

FEATURES

- High Performance Scientific Camera
 - e2V 30-11 series
 - 1024 x 255 active pixels
 - 26 μm x 26 μm pixel size
- Integrated 3 Stage TE Cooling
 - -40 $^{\circ}\text{C}$ from 20 $^{\circ}\text{C}$ ambient
 - Vacuum sealed chamber
 - Temperature controlled to ± 0.1 $^{\circ}\text{C}$.
 - Air cooled
- Integrated Digital Signal Processing
 - Utilizes [MityDSP](#) technology
 - Can be customized for application specific processing
- Interface Options
 - USB 2.0
 - 100 Mbit Ethernet
- Programmable General Purpose I/O
 - Use as trigger inputs or drive as shutter / frame strobes

APPLICATIONS

- Embedded Instrumentation
- Raman Spectroscopy
- Low Light Imaging Applications
- Portable Scientific Instrumentation
- Astronomy



Figure 1: MityCCD-E3011 with Standard Body

DESCRIPTION

The MityCCD-E3011 family of cameras integrates thermoelectrically cooled high performance CCD sensors suitable for scientific instrumentation with digital signal processing (DSP) capabilities.

An embedded camera rich in features, MityCCD is ready for stand-alone applications. A simple block diagram of the MityCCD camera is illustrated in Figure 2.

By integrating a floating point DSP and field programmable gate array into the camera electronics, the MityCCD camera provides the capability to embed application specific code (binning patterns, post processing algorithms, etc.) into a delivered instrument.

The MityCCD uses standard high speed interfaces including 100 Mbit Ethernet and USB 2.0 and eliminates the need for custom interface cards or electronics to a display PC, allowing the use of laptop devices, embedded computers, or (via Ethernet) remote display machines.

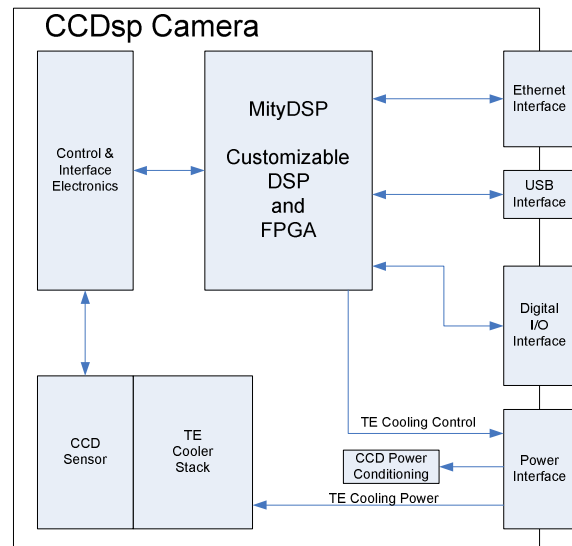


Figure 2: MityCCD Block Diagram

TECHNICAL SPECIFICATIONS

A summary of the imaging performance of the MityCCD-E3011 family of cameras is included below. This family of cameras utilizes the corresponding grade 0 sensors from e2V CCD30-11 family of CCDs. Detailed datasheets regarding the sensor performance curves for sensitivity, well depth, quantum efficiency, dark current, etc. may be located on the manufacturer's website **Error! Reference source not found.****Error! Reference source not found.****Error! Reference source not found.****Error! Reference source not found.**

PERFORMANCE

	Min	Typical	Max	Units
Active Pixels	-	1024x256	-	H x V
Pixel Size	-	26 x 26	-	W x H ; um
Imaging Area	-	26.6 x 6.6	-	W X H ; mm
Gain, Setting 1 ²		5.8		e ⁻ per count
Gain, Setting 2 ²		17.4		e ⁻ per count
ADC resolution	-	16	-	bits
Readout Noise @ 500 kHz, Gain 1 / 2	-	13.5 / 26	22 / 35	e ⁻
Dynamic Range, Gain 1 / 2	-	28k / 44k	-	
Readout Rate ¹	20	500	1000	kHz
Full Frame Rate	-	1.8	-	Frames / s
CCD Binned Frame Rate ⁴	-	100	-	Frames / s
USB Link Throughput ³	-	13,000	-	Kbytes / s
Ethernet Link Throughput ³	-	1,000	-	Kbytes / s
Cooling capability below ambient	55	60	-	Deg C
Vacuum Seal	-	10 ⁻¹⁰	10 ⁻⁹	Torr
Power Utilization ⁵	8	35	45	Watts
Power Input ⁵	12	18	24	V DC

