Model 400
Single Element UV/Vis/IR Pyroelectric Detector

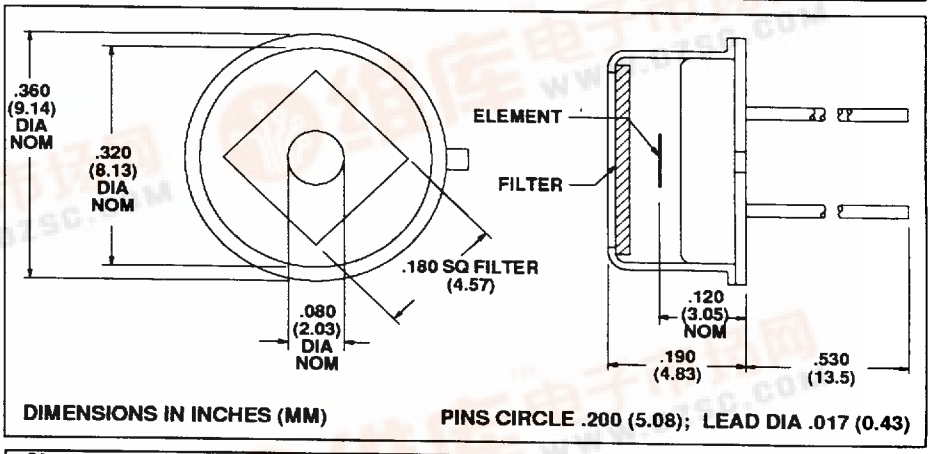
Manufactured under one or more of the following U.S. patents: 3,839,640 - 4,218,620 - 4,326,663 - 4,384,207 - 4,437,003 - 4,441,023 - 4,523,095

Model 400 consists of a single lithium tantalate sensing element sealed into a TO-5 transistor housing with an optical filter.

A patented element mounting technique is used to increase low frequency response and reduce effects of microphony.

Model 400 has a spectral response from less than 100 nm to more than 1000 µm wavelength. An optical filter may be used to select spectral response and to protect the sensing element from physical damage, drafts, electrical noise and moisture (degradation of insulation resistance).

The inherent high impedance of the detector requires special consideration be given to matching circuitry. Some basic circuits are shown below.

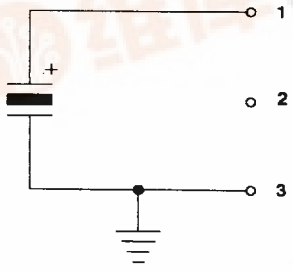


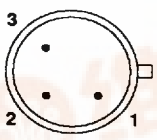
DIMENSIONS IN INCHES (MM)

PINS CIRCLE .200 (5.08); LEAD DIA .017 (0.43)

Applications

- **Pyrometry**
- **Gas Analysis**
- **Instrumentation**
- **Low Power Laser Measurements**
- **Millimeter Wave Studies**





1. OUTPUT
2. N/C
3. GND/CASE

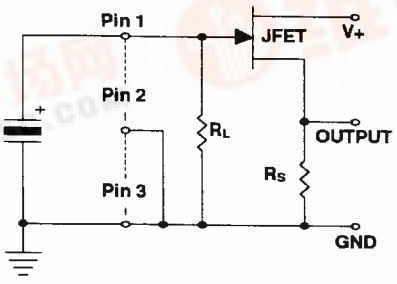
BOTTOM VIEW
(No Scale)

Characteristics		400	Unit	Test Conditions	ELTECdata Reference
Detector Type		Single	–		
Element Size		2.03	mm, Dia	Nominal	
Capacitance	min typ max	20 30 50	pF		
Responsivity	min typ max	0.8 1.1 1.4	µA/W	8 to 14 µm 1Hz to 1KHz	
Optical Bandwidth		<0.1 to 1000	µm	Without filter	101
NEP[1]	typ	6 X 10^{-10}	W/√Hz	8 to 14 µm @ 1Hz, BW 1Hz	100
D*[1]	typ	3 X 10^{8}	cm/√Hz/W	8 to 14 µm @ 1Hz, BW 1Hz	100
Element Resistance		>5 X 10^{12}	Ω		
Thermal Breakpoint f_T	typ	0.25	Hz		102
Recommended Operating Temperature		-55 +125	°C		
Incident Power Limit	max	10	mW	Call for Information	109
Storage Temperature		-55 +125	°C	ΔT<50C°/minute	

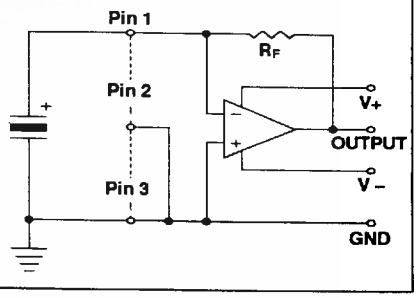
Characteristics at 25°C, with no filter, filter absorbtion must be considered according to type.
Data is established on a sample basis and is believed to be representative.
[1]Measured with ELTEC Model 320 Impedance Converter set at 5 X 10^{10} Ω.

