

FEATURES

- High Performance Scientific Camera
 - Sensors Unlimited Goodrich Corporation
 - 1 x 256 pixels
 - 1 x 512 pixels
 - 50 μm pitch
- Integrated TE Cooling
 - -10 $^{\circ}\text{C}$ from 20 $^{\circ}\text{C}$ ambient
 - Temperature controlled to ± 0.1 $^{\circ}\text{C}$
 - Air cooled
- Dual Gain Control Settings
 - High Resolution
 - High Dynamic Range
- 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-SU256LSB/SU512LSE

DESCRIPTION

The MityCCD-SU256LSB / SU512LSE family of cameras integrates thermoelectrically cooled high performance InGaAs infrared photodiode 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 at the right. 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 (arbitrary 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.

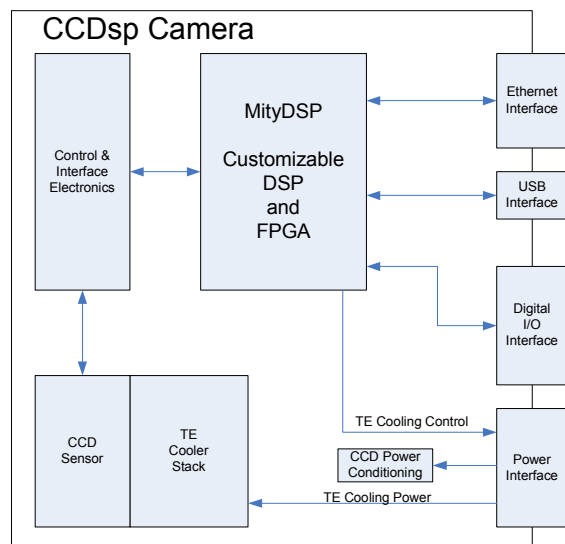


Figure 2: MityCCD Block Diagram



TECHNICAL SPECIFICATIONS

A summary of the imaging performance of the MityCCD-SU256LSB/SU512LSE family of cameras is included below. This family of cameras utilizes sensors from Sensors Unlimited Inc. – A Goodrich Company. Detailed datasheets regarding the sensor performance curves for sensitivity, well depth, quantum efficiency, dark current, etc. are available upon request [1].

PERFORMANCE

| | Min | Typical | Max | Units |
|---|-----|---------|------|--------------------------|
| Active Pixels (MityCCD-SU256LSB) | - | 256 x 1 | - | H x V |
| Active Pixels (MityCCD-SU512LSE) | - | 512 x 1 | - | H x V |
| Pixel Size | - | 50x500 | - | W x H ; um |
| Array Length (MityCCD-SU256LSB) | - | 12.8 | - | W ; mm |
| Array Length (MityCCD-SU512LSE) | - | 25.6 | - | W ; mm |
| Gain, Setting 1 (High Sensitivity) | | 70 | | e ⁻ per count |
| Gain, Setting 2 (High Dynamic Range) | | 1818 | | e ⁻ per count |
| ADC resolution | - | 16 | - | bits |
| Readout Noise @ High Sensitivity (25 KHz) | - | 800 | - | e ⁻ |
| Readout Noise @ High Dynamic Range (25 KHz) | - | 10,000 | - | e ⁻ |
| Readout Rate ¹ | 1 | 25 | 1250 | kHz |
| Full Frame Rate | - | 20 | - | Frames / s |
| USB Link Throughput ² | - | 13,000 | - | Kbytes / s |
| Ethernet Link Throughput ² | - | 1,000 | - | Kbytes / s |
| Analog Output | | 0 - 10 | | V |
| Cooling capability below ambient | 25 | 30 | 35 | °C |
| Power Utilization ³ | 8 | 15 | 18.5 | Watts |
| Power Input ³ | 12 | 18 | 24 | V DC |