Table 1: MityCCD-E3011 Performance

	BI	BI DD	FI	FI OE	FI DD	Units
Pixel Well Depth, typical	500	700	500	300	700	k e ⁻ / pixel
Readout Well Depth, typical (for binning)	1000	1400	1000	1200	1400	k e ⁻ / pixel
Dark Current @ -40 °C	.17	29.17	0.042	0.04	145.34	e ⁻ / pixel / s

Table 2: CCD30-11 electrical characteristics

Notes:

1 – The Readout Rate in a stock camera is 500 KHz. The readout rate may be customized for user specific applications, please contact Critical Link, LLC, for details.

2 – The MityCCD cameras offer two gain settings, which are configured via a user accessible jumper.

3 – Throughput rates assume a back-end PC capable of accepting the data rates provided by the camera.

4 – Assumes Full Vertical Binning within the CCD down to 1 output row using USB interface

5 – The MityCCD camera must be powered by the MityCCD-PS power supply assembly, which uses a 12-24 DC input in order to generate all necessary voltages to run the camera. The 8 Watt minimum power utilization represents a camera with no TE cooling enabled.

QUANTUM EFFICIENCY

TYPICAL SPECTRAL RESPONSE (No window)

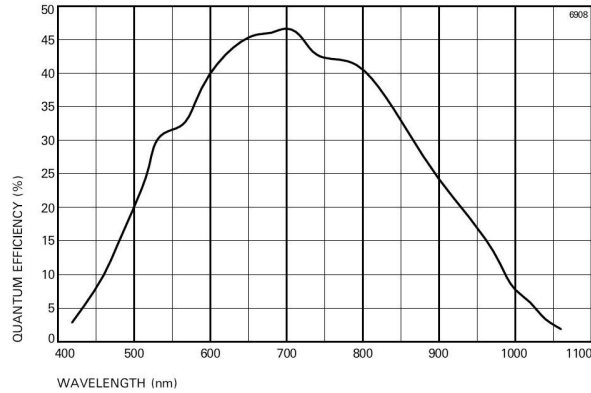


Figure 3: Typical Spectral Response for the MityCCD-E3011FI camera

TYPICAL SPECTRAL RESPONSE (At -20 °C, no window)

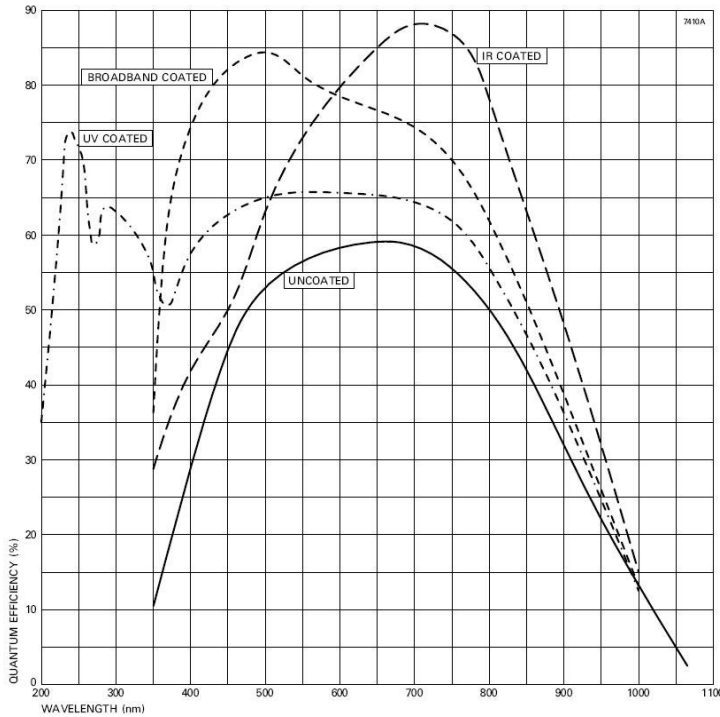


Figure 4: Typical Spectral Response for the MityCCD-E3011BI camera

TYPICAL SPECTRAL RESPONSE (No window)

