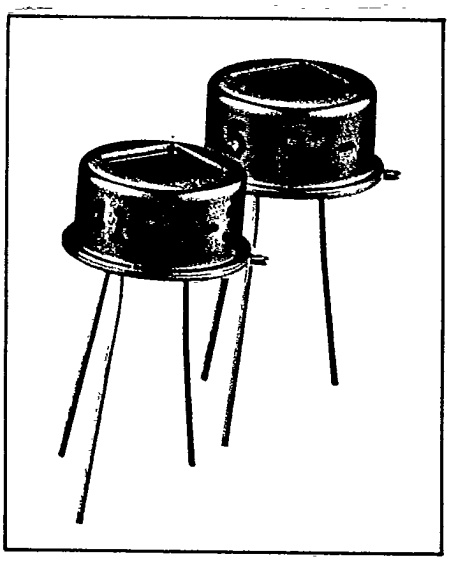
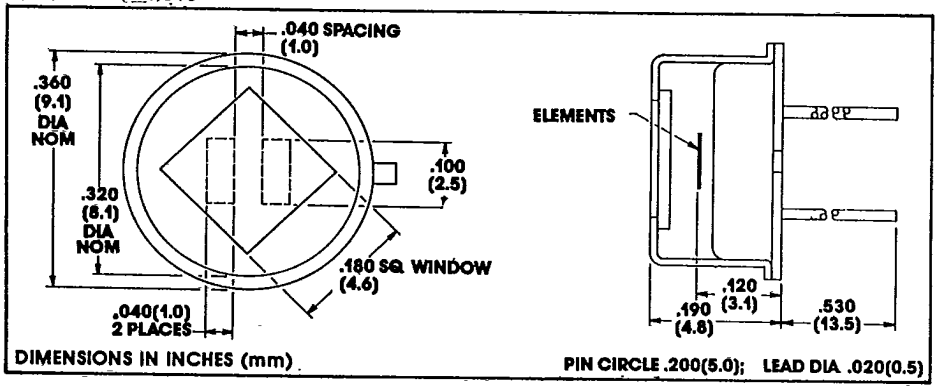


4192/5192

Parallel 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



DIMENSIONS IN INCHES (mm)

PIN CIRCLE .200(5.0); LEAD DIA .020(0.5)

Model 4192 consists of two physically separate lithium tantalate sensing elements and a FET source follower sealed into a standard TO-5 housing with an optical filter.

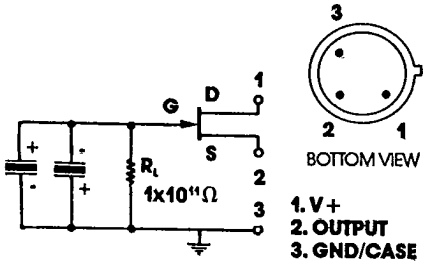
The sensing elements are connected electrically in a parallel opposed dual (POD) configuration for common mode signal cancellation. Signals from radiation falling on both active areas simultaneously will be cancelled, whereas a defined beam passing from one element to the next will produce two pulses: one positive and one negative.

A source resistor is needed to set the drain current and consequently the operating parameters of the JFET. A 47 KΩ or greater value resistor is recommended for connection between output (source) and ground.

Model 5192 is a lower-cost alternative selected to a higher noise tolerance.

