

Model 408

Single Element

Pyroelectric Detector with

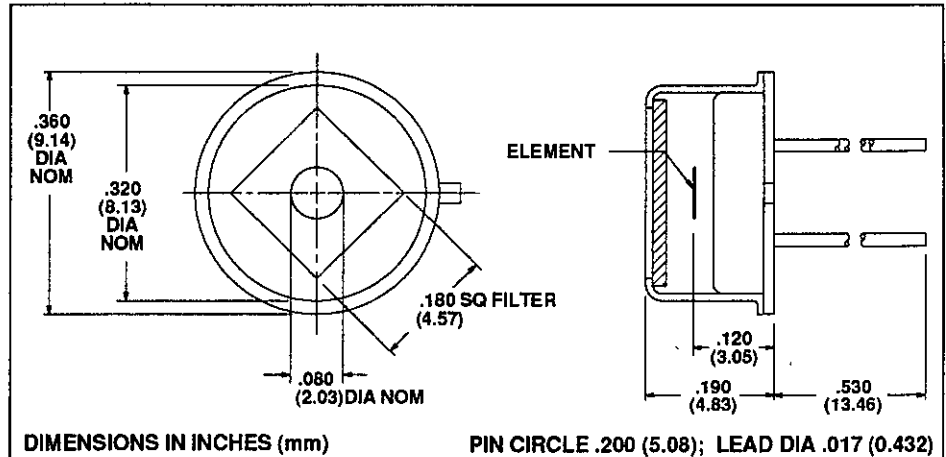
Current Mode Amplifier



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

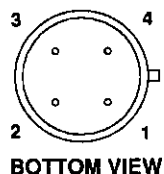
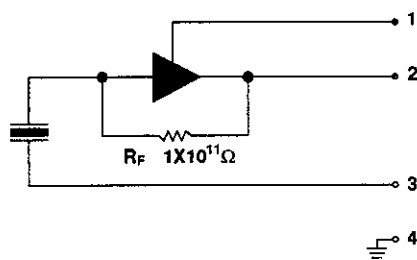
Model 408 consists of a single lithium tantalate sensing element, a JFET-input op amp and high megohm feedback resistor sealed into a TO-5 transistor housing with optical filter.

Designed primarily for large input thermal contrasts, additional amplification stages may not be needed as the Model 408 provides substantial gain through its current-to-voltage converter. Although this model incorporates an operational amplifier, only a single power supply is needed. The voltage reference is provided internally.



Applications

- Lighting Control
- Intruder Alarms
- People/Object Counting
- Industrial Control
- Robotics
- Heating/AC Control

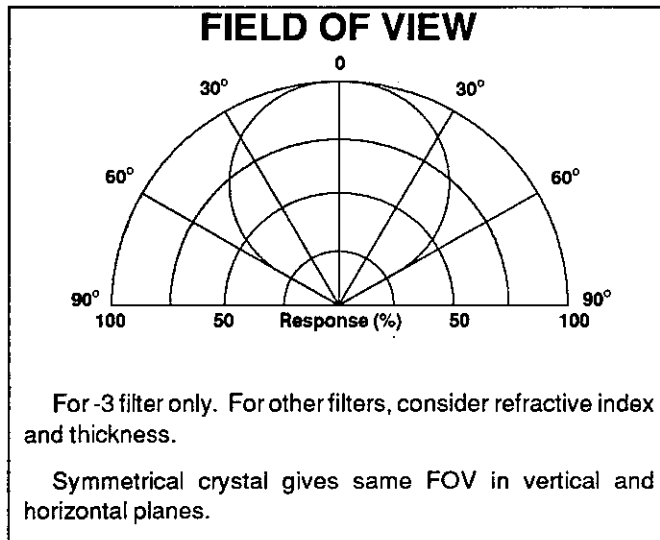


1. V_+
2. OUTPUT
3. COMMON
4. GND/CASE

Characteristics	408	Unit	Test Conditions	ELTECdata Reference
Detector Type:	Single	—		
Element Size:	2.0	mm, DIA	Nominal	
Optical Bandwidth:	1.5 to 1,000	μm	Various filters	101
Responsivity (Typ):	90,000	V/W	8 - 14 μm , 1Hz	
Responsivity (Typ):	45,000	V/W	8 - 14 μm , 10Hz	
Responsivity (Min):	33,750			
Noise (Typ):	1.0	$\text{mV}/\sqrt{\text{Hz}}$	1.0Hz, p-p (1 minute)	
Noise (Typ):	0.5	$\text{mV}/\sqrt{\text{Hz}}$	10.0Hz, p-p (1 minute)	
NEP (Typ):	2.5×10^{-9}	$\text{W}/\sqrt{\text{Hz}}$	8 - 14 μm , 1-10Hz, BW 1 Hz	100
D^* (Typ):	7.0×10^7	$\text{cm}\sqrt{\text{Hz}}/\text{W}$	8 - 14 μm , 1-10Hz, BW 1 Hz	100
Operating Voltage (Min):	5	VDC		104
Operating Voltage (Max):	15			(4.1.c)
Operating Current (Typ):	0.8	mA		104
Operating Current (Max):	3.0			(4.1.c)
Offset Voltage (Min):	1.5	VDC		104
Offset Voltage (Typ):	2.5			Fig 4
Offset Voltage (Max):	4.0			
Output Impedance:	< 100	Ω		
Thermal Breakpoint f_T (Typ):	0.25	Hz		102
Electrical Breakpoint f_e (Typ):	6.0	Hz	$R_f = 1 \times 10^{11} \Omega$	102
Recommended Operating Temperature:	0 +40	$^{\circ}\text{C}$		
Package Sealing (Max):	10^{-8}	cm^3/sec	Helium	
Storage Temperature:	-55 +125	$^{\circ}\text{C}$	$\Delta T < 50 ^{\circ}\text{C}/\text{minute}$	

Characteristics 25°C , with -3 filter, $V_S = +10 \text{ VDC}$

Data 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):

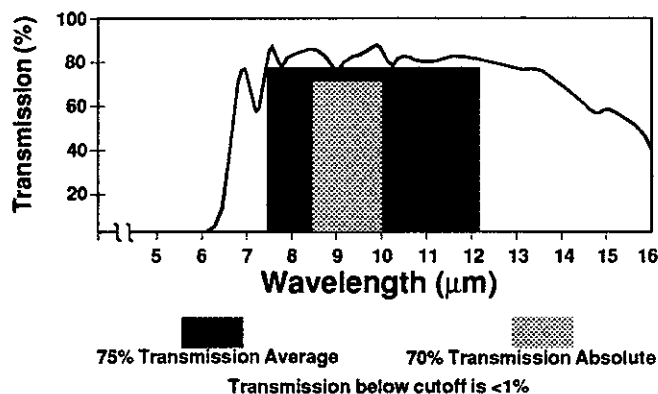
Mounting: Avoid mechanical stresses on case and leads.

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 ($<50^{\circ}\text{C}/\text{min.}$) 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
- 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 $<20\text{mV}$.

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

Power Polarity: Carefully note power supply polarity connections to avoid damage to internal op amp.

Output Protection: Output is short circuit protected.

Current Mode Output: Output in the current mode is inverting (negative output for positive temperature change output).

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 $s = (t/N)(N-1)$.