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.

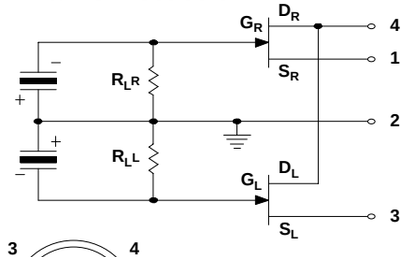
The minimum common mode rejection ratio for dual element detectors (series or parallel opposed) is typically 5:1. Much higher ratios are possible for the Model 429 because it allows external trimming to balance the gain of each element.

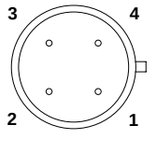
In application, the Model 429 can be used as a dual element detector with common mode cancellation accomplished in external circuitry. It can be used to determine direction of a moving object or used as a single element sensor with the second channel used for redundancy or system backup.

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

Applications

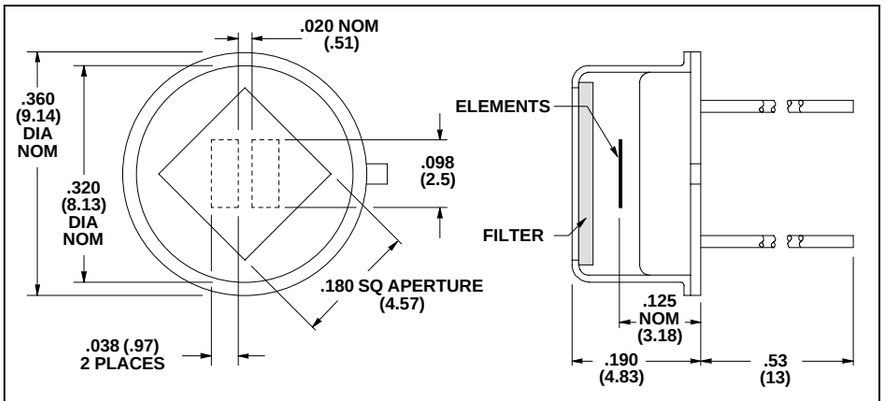
- **Perimeter Surveillance**
- **High Reliability Intrusion Detection**
- **Infrared Telescopes**
- **Industrial Control**
- **Flame Detection**





BOTTOM VIEW

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



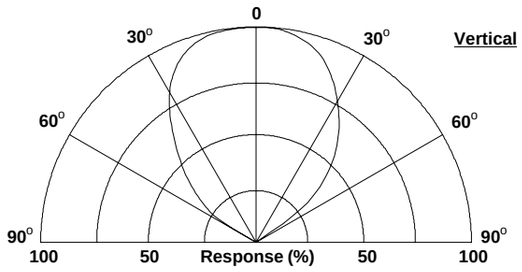
DIMENSIONS IN INCHES (mm)

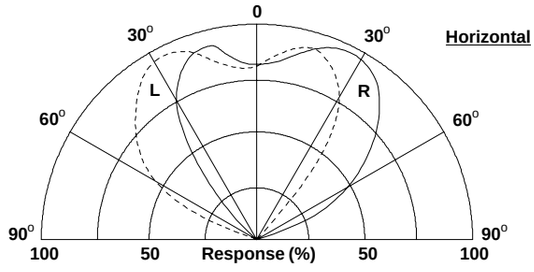
PIN CIRCLE .200 (5.08); LEAD DIA .017 (.43)

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	$\mu V/\sqrt{Hz}$	1.0 Hz p-p (1 minute)	
NEP	(Typ):	1.5×10^{-9}	$W/\sqrt{Hz}$	8 to 14 μm @ 1Hz, BW 1 Hz	100
D*	(Typ):	1.0×10^{8}	$cm\sqrt{Hz}/W$	8 - 14 μm BW 1 Hz	100
Operating Voltage	(Min):	3	VDC	V+ to Gnd	104 (4.1.c)
	(Max):	15			
Operating Current	(Min):	0.1	μA	Each Channel	104 (4.1.c)
	(Max):	40			
Offset Voltage	(Min):	0.3	VDC	R_S = 100KΩ	104 Fig. 4
	(Max):	1.2			
Output Impedance:		≤ R_S			
Thermal Breakpoint f_T	(Typ):	0.2	Hz		102
Electrical Breakpoint f_e	(Typ):	0.1	Hz	$R_L = 1X10^{11}\Omega$	102
Recommended Operating Temperature:		-10 +50	°C	Functional	
Incident Power Limit:	(Max):	10	mW		
Package Sealing	(Max):	10^{-8}	cm^3/sec	Helium	
Storage Temperature:		-55 +125	°C	ΔT < 50 C°/minute	

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

FIELD OF VIEW

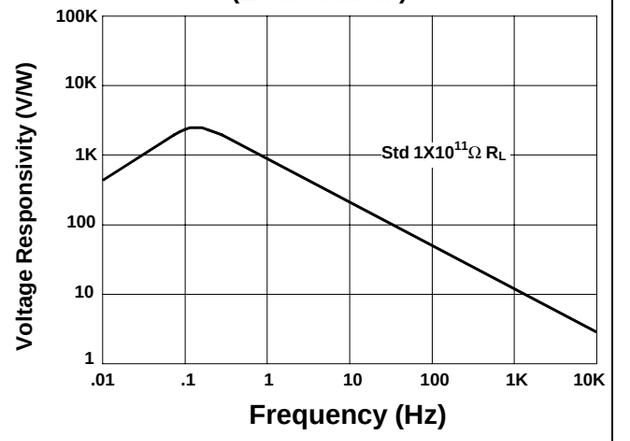




L - Left Element R - Right Element

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

FREQUENCY RESPONSE
(Each element)



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 linearized by using a lower value resistor, but at the expense of lower responsivity and a lower D*. Load resistor values other than the standard $1X10^{11}\Omega$ can be specified.

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

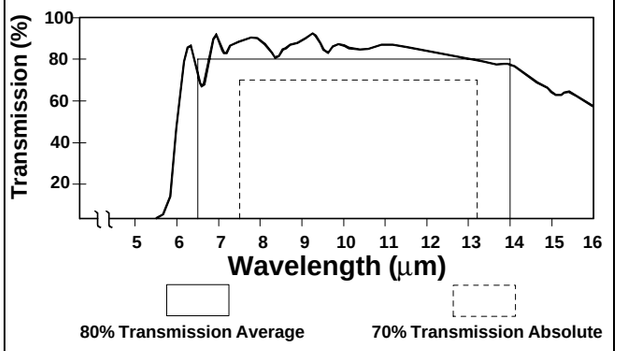
Mounting: Avoid mechanical stresses on case and leads.

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 electrostatic 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)



80% Transmission Average 70% Transmission Absolute

Transmission below cutoff is <1% Average

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 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 <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).

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.