Model 481

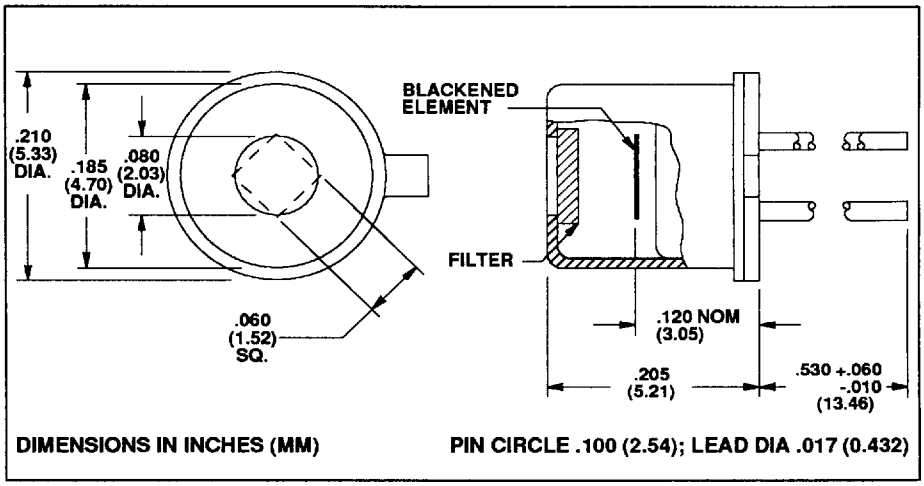
Single Element Pyroelectric Detector With JFET Amplifier

Manufactured under one or more of the following U.S. patents: 3,839,640 - 4,218,620 - 4,326,663 - 4,384,207 - 4,437,003 - 4,441,023 - 4,523,095

Model 481 contains a single lithium tantalate sensing element and a JFET source follower sealed into a standard TO-18 housing with optical filter.

A patented element mounting technique is used to improve thermal time constant and reduce effects of microphony.

A source resistor is needed to set the drain current and consequently the operating parameters of the JFET. A 47KΩ or greater value resistor is recommended.

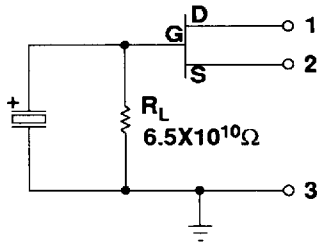


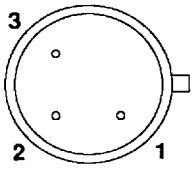
DIMENSIONS IN INCHES (MM)

PIN CIRCLE .100 (2.54); LEAD DIA .017 (0.432)

Applications

- **Motion Sensing**
- **Lighting Control**
- **Intrusion Detection**
- **Industrial Control**
- **Gas Analysis**
- **Heating/AC Control**
- **Pyrometry**
- **Low-Power Laser Detection**
- **Robotics**
- **Instrumentation**





BOTTOM VIEW
(NO SCALE)

PIN CONNECTIONS

1. V +
2. OUTPUT
3. CASE/GROUND

Detector Specifications - - Model 481

Detector Type:	Single Element
Element Size:	1.52 mm, Square
Element Material:	Lithium Tantalate
Optical Bandwidth:	0.1 to 1,000 μm
Responsivity (typ):	3,110 V/W
Responsivity (min):	2,580 V/W
Noise (typ):	2.25 μV rms
Noise (max):	6.60 μV rms
NEP (typ):	7.21×10^{-10} W/√Hz
NEP (max):	2.56×10^{-9} W/√Hz
D* (typ):	2.11×10^{8} cm√Hz/W
D* (min):	5.94×10^{7} cm√Hz/W
Operating Voltage (min & max):	3 to 15 VDC
Offset Voltage (min & max):	0.3 to 1.2 V (R_s = 100K Ω)
Operating Current (min & max):	3.0 to 12 μA
Thermal Breakpoint (typ):	0.25 Hz
Electrical Breakpoint (typ):	0.12 Hz ($R_L = 6.5 \times 10^{10}$ Ω)
Recommended Operating Temperature:	−10 to +50°C
Responsivity vs. Temperature (max):	+0.2%/°C
Storage Temperature:	−55 to +125 °C ΔT < 50C°/minute
Incident Power Limit:	0.2 W
Output Polarity:	Positive for positive change
Output Impedance:	≤ Rs
Output Protection:	DO NOT OPERATE WITH R_S LOWER THAN 22K Ω

Characteristics at 8.3 to 14.0 μm, 500°K, 1 Hz, 1 Hz BW, Rt = 25°C, RS = 100,000 Ω
Data is established on a sample basis and is believed to be representative.

For best results, the following precautions and recommendations should be observed. (See ELTECdata #101):

Mounting: Avoid mechanical stresses on case and leads.

Soldering: Use minimum heat and a heat sink between case and leads. Leave minimum lead length of .250 inch (6.35mm). DO NOT MACHINE SOLDER.

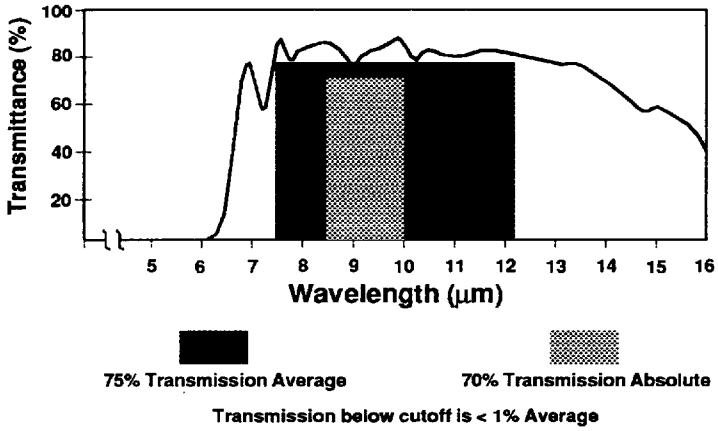
Static Discharge: Protect detectors from electrostatic charges.

Thermal Shock: Temperature changes and rate of change must be kept to a minimum (<50C°/min.) to prevent damage.

Optical Design: Use of a detector with a filter in an optical system may require consideration of the image displacement toward the filter. This displacement (s) caused by the insertion of a planoparallel plate (filter thickness = t; refractive index = N) is given by s = (t/N)(N-1).

Optical Bandwidth: The detector is sensitive in a range from 0.1 to 1000 µm depending on filter used. For more information, see ELTECdata # 101.

Transmission Characteristics of –3 Filter (HP-7)



For information on other standard filters available, refer to ELTECdata # 101

Light Leakage: Slight sensitivity to visible light leaking through the glass-to-metal seal on the base may be observed.

Noise: As a resolution or lower information limit, noise is established not only by the detector. Other noise sources are:

- Radiated and conducted RF signals
- Subsequent amplification or signal conditioning stages
- Power supply noise
- Components, such as high value resistors and capacitors (tantalum and aluminum electrolytic)
- Mechanical contacts and weak solder joints
- Vibration excited microphonics
- Outside thermal influences on the detector other than the desired infrared input, i.e. drafts.

All of these noise sources should be considered carefully when the information signal is <1mV.

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