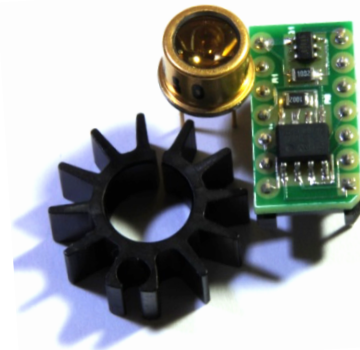


PIRE^{PLUS}

High-Speed Infrared Emitter with Integrated Drive Electronics

Key Features:

- Pulsable Source of Black-body Radiation
- Emulates a Black-body in Spectral Distribution
- Ultra-thin Metallic Foil Active Element
- Parabolic Reflector for Collimation and Uniformity
- Fast Pulse Rates, up to 180 Hz with 50% Modulation Depth
- Adjustable Pulse Rates with Analog Control Input
- High Output Emitter .04 Watts/cm²
- Broadband Output with Typical 0.88 Emissivity
- Compact, Reduced Footprint Solution



The high-performance PIRE^{PLUS} solution is designed to be used as fast pulsed sources of blackbody radiation. The solution can be ordered in a 3 item kit including driver PCB assembly, emitter, and heat sink or in an easily to use evaluation module. The high-speed pulsable foil emitter with its corresponding drive electronics on a compact 14 pin circuit board are designed to maximize output power from 1 Hz to 200 Hz pulse speeds with a single analog control input. The complementary assemblies enhance signal to noise performance while minimizing the overall system footprint.

The construction and implementation of the emitter and control circuitry optimize performance by matching the drive waveform for the desired operating frequency. This ensures peak output temperatures at all pulse frequencies and promotes the highest output for any application. Combined with Opto Diode's IR detectors, the PIRE^{PLUS} solution operating with typical pulse speeds of 180 Hz and 50% modulation depth can accurately detect trace elements in concentrations in low parts per million.

The radiating element in the pulsable emitter is an ultra-thin Opto Diode specific comb metallic foil configured so that radiation from both sides of the heated foil is efficiently directed out of the package along the optic axis. The foil material has a typical emissivity of 0.88 and closely emulates a blackbody source in spectral distribution. The emitter is designed to operate at a rated maximum foil temperature of 1000 Kelvin. The emitter is offered in a hermetically sealed TO-5 package with integral

standard parabolic reflector to provide near collimated and uniform radiation output.

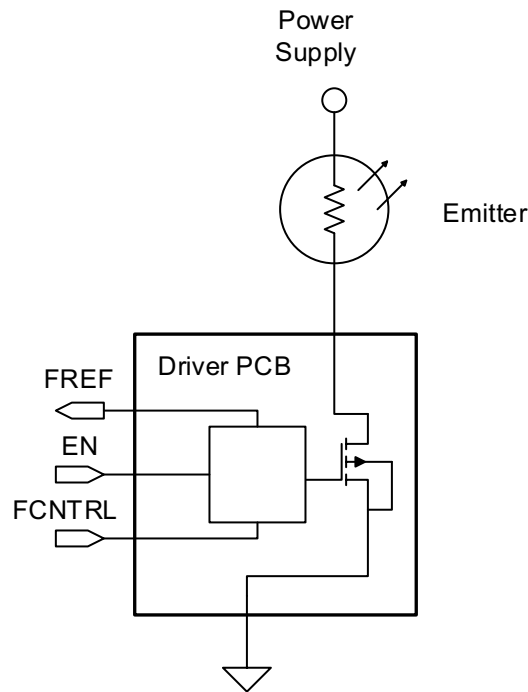
The PIRE^{PLUS} sub-system is an ideal solution for a variety of applications. The control circuitry will exploit the capabilities of the high-speed source in many applications. With the emitter, heat sink, and controller set, designers can focus on maximizing the overall system performance rather than interfacing with the source.