SAMPLE CIRCUITS

Voltage Mode Operation

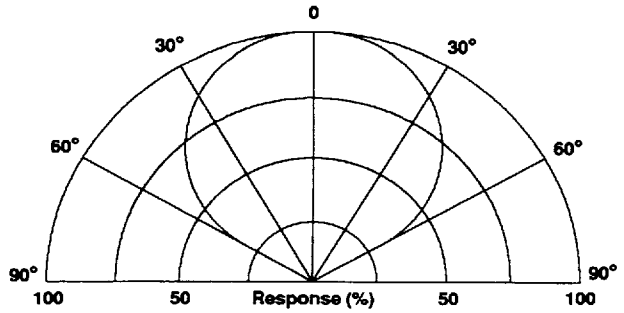


Current Mode Operation



3294041 0000680 793

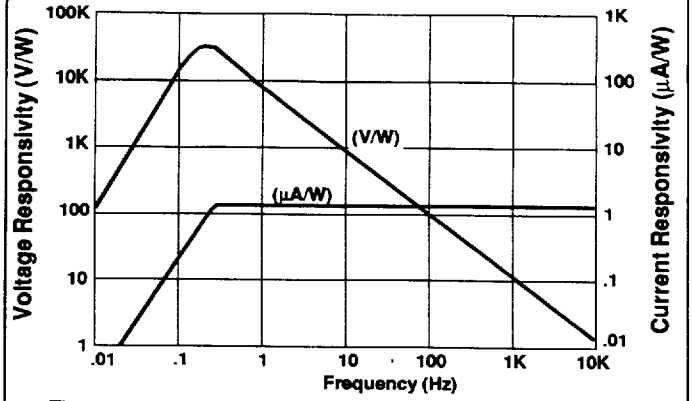
FIELD OF VIEW



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 current response of the Model 400 to modulated radiant energy (pulsed or chopped) is flat beyond the thermal break and is shown on the designated curve with appropriate dimensioning on the right ordinate axis. Response of the Model 400 through a source follower (ELTEC Model 320 set at 5×10^{10}) is shown on the left ordinate axis.

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

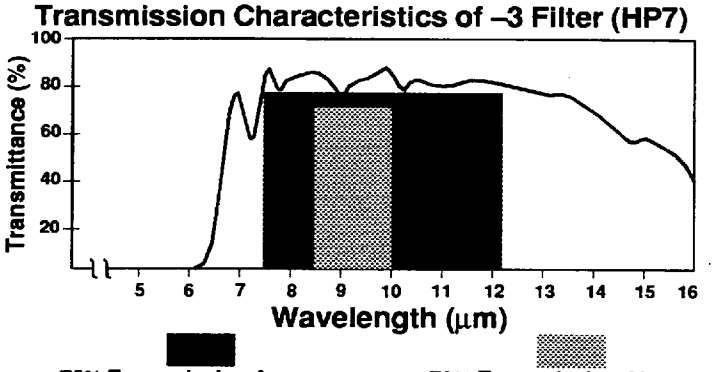
Mounting: Avoid mechanical stresses on case and leads.

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.

Optical Filter: This Model can be used with any standard ELTEC detector filter. For more information, please refer to ELTECdata # 101.

Transmission Characteristics of –3 Filter (HP7)



75% Transmission Average **70% Transmission Absolute**

Transmission below cutoff is <1% Average

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

Noise: Noise is limited only by the external amplifier and not by the detector. Amplifiers with impedances over 10^9 Ω are not recommended, other than for experimental purposes, due to susceptability to electrical noise, EMI and current leakage. Contact ELTEC for help in choosing an appropriate pyroelectric detector with integrated high impedance amplifier.

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

Calculations: When calculating response from the basic formula, (see ELTECdata # 100) use crystal thickness as 0.005 cm (0.002 inch) and use 30 pF capacitance.

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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