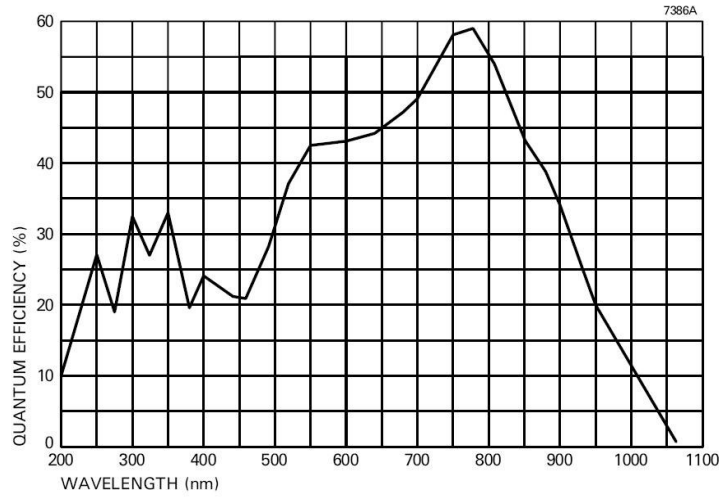


Figure 5: Typical Spectral Response for the MityCCD-E3011FIOE camera

TYPICAL SPECTRAL RESPONSE (No window)