Applications:

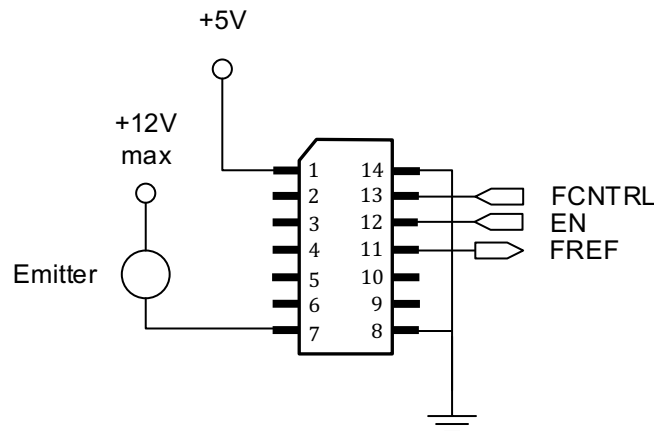
- Gas analysis, medical and industrial
- Environmental monitoring
- Spectroscopy
- Process control systems

Drive Circuit Block Diagram

The driver PCB uses single N-channel MOSFET with, very low on-state resistance combined with high transconductance, superior reverse energy and diode recovery dv/dt capability to switch the emitter on and off at a frequency controlled by one of the inputs.



Typical Connection Diagram



Driver Board Pin Description

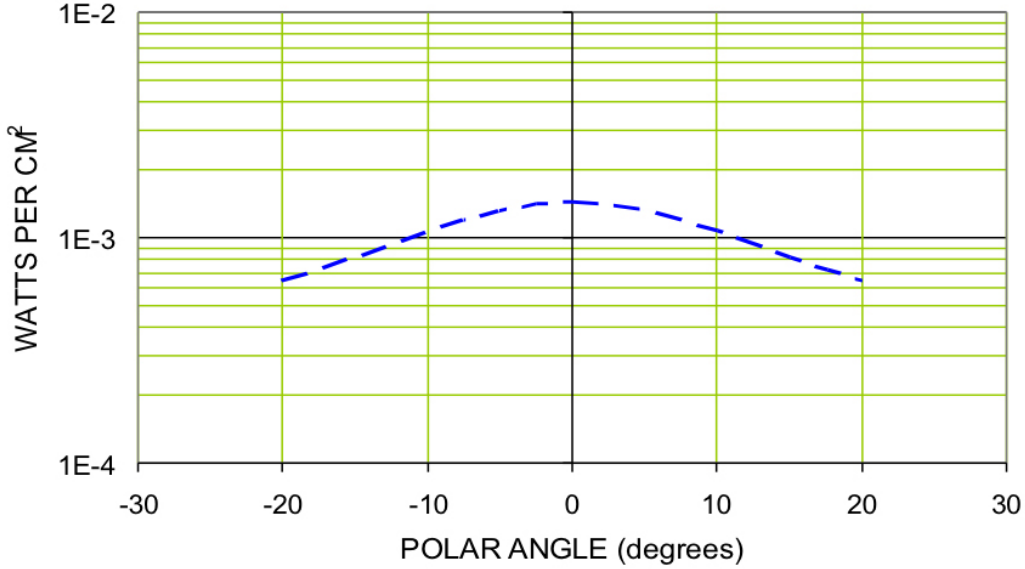
| Pin# | Pin Name | Description |
|------|-----------|--|
| 1 | +5V | +5V Power Supply Input |
| 2 | Reserved1 | Reserved 1 |
| 3 | Reserved2 | Reserved 2 |
| 4 | Reserved3 | Reserved 3 |
| 5 | NC1 | No Connect |
| 6 | NC2 | No Connect |
| 7 | Emitter | Infrared Emitter Source (MOSFET Drain) |
| 8 | AGND | Analog Ground (MOSFET Source) |
| 9 | NC3 | No Connect |
| 10 | NC4 | No Connect |
| 11 | FREF | Output Pulse Reference (MOSFET Gate) |
| 12 | EN | Enable Input (GND to Disable) |
| 13 | FCNTRL | Frequency Control Analog Input |
| 14 | DGND | +5V Digital Ground |