Table 1: MityCCD-SU256LSB & MityCCD-SU512LSE Performance

| | Typical | Units |
|---|-----------------------|----------------------------|
| Saturation charge, typical (High Sensitivity Mode) | 5 x 10 ⁶ | e ⁻ / pixel |
| Saturation charge, typical (High Dynamic Range Mode) | 130 x 10 ⁶ | e ⁻ / pixel |
| Dark Current @ 20 °C | 5.0 | pA |
| Dark Current @ -10 °C [typical] (High Dynamic Range Mode) | 9 x 10 ³ | e ⁻ / pixel / s |

Table 2: Electrical Performance

Notes:

1 – The Readout Rate in a stock camera is 25 KHz. The readout rate may be customized for user specific applications, please contact Critical Link, LLC, for details.

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

3 – 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 TE cooling enabled in order to maintain a 25 C temperature at the sensor head (essentially, the TEC is off).



OPTICAL RESPONSIVITY

| | Typical | Units |
|---|---------|---------------|
| Peak wavelength (λ_{pk}), nominal | 1.5 | μm |
| Quantum efficiency @ λ_{pk} , minimum | 70 | % |
| Average array response @ λ_{pk} , minimum (high dynamic range mode) | 10.5 | nV/photon |
| Response non uniformity, maximum | 10 | % |

Table 3: Optical Responsivity

QUANTUM EFFICIENCY

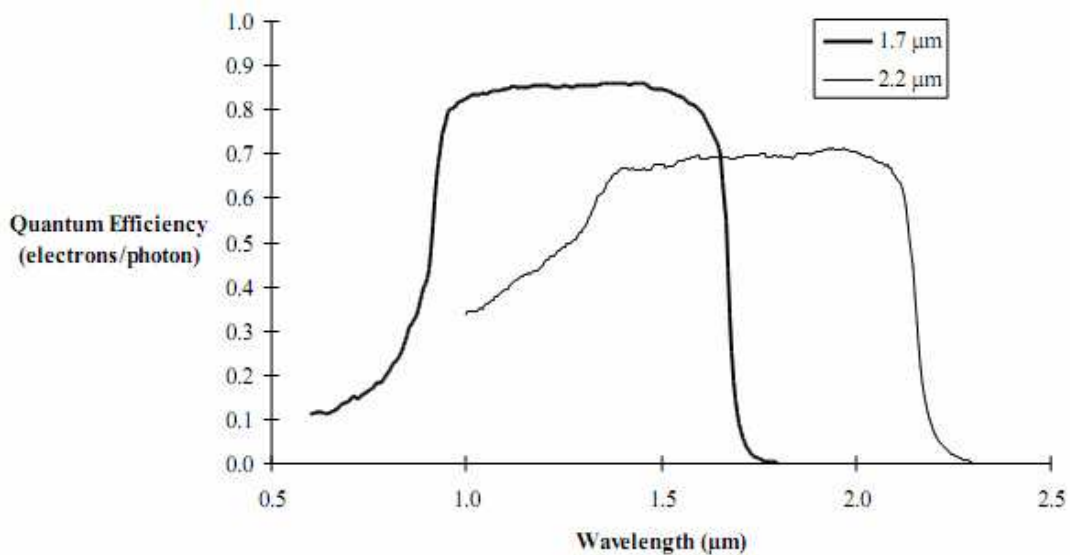


Figure 3: SU256LSB/ SU 512LSE Quantum Efficiency

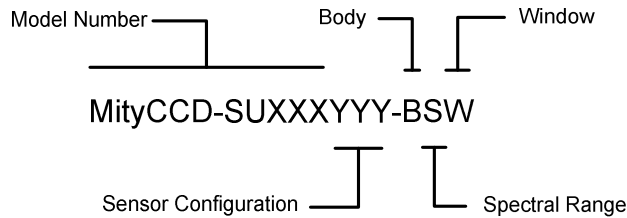
OPERATING AND STORAGE CONDITIONS

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

Table 4: Operating and Storage Conditions for MityCCD-SU256LSB/ MityCCD-SU512LSE



ORDERING INFORMATION



| Model Number | Description |
|--------------|------------------|
| MityCCD-SU | Back-Illuminated |

| Sensor Config | Description |
|---------------|----------------|
| 256LSB | 1 x 256 Sensor |
| 512LSE | 1 x 512 Sensor |

| Spectral Range | Description |
|----------------|-------------|
| A | 1.7um |
| B | 2.2um |

