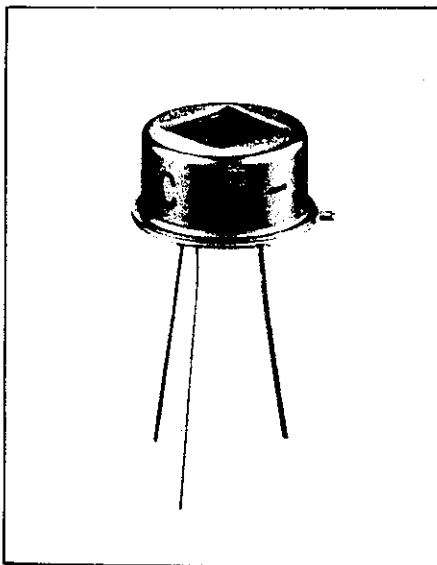




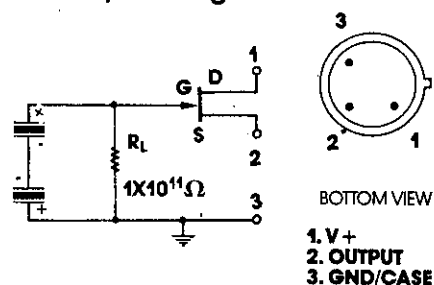
Model 414 consists of two separate sensing elements on a single lithium tantalate crystal and a JFET source follower sealed into a TO-5 transistor housing with optical filter.

The sensing elements are connected electrically in a series opposed dual (SOD) configuration. This design affords cancellation of unwanted common mode signals due to changes in the thermal background. The signal output is comparable in magnitude to single element sensors with source followers. The small element size is adapted to short focal lengths of long range optical systems.

A source resistor, 47 K Ω or greater is needed to set the JFET drain current.

Applications

- Intrusion Detection
- Lighting Control
- Robotics
- Motion Sensing
- Automatic Door Control
- Safety Warning

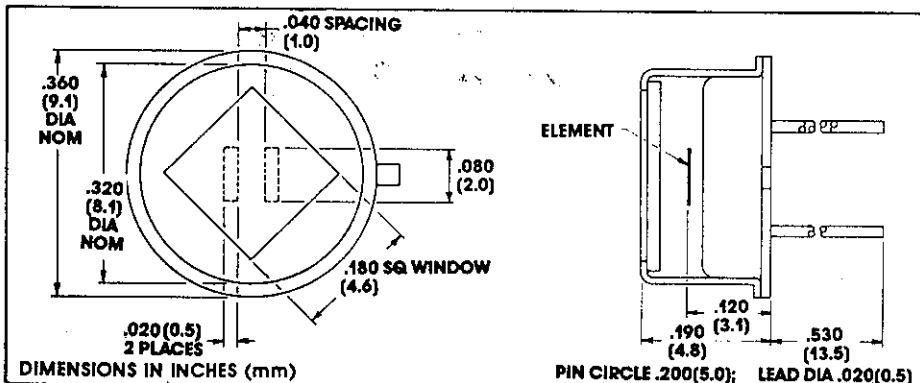


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414 Series Opposed Dual Pyroelectric IR Detector with Source Follower



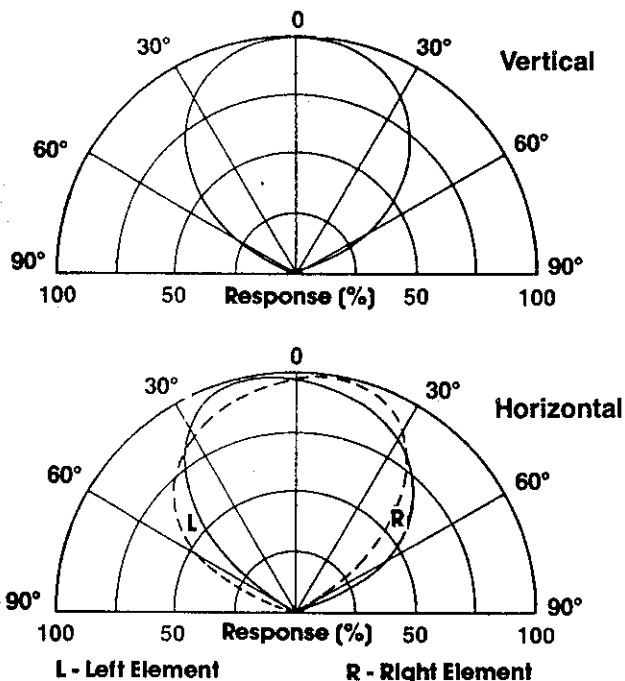
Manufactured under one or more of the following U.S. patents:
3,839,640 - 4,218,620 - 4,326,663 - 4,384,207 - 4,437,003 -
4,441,023 - 4,523,095