Electrical Specifications

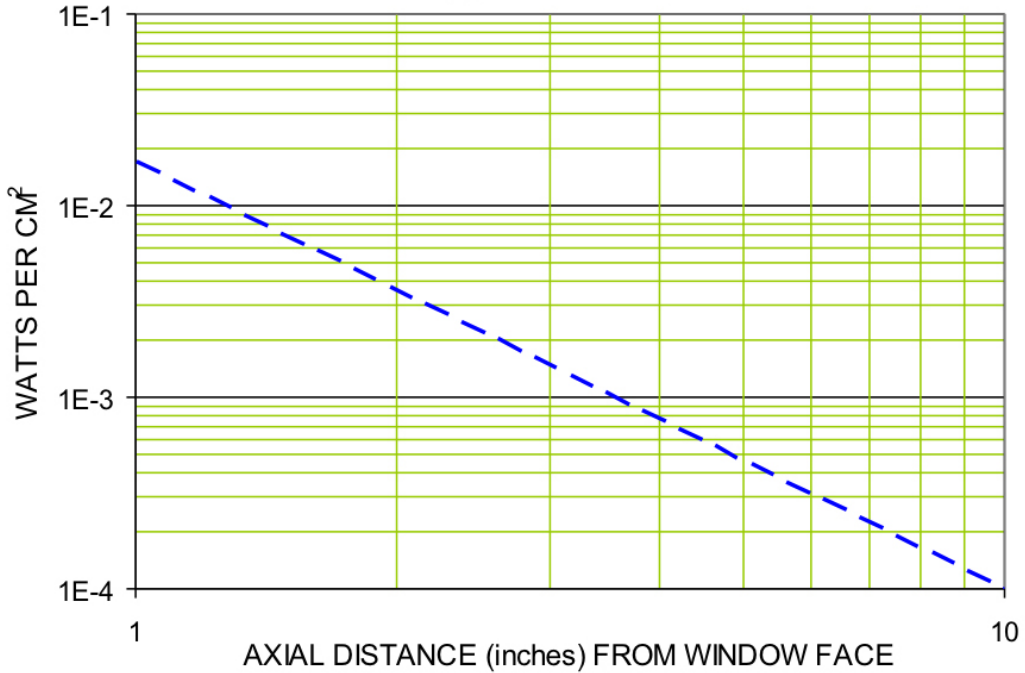
| Specification | Min. | Typ. | Max. |
|-------------------------------|-----------------|-------|----------------|
| Emitter Voltage | 3V | | 12V |
| Pulse Frequency Range | 2Hz | 100Hz | 200Hz |
| Frequency Control Voltage | 0V | 2.5V | 5V |
| Emitter Resistance | | 2.5Ω | |
| Peak Emitter Current (12V) | | | 5A |
| Average Emitter Current (12V) | 10mA | | 220mA |
| Output Enable Voltage | 0V (Disable) | | 5V (Enable) |
| Filament Temperature (12V) | | | 1000°K |
| Filament Emissivity | | 0.88 | |
| Operating Temperature | -30°C | | +100°C |
| Spectral Output | 0.35μm | | 6μm |