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

| Window | Description |
|--------|---------------------------------|
| A | 1450nm – 1650nm Anti-Reflective |
| B | Broadband Anti-Reflective |

Additional Notes:

1. A MityCCD-SU256LSB/SU512LSE 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-SU256LSB/SU512LSE camera also requires a software package. For more information contact Critical Link, LLC for details.
3. A MityCCD-SU256LSB/SU512LSE 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].

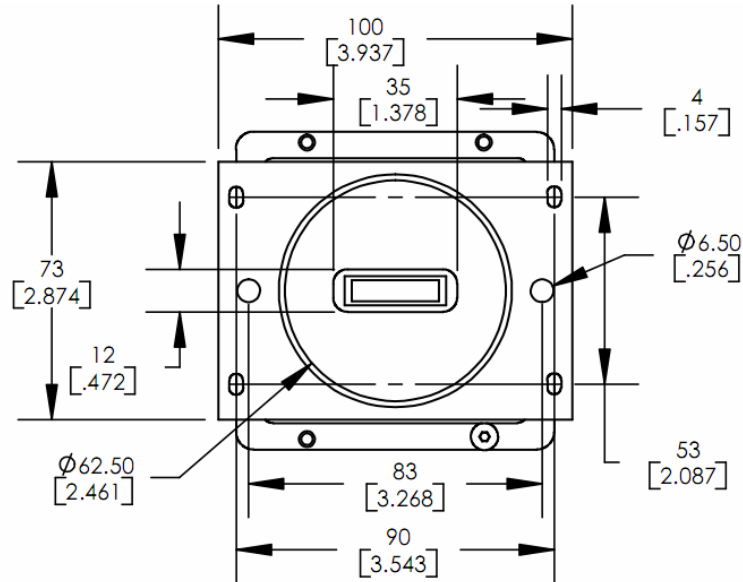