Applications

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

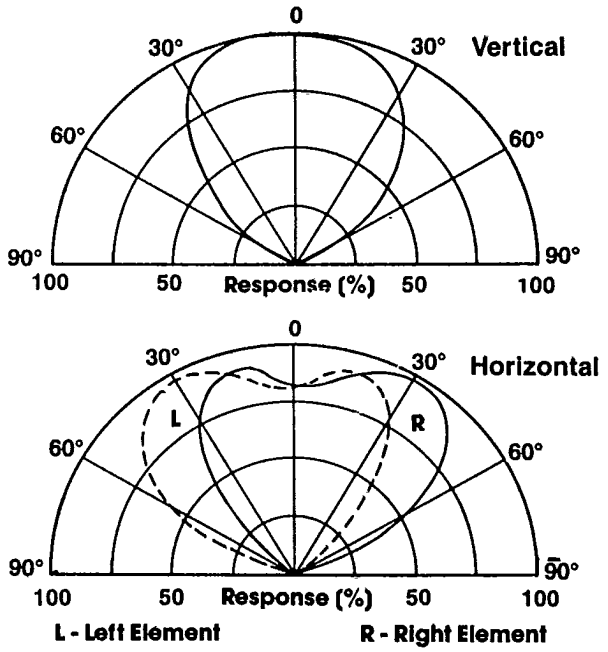


Characteristics		4192	5192	Unit	Test Conditions	ELTECdata Reference
Detector Type		POD	POD	—		
Element Size		1.0 x 2.5	1.0 x 2.5	mm	nominal, each	
Element Spacing		1.0	1.0	mm	nominal	
Responsivity (Each Element)	min typ max	2000 2700 3500	2000 2700 3500	V/W	8-14μm@1Hz	
Common Mode Rejection Ratio	min typ	5:1 15:1	5:1 15:1	—	8-14μm@1Hz	
Noise	typ max	13.5 27.0	20.0 54.0	μV/√Hz	1.0Hz p-p (1 minute)	
NEP	typ max	1.3×10^{-9} 3.4×10^{-9}	1.9×10^{-9} 6.8×10^{-9}	W/√Hz	8-14μm @1Hz, BW 1Hz	100
D*	min typ	0.4×10^{8} 1.1×10^{8}	0.2×10^{8} 0.7×10^{8}	cm√Hz/W	8-14μm @1Hz, BW 1Hz	100
Operating Voltage	min max	3 15	3 15	VDC	V_D to Gnd	104 (4.1.c)
Operating Current Limits[1]	min max	0.1 40	0.1 40	μA	Rs Dependent	104 (4.1.c)
Offset Voltage	min max	0.2 0.8	0.2 0.8	VDC	$R_S = 22K\Omega$	104 Fig. 4
Offset Voltage	min max	0.3 1.2	0.3 1.2	VDC	$R_S = 100K\Omega$	104 Fig. 4
Output Impedance		20	20	KΩ		
Thermal Breakpoint f_T	typ	0.2	0.2	Hz		102
Electrical Breakpoint f_e	typ	0.05	0.05	Hz	$R_L = 1 \times 10^{11}\Omega$	102
Recommended Operating Temp.		-10 + 50	-10 + 50	°C		
Responsivity vs. Temperature	max	+ 0.2	0.2	%/°C	Unity Gain Circuit	104 (3.5)
Incident Power Limit	max	0.2	0.2	W		
Pressure Sensitivity	max	200	200	μV/mbar	Step Response	
Microphony	max	50	50	μV/g	10-1000Hz	104 (3.9)
Package Sealing	max	10^{-8}	10^{-8}	cm^3/sec	Helium	
Storage Temperature		-55 + 125	-55 + 125	°C	ΔT<5°C/minute	

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

[1]Actual current is given by offset voltage and external circuit.

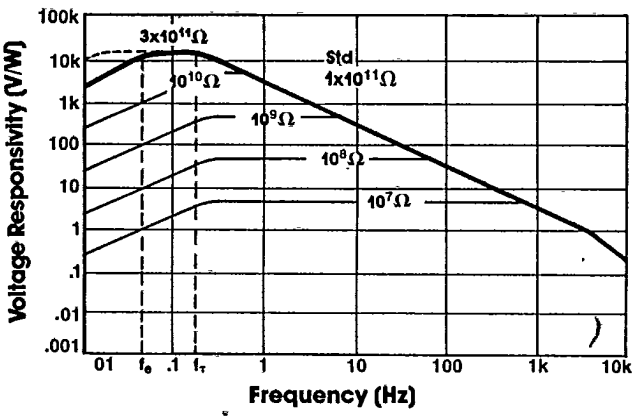
FIELD OF VIEW



For -3 window only. For other windows, 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):

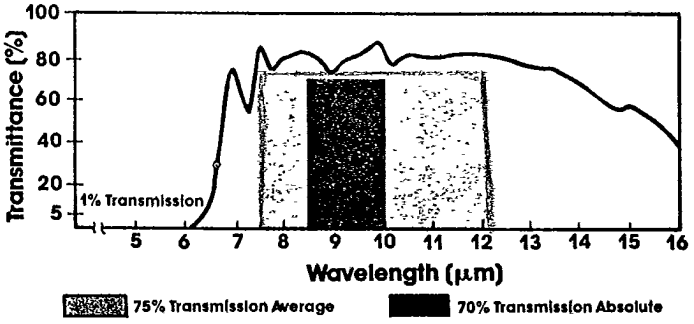
Mounting: Avoid mechanical stresses on case and leads.

Soldering: Use minimum heat and 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°C/min.) to prevent damage.

Transmission Characteristics of -3 Window (HP7)



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

Noise: As a resolution or lower information limit, noise is not established only 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 <1mV.

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 μm depending on window used. For more information, see ELTECdata #101.

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

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