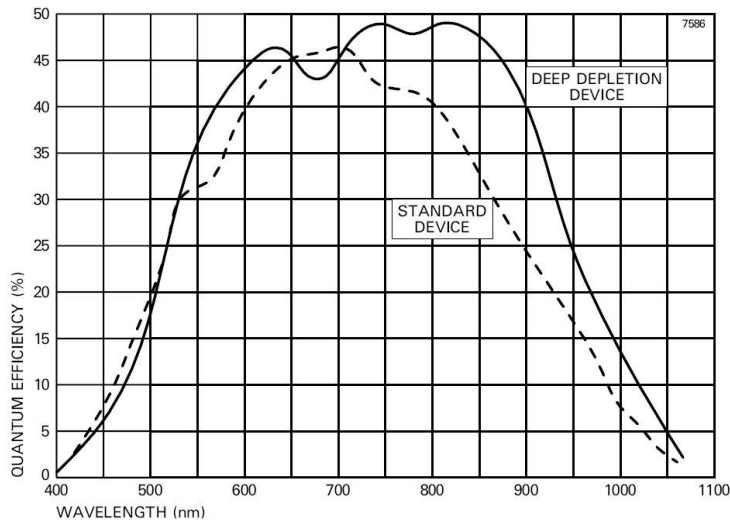


Figure 6: Typical Spectral Response for the MityCCD-E3011FIDD camera

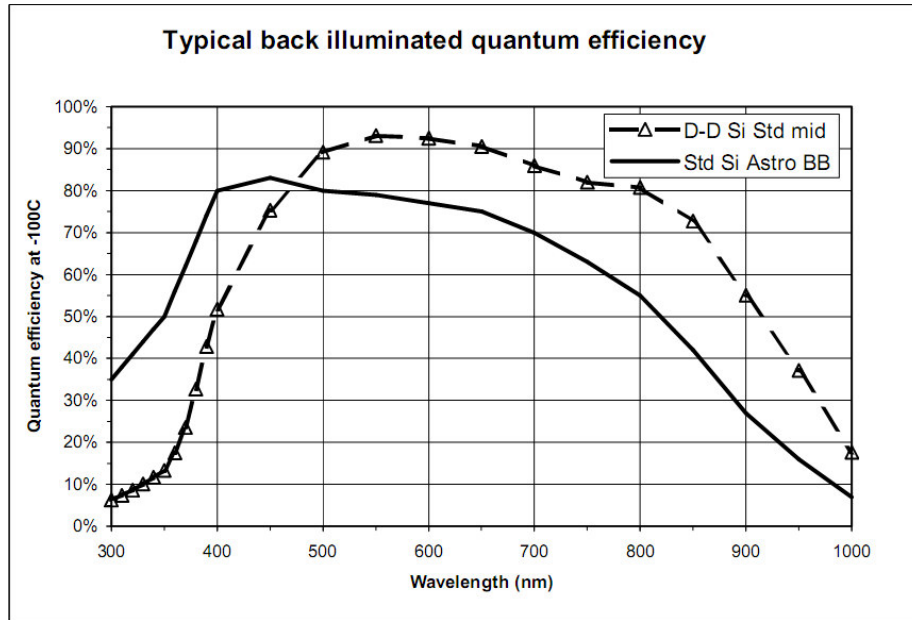


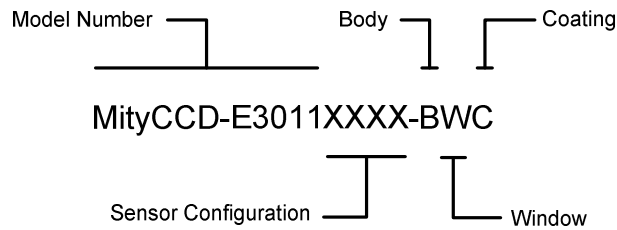
Figure 7: Comparison of the typical spectral response for the MityCCD-E3011BI and MityCCD-E3011BIDD

OPERATING AND STORAGE CONDITIONS

Ambient Temperature Range	0 °C to 30 °C
Humidity	< 80%, Non-Condensing
Storage Temperature Range	-20 °C to 55 °C

Figure 8: Operating and Storage conditions for the MityCCD-E3011 family of cameras

ORDERING INFORMATION



Sensor Config	Description
BI	Back Illuminated
BIDD	Back Illuminated with Deep Depletion
FI	Front Illuminated
FIOE	Front Illuminated with Open Electrode
FIDD	Front Illuminated with Deep Depletion

Window	Description
V	Visible Window
I	IR Window

Body	Description
A	Standard Body
B	Open Frame – No Flange required
C	Reserved
D	Enclosed Body
E	Reserved

Coating	Description
B	Broadband Anti-Reflective Coating
M	Mid-Band Anti-Reflective Coating
U	UV Anti-Reflective Coating

Additional Notes:

1. A MityCCD-E3011 camera also requires a power supply package and a flange package that can be ordered separately. For more information contact Critical Link, LLC for details.
2. A MityCCD-E3011 camera also requires a software package. For more information contact Critical Link, LLC for details.
3. A MityCCD-E3011 camera can be ordered with optional accessories. For more information contact Critical Link, LLC for details.

EXTERNAL DIMENSIONS

Unless otherwise noted, all dimensions are in mm [inches].