Figure 4: Standard Body (Type A) with Rectangular Flange (Type A) - Front View

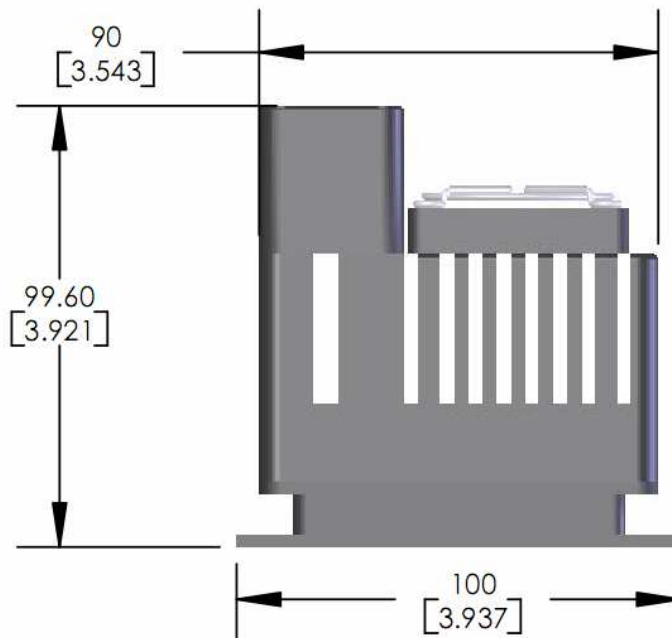


Figure 5: Standard Body (Type A) with Rectangular Flange (Type A) - Side View



Figure 6: Standard Body (Type A) with Rectangular Flange (Type A) - Top View

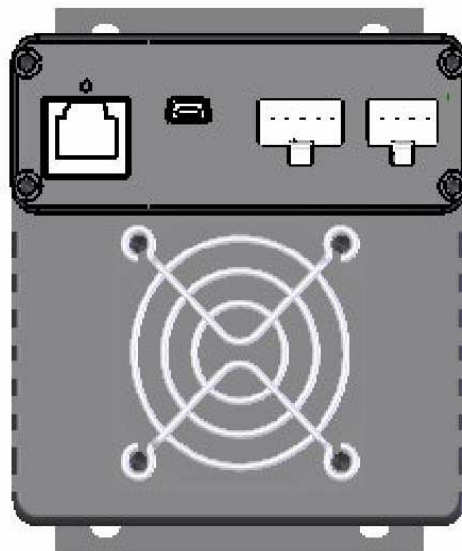


Figure 7: Standard Body (Type A) with Rectangular Flange (Type A) - Back View

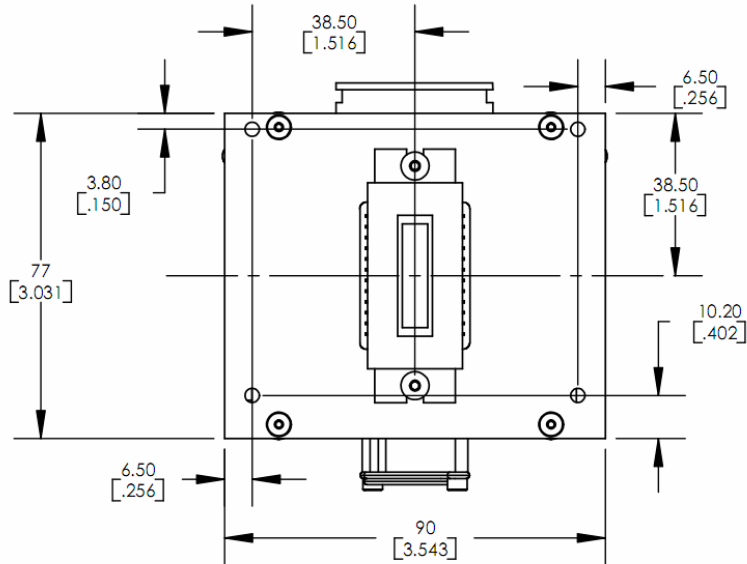


Figure 8: Open Frame Body (Type B) – Front View

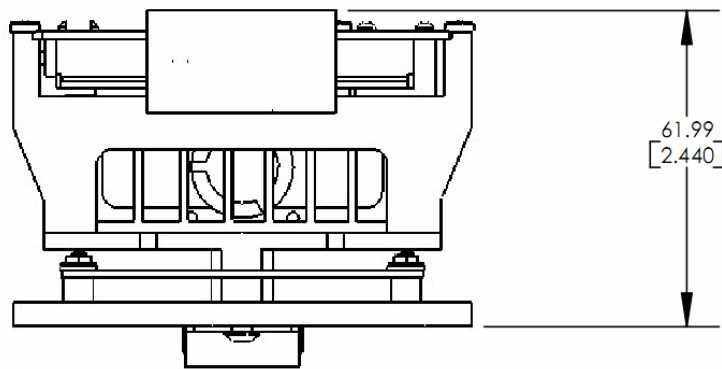


Figure 9: Open Frame Body (Type B) – Top View

