

Model 429

Twin Channel

Pyroelectric IR 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 429 consists of two lithium tantalate sensing elements, each with a JFET amplifier and output pin, sealed into a 4-pin TO-5 housing with optical filter.

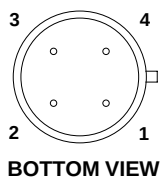
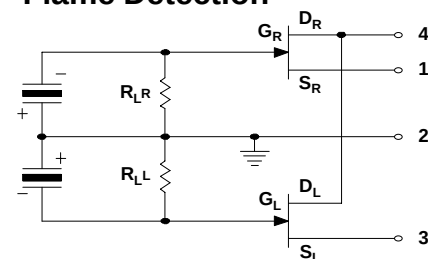
The minimum common mode rejection ratio for dual element detectors (series or parallel opposed) is typically 5:1. Much higher ratios are possible for the Model 429 because it allows external trimming to balance the gain of each element.

In application, the Model 429 can be used as a dual element detector with common mode cancellation accomplished in external circuitry. It can be used to determine direction of a moving object or used as a single element sensor with the second channel used for redundancy or system backup.

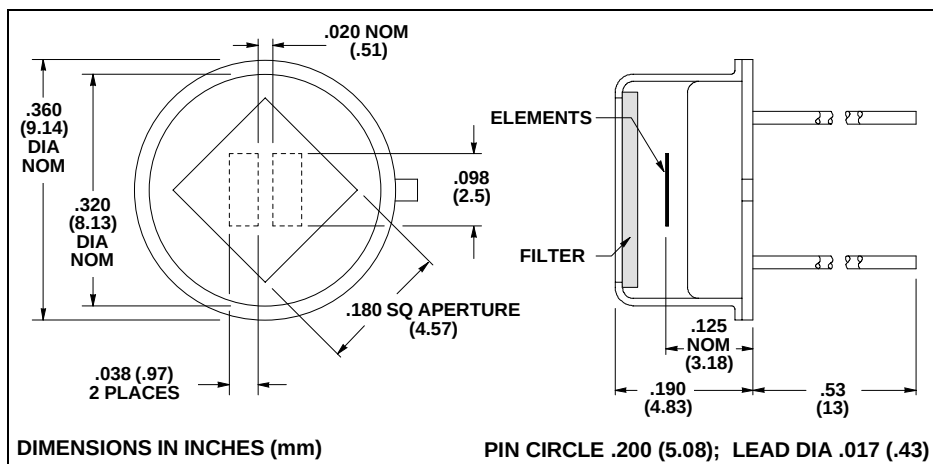
Two source resistors, 47 K Ω or greater are needed to set JFET drain currents. Outputs are negative for positive inputs.

Applications

- Perimeter Surveillance
- High Reliability Intrusion Detection
- Infrared Telescopes
- Industrial Control
- Flame Detection