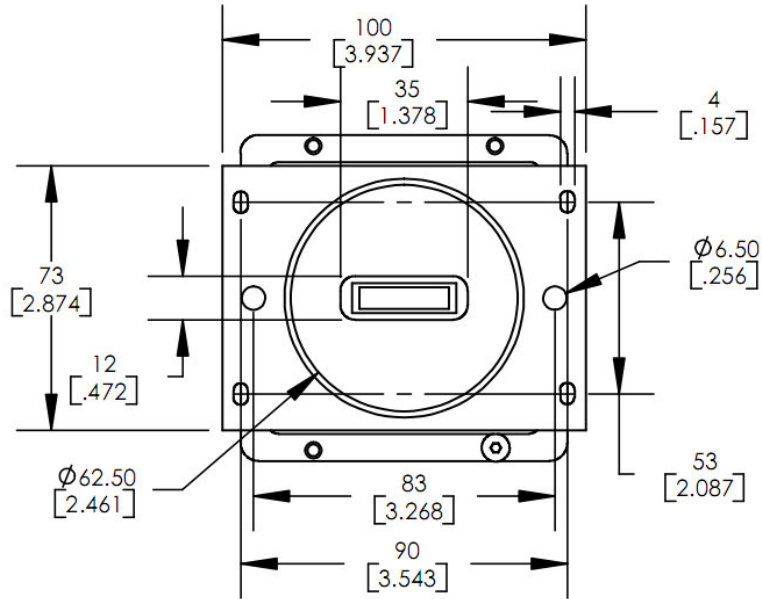


Figure 9: Standard Body (Type A) with Rectangular Flange (Type A) - Front View

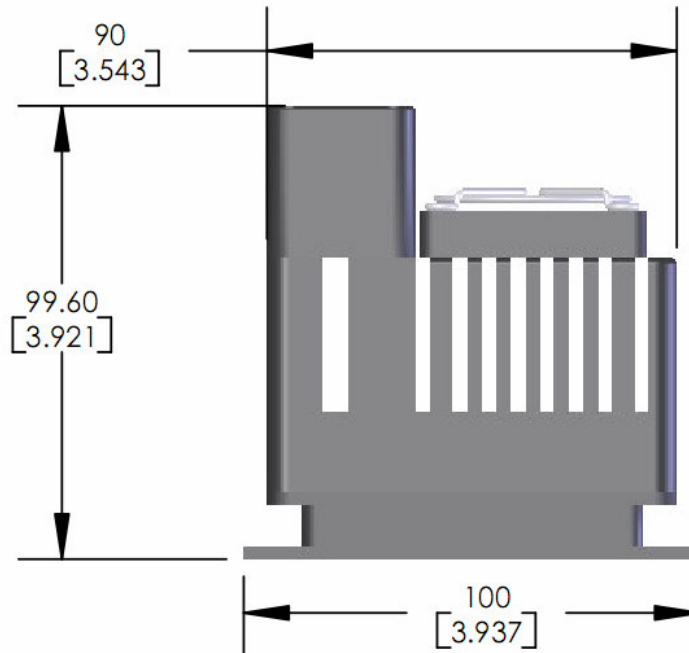


Figure 10: Standard Body (Type A) with Rectangular Flange (Type A) - Side View



Figure 11: Standard Body (Type A) with Rectangular Flange (Type A) - Top View

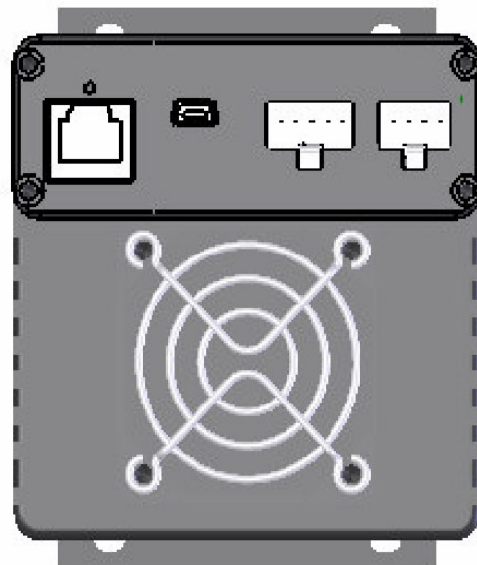


Figure 12: Standard Body (Type A) with Rectangular Flange (Type A) - Back View

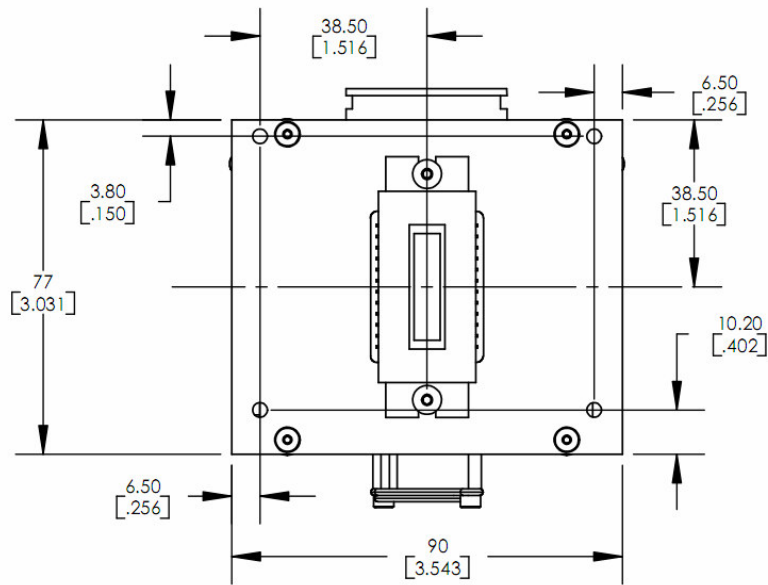


Figure 13: Open Frame Body (Type B) – Front View

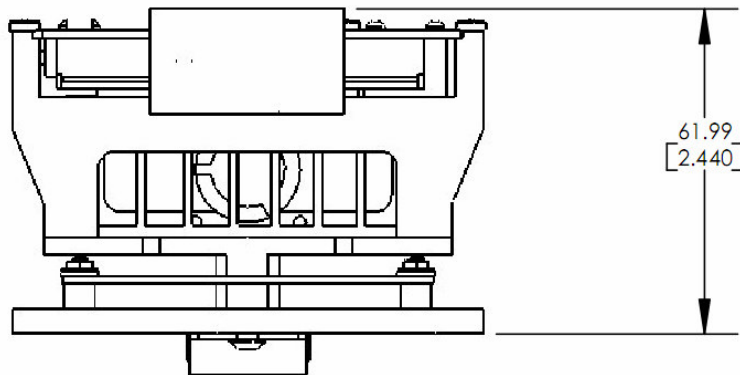


Figure 14: Open Frame Body (Type B) – Top View

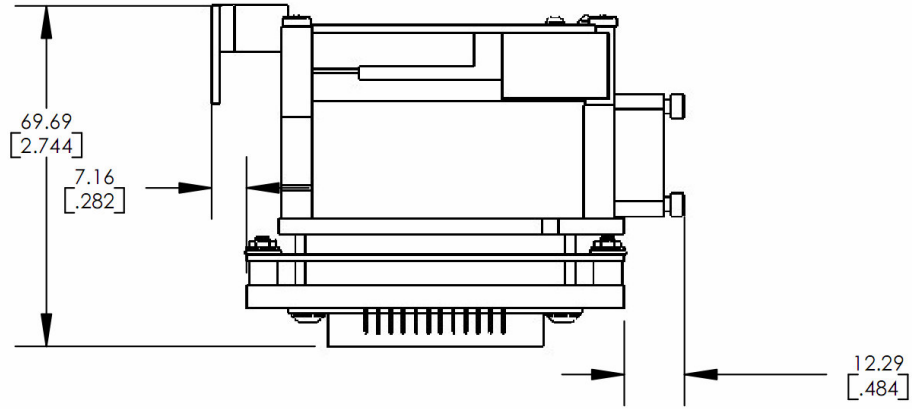


Figure 15: Open Frame Body (Type B) - Side View

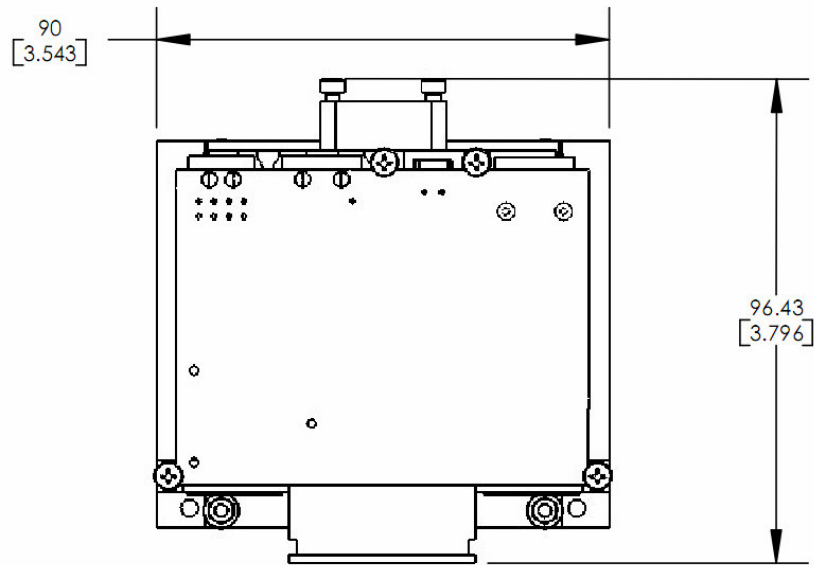


Figure 16: Open Frame Body (Type B) - Back View

