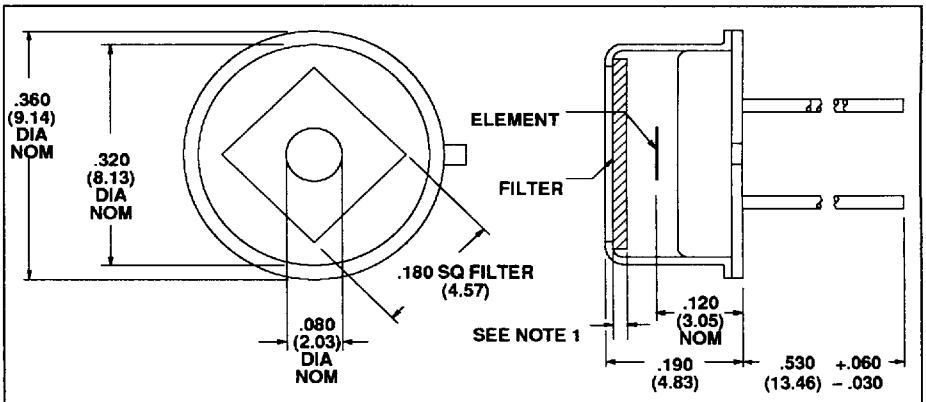
Model 406
Single Element Pyroelectric IR Detector With Source Follower

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 406 contains a single lithium tantalate sensing element and a JFET source follower sealed into a standard TO-5 transistor package with an optical filter.

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

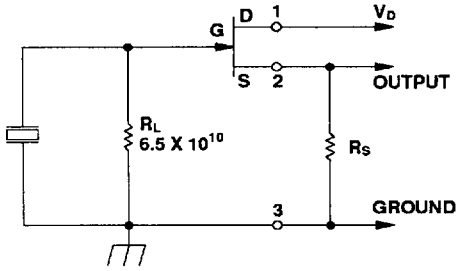
A source resistor is needed to set the drain current and consequently the operating parameters of the JFET. A 47K Ω or greater value resistor is recommended.

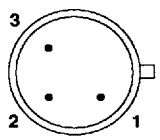


DIMENSIONS IN INCHES (MM) PINS CIRCLE .200 (5.0); LEAD DIA .017 (0.43)

Applications

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





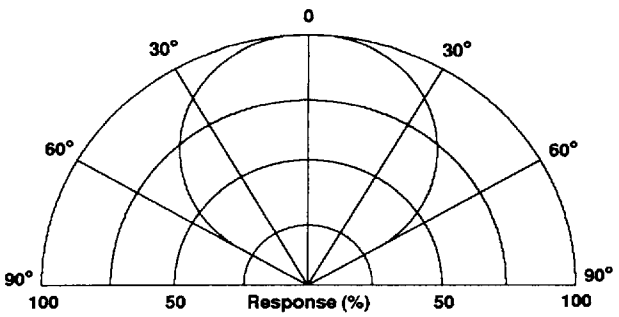
1. V+
2. OUTPUT
3. GND/CASE

BOTTOM VIEW
(No Scale)

Characteristics		406	Unit	Test Conditions	ELTECdata Reference
Detector Type		Single	--		
Element Size		2.0	mm, Dia	Nominal	
Optical Bandwidth		.1 to 1000	µm	Various filters	101
Responsivity	min	2100			
	typ	2350	V/W	8 to 14 µm@1Hz	
	max	2600			
Noise	typ	10	µV/√Hz	1.0 Hz	
	max	20		p-p (1 minute)	
NEP	typ	7.0 X 10^{-10}	W/√Hz	8 to 14 µm	100
	max	1.7 X 10^{-9}		@1Hz, BW 1Hz	
D*	min	1.0 X 10^{8}	cm√Hz/W	8 to 14 µm	100
	typ	2.5 X 10^{8}		@1Hz, BW 1 Hz	
Operating	min	3	V	V_D to Gnd	104
Voltage	max	15			(4.1.c)
Operating	min	0.1	µA		104
Current	max	40			(4.1.c)
Offset	min	0.2	V	R_S=22KΩ	104
Voltage	max	0.8			Fig 4
Offset	min	0.3	V	R_S=100KΩ	104
Voltage	max	1.2			Fig 4
Output Impedance	max	≤ R_S	KΩ		
Thermal Breakpoint f_T	typ	0.25	Hz		102
Electrical Breakpoint f_e	typ	0.08	Hz	R_L=6.5 X 10^{10}Ω	102
Recommended Operating Temp.		-10 +50	°C		
Storage Temperature	max	-55 +125	°C	ΔT<50C°/minute	

Characteristics at 25°C, with -3 filter, V_D=5 VDC, R_S=100KΩ unless otherwise stated.
Data is established on a sample basis and is believed to be representative.

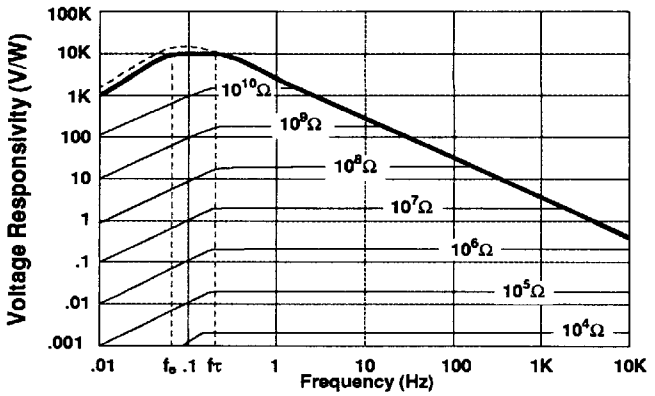
FIELD OF VIEW



For –3 filter only. For other filters, consider refractive index and thickness.

Symmetrical crystal gives same FOV in vertical and horizontal planes.

FREQUENCY RESPONSE



The voltage response of this detector is dependent on the pulse rate or equivalent frequency of input. The frequency response of the detector can be linerarized by using a lower value resistor, but at the expense of lower responsivity and a lower D*. Load resistor values other than the standard 6.5 X 10^{10} Ω can be specified.

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

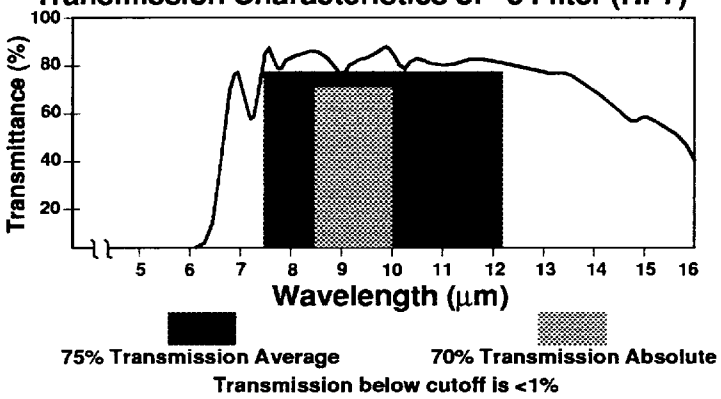
Mounting: Avoid mechanical stresses on case and leads.

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 electro-static charges.

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

Transmission Characteristics of –3 Filter (HP7)



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

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
- Shock and 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.

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

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).

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