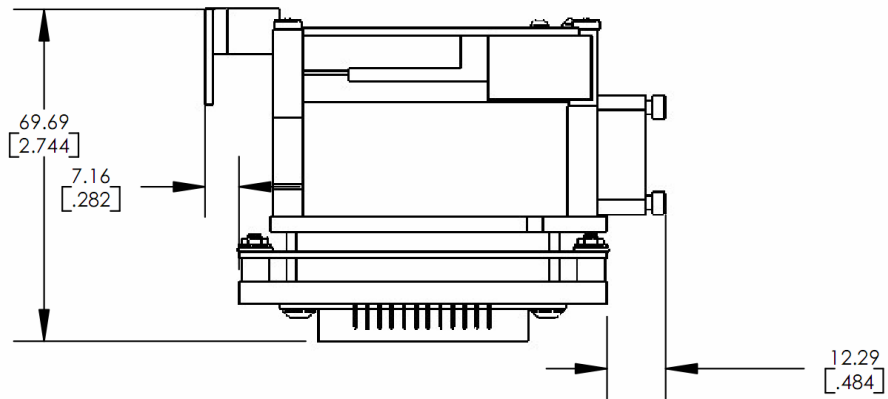


Figure 10: Open Frame Body (Type B) - Side View

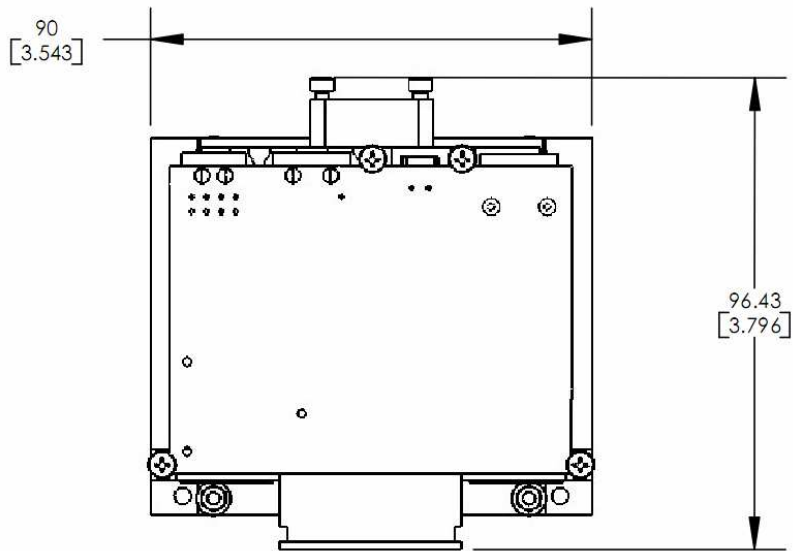


Figure 11: Open Frame Body (Type B) - Back View

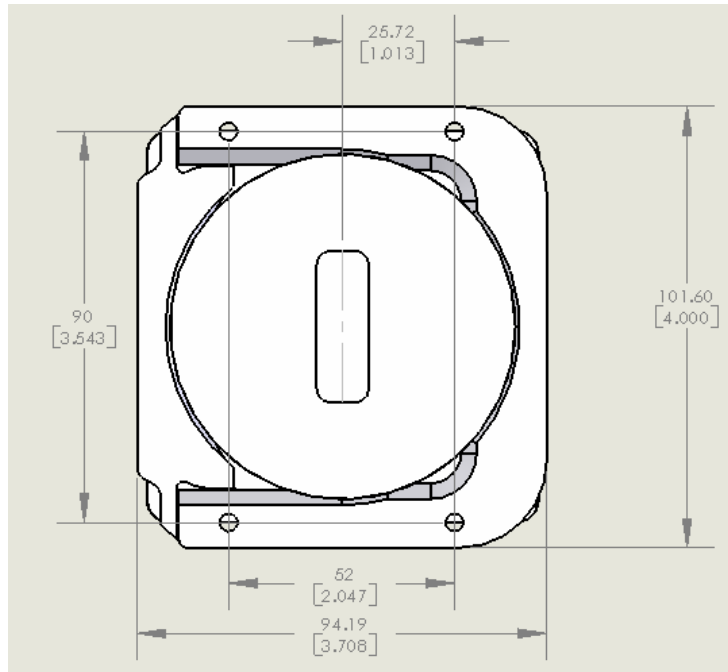


Figure 12: Enclosed Body (Type D) with Split Flange (Type C) – Front View

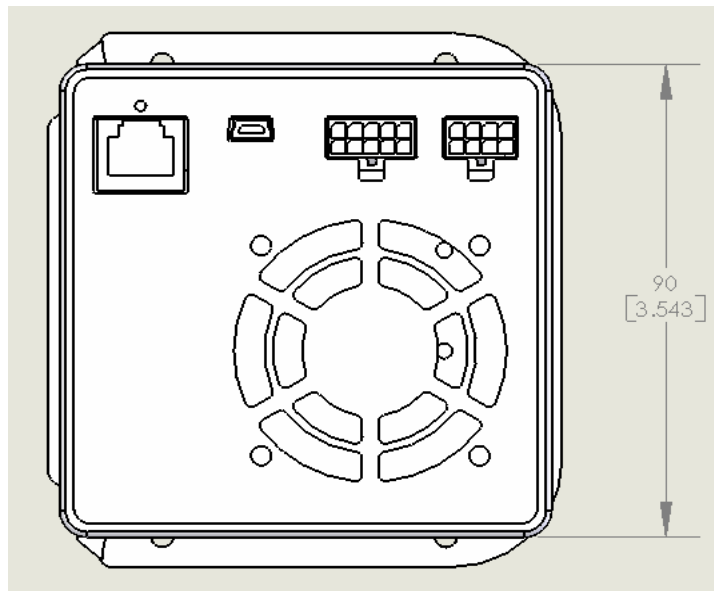


Figure 13: Enclosed Body (Type D) with Split Flange (Type C) - Back View

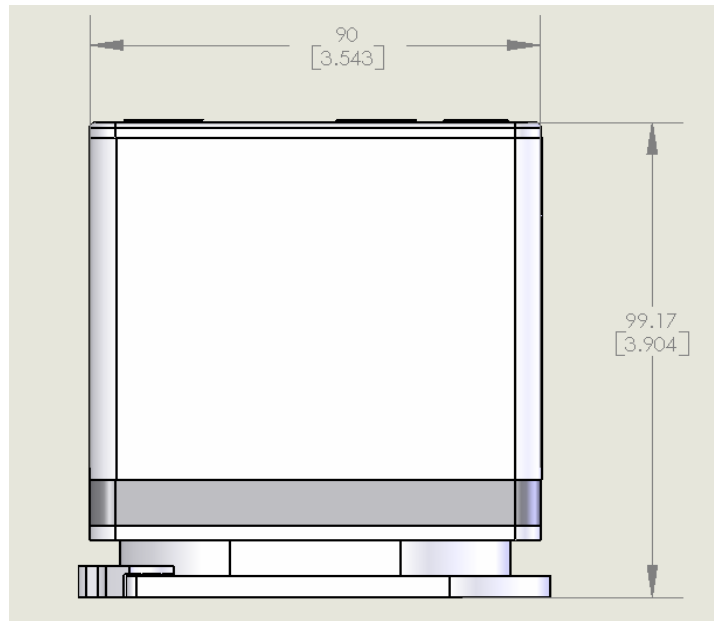


Figure 14: Enclosed Body (Type D) with Split Flange (Type C) - Top View

ELECTRICAL CONNECTIONS

In addition to industry standard Mini USB and 10/100 Mbit based Ethernet RJ-45 communications interface jacks, the MityCCD also provides the following interface connectors.

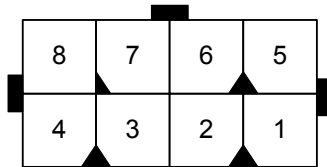


Figure 15: Power Connector¹ - Rear View.

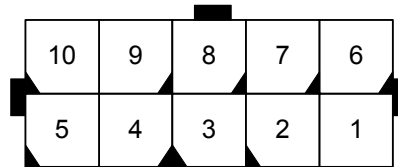


Figure 16: GPIO Connector² - Rear View.

| 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 2 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] Sensors Unlimited Goodrich Corporation, "LDB, LSB, LE and LSE Series Linear Indium Gallium Arsenide Photodiode Arrays," Doc. No. 108620 Rev 1, 15-Dec, 2006