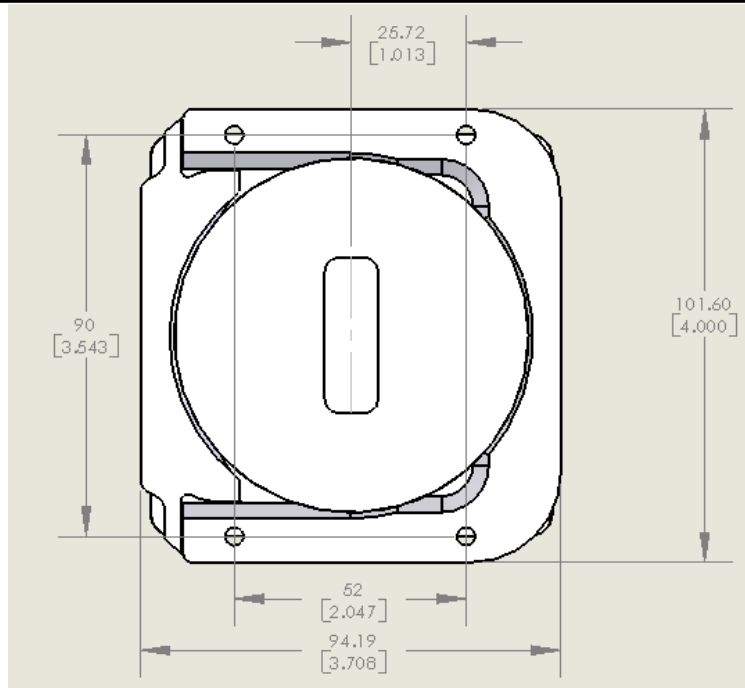


Figure 17: Enclosed Body (Type D) with Split Flange (Type C) – Front View

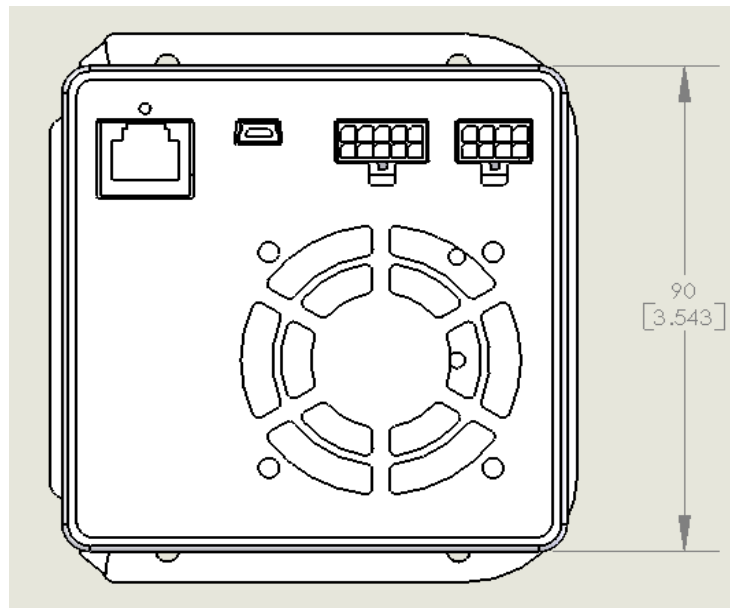


Figure 18: Enclosed Body (Type D) with Split Flange (Type C) - Back View

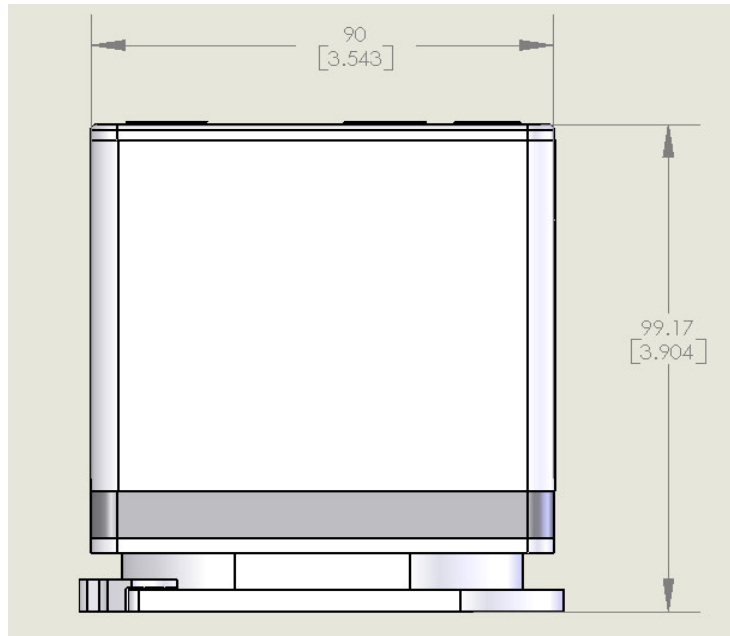


Figure 19: Enclosed Body (Type D) with Split Flange (Type C) - Top View

ELECTRICAL CONNECTIONS

In addition to industry standard Mini USB and RJ-45 communications interface jacks the MityCCD also provides the following interface connectors.

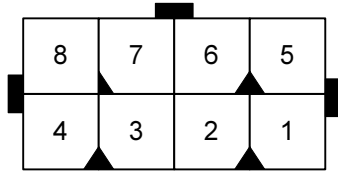


Figure 20: Power Connector¹ - Rear View

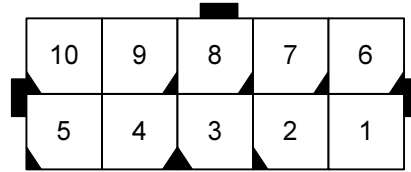


Figure 21: GPIO Connector² - Rear View

Pin	I/O	Description
1	O	TE Cooler Control
2	I	TE Cooler -V Rtn
3	-	GND
4	I	+6 V (1 Amp Max)
5	I	TE Cooler +V In (7 V at 4 Amps Max)
6	I	+ 15 V (0.3 Amp Max)
