spec updates

REFERENCES

[1] www.cmosis.com
[2] CMV8000, "datasheet_cmv8000_v1.1", Jan 5 2014.