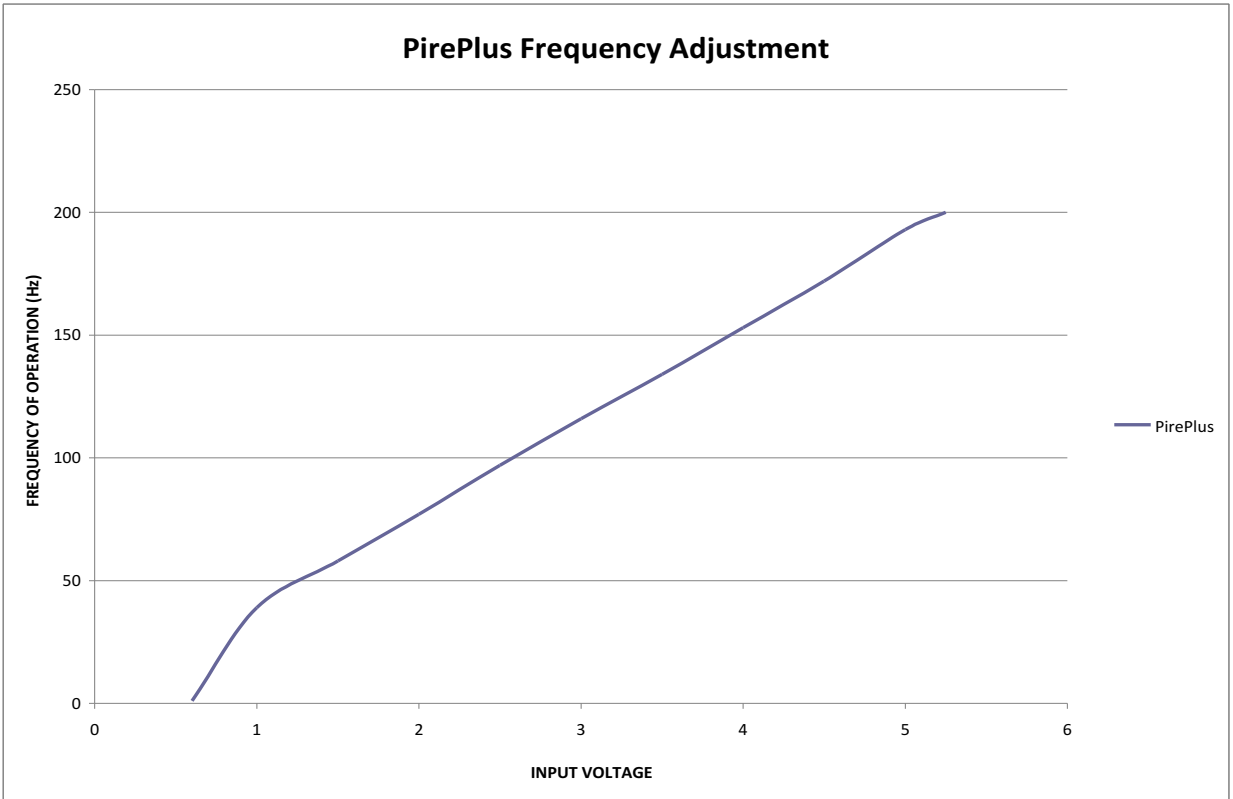
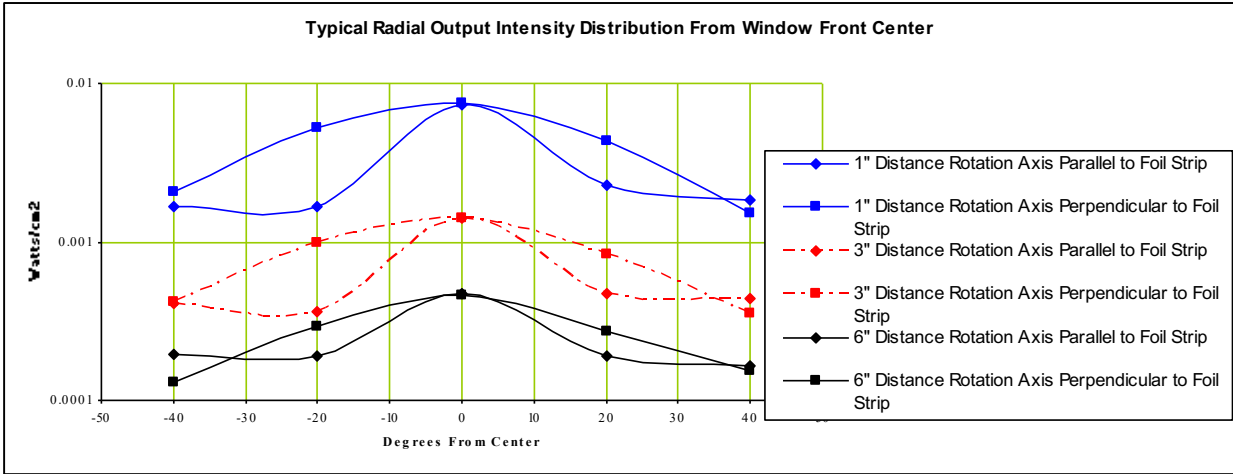
Additional Information