Characteristics	414	Unit	Test Conditions	ELTECdata Reference
Detector Type	SOD	—		
Element Size	0.5 x 2.0	mm	nominal, each	
Element Spacing	1.0	mm	nominal	
Responsivity (Each Element)	min typ max	5000 8000 11,000	V/W	8 to 14 μ m@1Hz
Common Mode Rejection Ratio	min typ	5:1 10:1		8 to 14 μ m@1Hz
Noise	typ max	50 100	μ V/ $\sqrt{\text{Hz}}$	1.0Hz p-p (1 minute)
NEP	typ max	1.5×10^{-9} 5.0×10^{-9}	W/ $\sqrt{\text{Hz}}$	8 to 14 μ m @1Hz, BW 1Hz
D*	min typ	2.0×10^7 7.0×10^7	cm $\sqrt{\text{Hz}}$ /W	8 to 14 μ m @1Hz, BW 1Hz
Operating Voltage	min max	3 15	V	V _b to Gnd
Operating Current	min max	0.1 40	μ A	
Offset Voltage	min max	0.2 0.8	V	R _s = 22K Ω
Offset Voltage	min max	0.3 1.2	V	R _s = 100K Ω
Output Impedance	max	20	K Ω	
Thermal Breakpoint f _t	typ	0.25	Hz	
Electrical Breakpoint f _e	typ	0.25	Hz	R _L = 1×10^{11} Ω
Recommended Operating Temp.		0 + 40	$^{\circ}$ C	
Responsivity vs. Temperature	max	+ 0.2	%/ $^{\circ}$ C	Unity Gain Circuit
Incident Power Limit	max	0.2	W	
Pressure Sensitivity	max	200	μ V/mbar	Step Response
Microphony	max	50	μ V/g	10-1000Hz
Package Sealing	max	10 ⁻⁸	cm ³ /sec	Helium
Storage Temperature		-55 + 125	$^{\circ}$ C	Δ T < 5 $^{\circ}$ C/minute

Characteristics at 25 $^{\circ}$ C, with -3 Window, V_D = 5 VDC, R_s = 100K Ω unless otherwise stated. Data is established on a sample basis and is believed to be representative.

FIELD OF VIEW



For -3 window only. For other windows, consider refractive index and thickness.

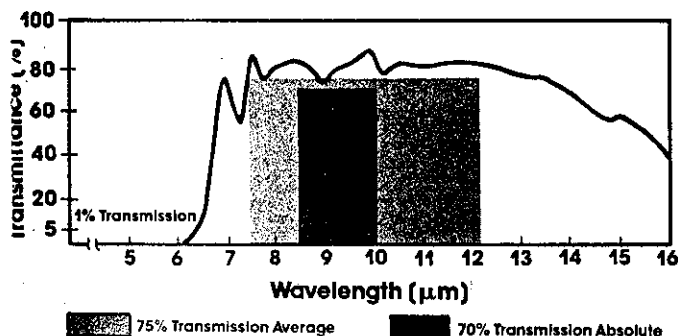
Mounting: Avoid mechanical stresses on case and leads.

Soldering: Use minimum heat and heat sink between case and leads. Leave minimum lead length of .250 inch (6.0mm). 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 ($<5^{\circ}\text{C}/\text{min.}$) to prevent damage.

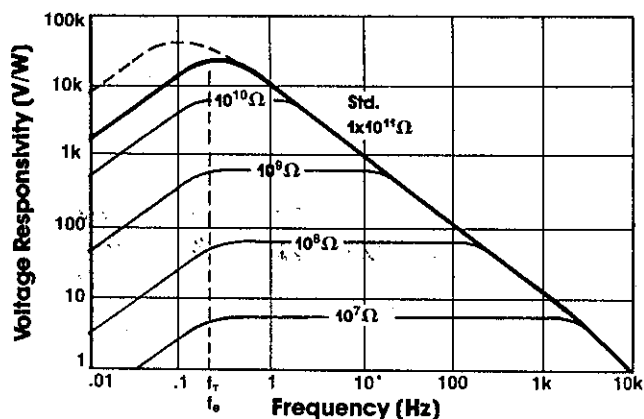
Transmission Characteristics of -3 Window (HP-7)



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

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 a lower responsivity and a lower D^* . Load resistor values other than the standard $1 \times 10^{11} \Omega$ can be specified.

Noise: As a resolution or lower information limit, noise is not established 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 tantalum or electrolytic capacitors
- Mechanical contacts and weak solder joints
- Microphonics or vibration
- Outside thermal influences on the detector other than the desired infrared input, i.e. drafts.

All these noise sources should be considered carefully when the information signal is $<1\text{mV}$.

Optical Design: Use of a detector with a window in an optical system may require consideration of the image displacement toward the window. This displacement ($= s$) caused by the insertion of a planoparallel plate (window 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 $1000 \mu\text{m}$ depending on window used. For more information, see ELTECdata #101.