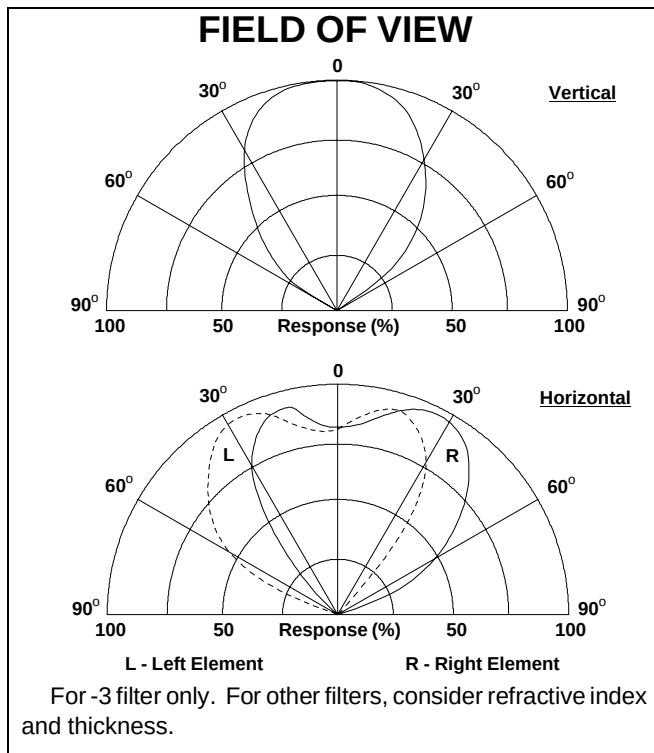


1. RIGHT OUTPUT
2. GND/CASE
3. LEFT OUTPUT
4. V+



Characteristics	429	Unit	Test Conditions	ELTECdata Reference
Detector Type:	Twin Ch.	—		
Element Size:	1.0 x 2.5	mm	Nominal, each	
Element Spacing:	0.5	mm	Nominal	
Responsivity (Each Element) (Typ):	5,000	V/W	8 to 14 μm @ 1Hz	
Channel Separation	30	dB	8 to 14 μm @ 1Hz	
Responsivity Ratio (Max):	1.25		8 to 14 μm @ 1Hz	
Noise (Typ):	30	$\mu\text{V}/\sqrt{\text{Hz}}$	1.0 Hz p-p (1 minute)	
NEP (Typ):	1.5×10^{-9}	$\text{W}/\sqrt{\text{Hz}}$	8 to 14 μm @ 1Hz, BW 1 Hz	100
D* (Typ):	1.0×10^8	$\text{cm}\sqrt{\text{Hz}}/\text{W}$	8 - 14 μm BW 1 Hz	100
Operating Voltage (Min): (Max):	3 (15)	VDC	V+ to Gnd	104 (4.1.c)
Operating Current (Min): (Max):	0.1 (40)	μA	Each Channel	104 (4.1.c)
Offset Voltage (Min): (Max):	0.3 (1.2)	VDC	$R_S = 100\text{K}\Omega$	104 Fig. 4
Output Impedance:	$\leq R_S$			
Thermal Breakpoint f_T (Typ):	0.2	Hz		102
Electrical Breakpoint f_e (Typ):	0.1	Hz	$R_L = 1 \times 10^{11}\Omega$	102
Recommended Operating Temperature:	-10 +50	$^{\circ}\text{C}$	Functional	
Incident Power Limit: (Max):	10	mW		
Package Sealing (Max):	10^{-8}	cm^3/sec	Helium	
Storage Temperature:	-55 +125	$^{\circ}\text{C}$	$\Delta T < 50$ C $^{\circ}$ /minute	

Characteristics 25 $^{\circ}\text{C}$, with -3 filter, $V_D = 5$ VDC, $R_S = 100\text{K}\Omega$ each channel unless otherwise stated. Data established on a sample basis and is believed to be representative.



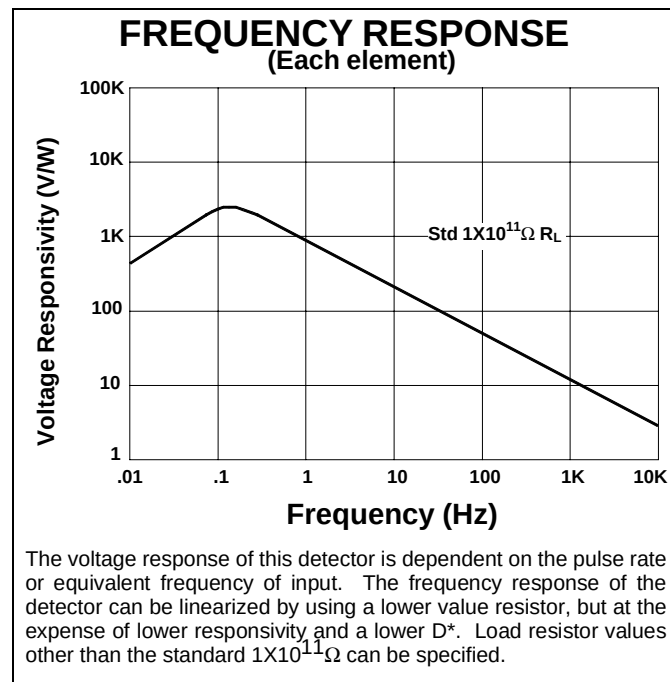
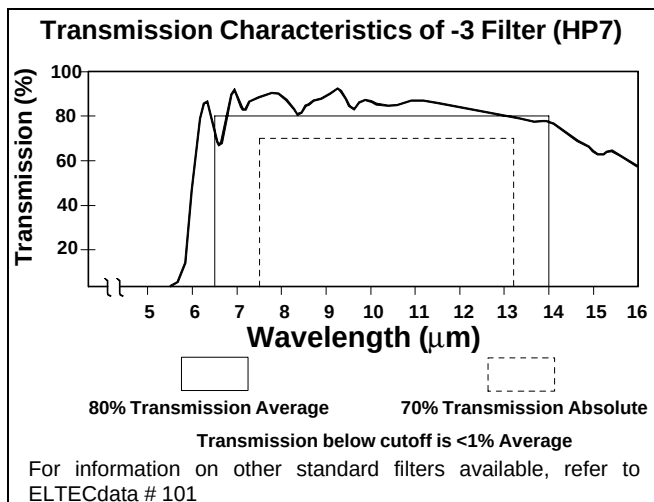
For best results, the following precautions and recommendations should be observed. (See ELTECdata # 101):

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.



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 or 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 $<1\text{mV}$.

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

Optical Bandwidth: The detector is sensitive in a range from 1.5 to 1000 μm depending on filter used. For more information, see ELTECdata # 101.