**Average DC Intensity¹ (@1000 K) vs. Angle
(@ 3 inches and 2.78 watts)**



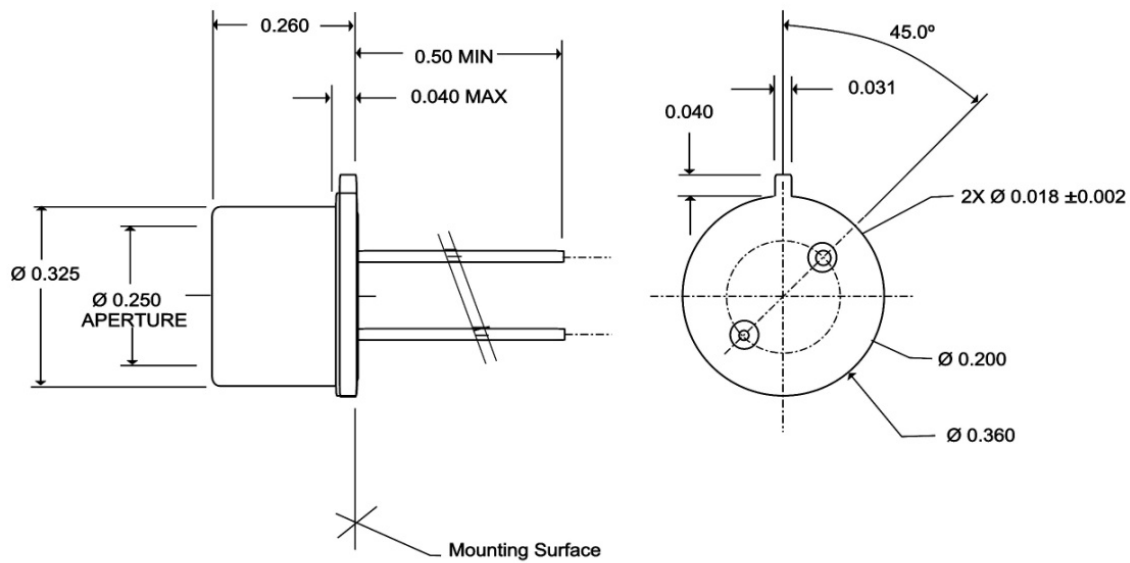
**DC Intensity (@1000 K) vs. Distance
(@ 2.78 watts)**