7	I	+32 V (0.04 Amp Max)
8	I	-9 V (0.2 Amp Max)

Pin	I/O	Description
1	I/O	General Purpose TTL I/O 3
2	I/O	General Purpose TTL I/O 1
3	O	+5 VD (800 mA max)
4	I	RS232 RX
5	-	GND
6	-	GND
7	I/O	General Purpose TTL I/O 2
8	I/O	General Purpose TTL I/O 0
9	-	GND
10	O	RS232 TX

Notes:

1 – Mating connector is Mfg part # 43025- 0800, please contact Critical Link, LLC, for details.

2 – Mating connector is Mfg part # 43025- 1000, please contact Critical Link, LLC, for details.

REFERENCE

- [1] e2V technologies, "CCD30-11 Back Illuminated High Performance CCD Sensor," 2006, <http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/04-30-11-BI-AIMO-DIP.pdf>
- [2] e2V technologies, "CCD30-11 Inverted Mode Sensor High Performance CCD Sensor," 2006, <http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/01-CCD30-11.pdf>
- [3] e2V technologies, "CCD30-11 Open Electrode High Performance CCD Sensor," 2006, <http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/02-30-11.pdf>
- [4] e2V technologies, "CCD30-11 Deep Depletion Sensor High Performance CCD Sensor," 2006, [http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/03-30-11\(2\).pdf](http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/03-30-11(2).pdf)
- [5] e2V technologies, "CCD30-11 Back Illuminated Deep Depletion Sensor Full Frame Scientific Sensor," August 2005, <http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/05-30-11-DD-BI-NIMO-DIP.pdf>
- [6] e2V technologies, "Solid State Imaging – Technical Note on Deep Depletion of Charge Coupled Devices," June 2003, <http://www.e2v.com/assets/media/files/documents/imaging-space-and-scientific-sensors/Papers/ccdtn101.pdf>