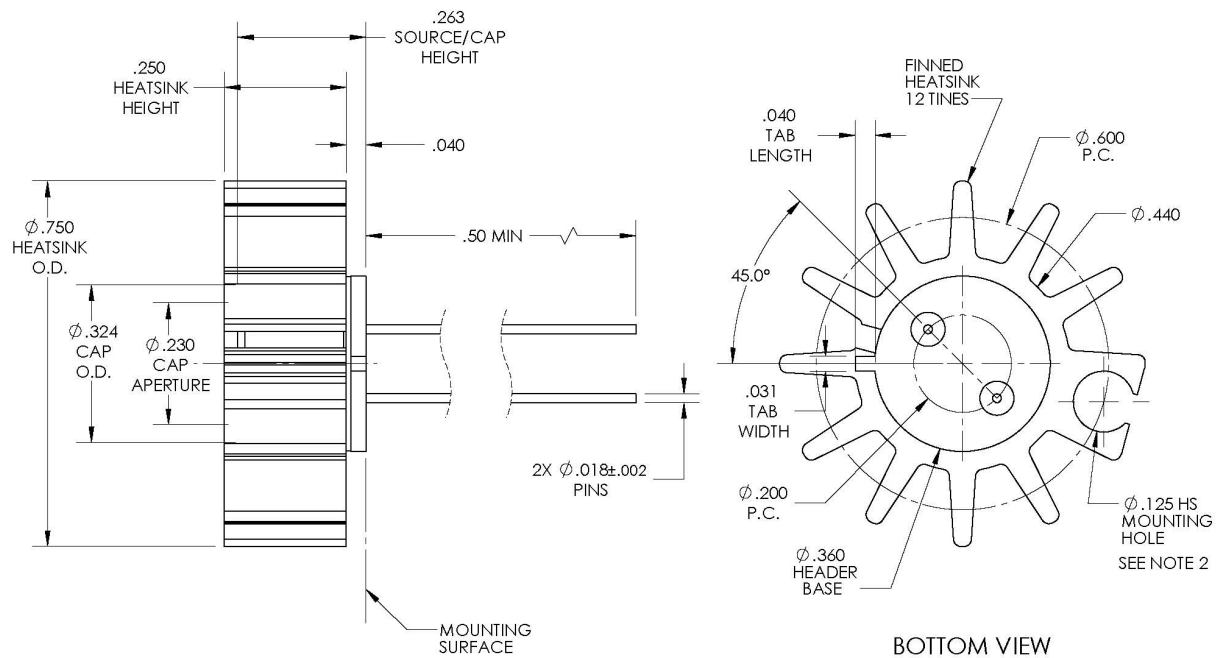


Mechanical Drawings & Package Dimensions

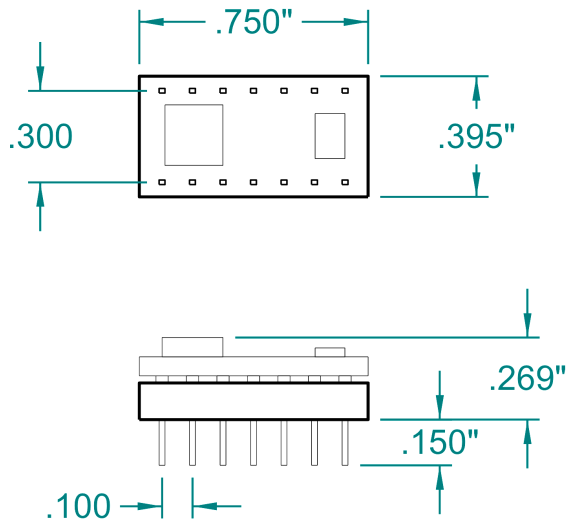
40101



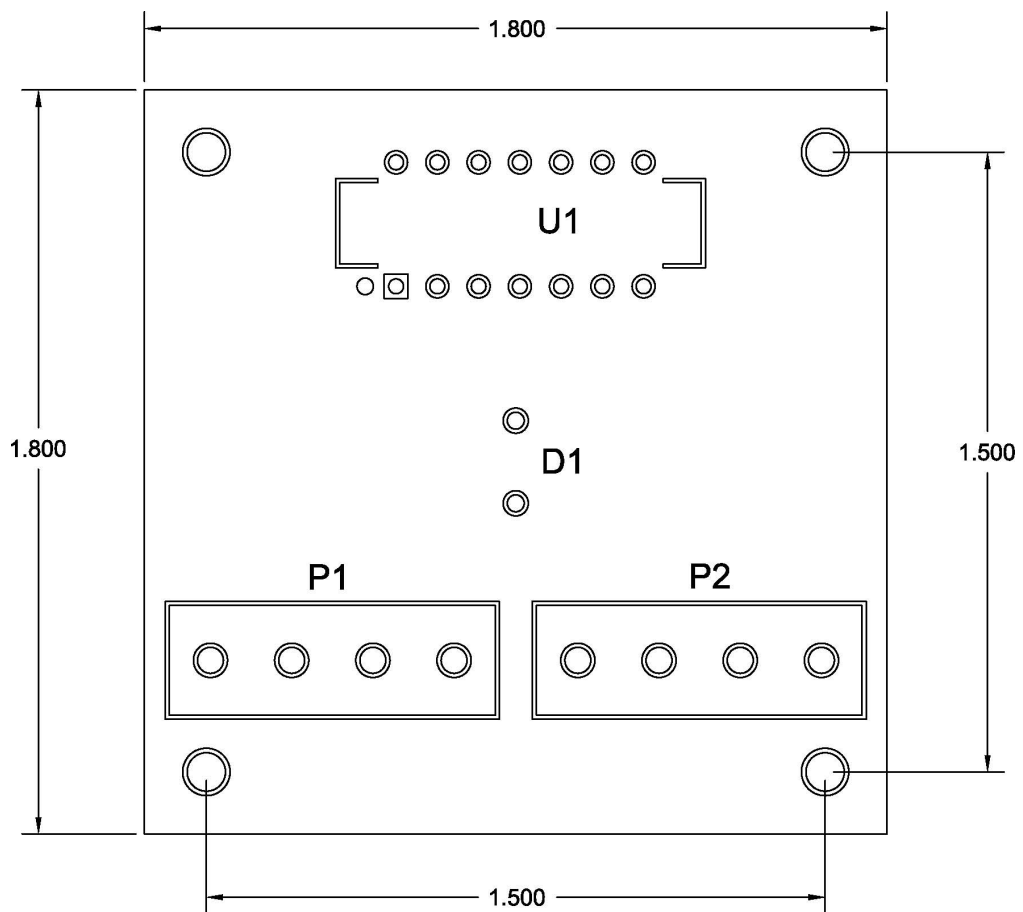
14407



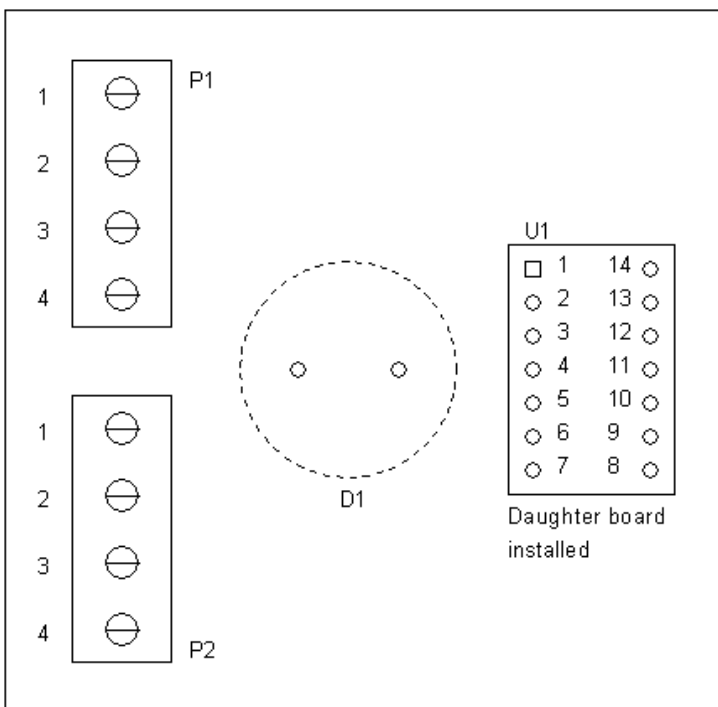
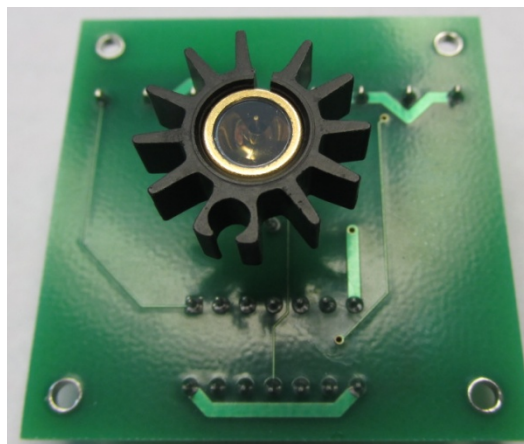
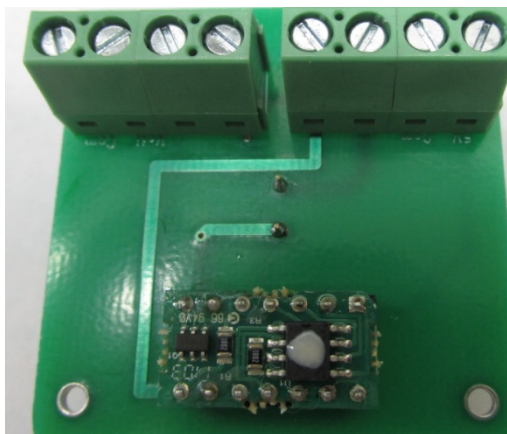
16700



40801



Evaluation Board Pin Out



| U1 Daughter Board | |
|-------------------|----------------------------|
| Pin# | Description |
| 1 | +5V |
| 2 | NC |
| 3 | NC |
| 4 | NC |
| 5 | NC |
| 6 | NC |
| 7 | LED- |
| 8 | Common |
| 9 | NC |
| 10 | NC |
| 11 | FREF (Pulse Reference) |
| 12 | NC |
| 13 | FCNTRL (frequency Control) |
| 14 | Common |

| P1 | |
|------|-------------|
| Pin# | Description |
| 1 | +5V |
| 2 | Common |
| 3 | +12V |
| 4 | Common |

| P2 | |
|------|----------------------------|
| Pin# | Description |
| 1 | FREF (Pulse Reference) |
| 2 | Common |
| 3 | FCNTRL (Frequency Control) |
| 4 | Common |

Ordering Information

| Model # | Part# | Description | Part# | Description |
|-----------|-------|--------------------------|-------|---------------------|
| Pire+ Kit | 40800 | Pire ^{Plus} Kit | 16700 | Driver PCB Assembly |
| | | | 40101 | Emitter |
| | | | 14407 | Heat Sink |

| Model # | Part# | Description |
|-----------|-------|---------------------------------------|
| Pire+ EVB | 40801 | Pire ^{Plus} Evaluation Board |