

THERMOPILE DETECTOR

MODEL 2M THERMOPILE DETECTOR

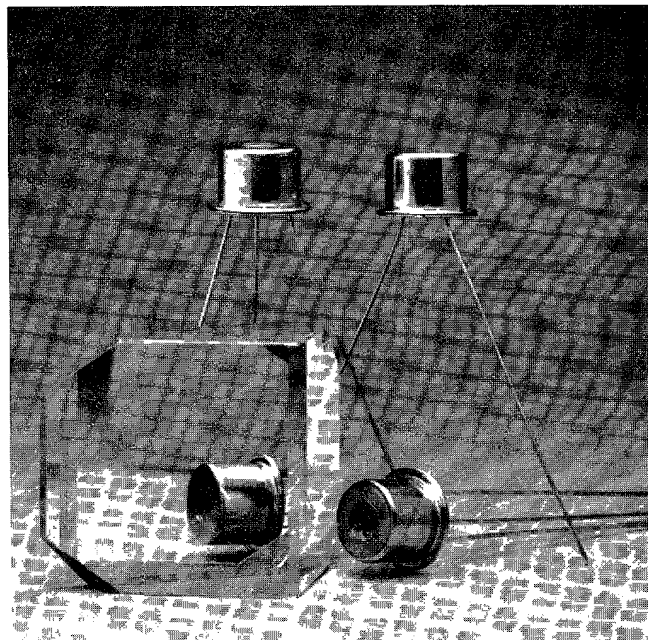
TECHNICAL DESCRIPTION

The Model 2M detector is a miniature multijunction thermopile made of evaporated bismuth and antimony. On the active junction area is deposited an energy absorbing black of either smoke or paint. The element is hermetically sealed in a TO-5 package under a purged atmosphere of Argon or Nitrogen, and then heat treated to insure long term stability. The final package is resistant to both mechanical and temperature shock. The thermopile is a voltage generating device and therefore requires no bias voltage or current for operation. Since it acts as a pure resistance, it generates no $1/f$ noise but only the Johnson noise of its resistance.

The spectral absorption of the deposited blacks are essentially flat from the ultraviolet to the far infrared, and thus the spectral sensitivity of the detector depends on the choice of the window material. This spectral band pass may be limited by selecting window materials or filters to replace or augment the standard KBr window.

FEATURES

- * LOW COST
- * NO COOLING
- * NO $1/f$ NOISE
- * HERMETICALLY SEALED
- * RUGGED
- * HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS: SPECIFICATIONS APPLY AT 25°C WITH KBr WINDOW

Parameter	Conditions	Min.	Typ.	Max.	Symbol	Units	Comments
Resistance		10	13	18	r	$K\Omega$	
Resistance T.C.	0° to 85°C		-0.2			%/°C	Best linear fit (Note 1)
Noise Voltage		12.8	14.6	17.2	V_n	$nV/\sqrt{Hz}$	$V_n^2 = 4kTr\Delta f$
Output Voltage	DC 10Hz	200 17	250 22	300 30	V_s	μV $RMS\mu V$	$H = 325\mu W/cm^2$ $H = 146\mu W/cm^2$
Responsivity	(500K,DC,-) (500K,10,1)	15.4 2.9	19.2 3.8	23.1 5.1	R	V/W	$R = V_s/H_A$ (Note 2)
Responsivity T.C.	0° to 85°C		-0.4			%/°C	Linear (Note 1)
NEP	(500K,DC,-) (500K,10,1)	0.6 2.5	0.8 3.9	1.1 5.9	NEP	$nW/\sqrt{Hz}$	$NEP = V_n H_A / V_s$
D^*	(500K,DC,-) (500K,10,1)	1.8 0.3	2.6 0.5	3.6 0.8	D^*	$10^8 cm\sqrt{Hz}/W$	$D^* = V_s / V_n H \sqrt{A}$
Time Constant	Blackbody		40		τ	mS	Chopped 3dB (Note 1)

NOTE 1: Parameter is not 100% tested, 90% of all units meet these specifications.

2: A is detector area in cm^2 .

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PHYSICAL CHARACTERISTICS

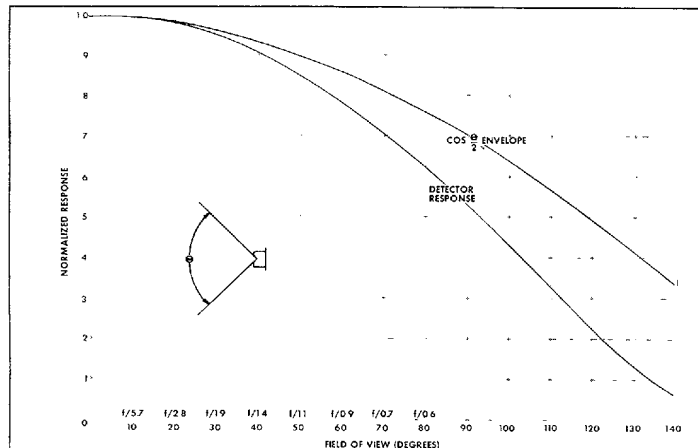
Number of Junction: 48
Sensitive Area: 2 mm X 2 mm
Package: TO-5
Window Material: KBr or to be specified
Encapsulating Gas: Argon or Nitrogen
Field of View: 80°

OPERATING CONDITION

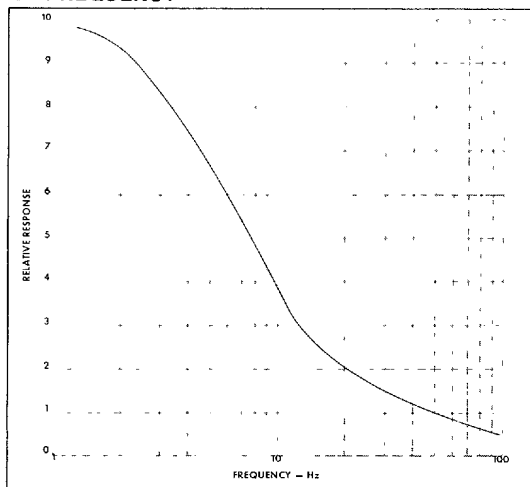
Temperature Range: -65°C to 85°C*
Maximum Incidence: 0.1 Watts/cm²
Spectral Response: Flat from UV to far IR
Signal Output: Linear from 10⁻⁶ to 10⁻¹ Watts/cm²

* Available to 125°C on special order.

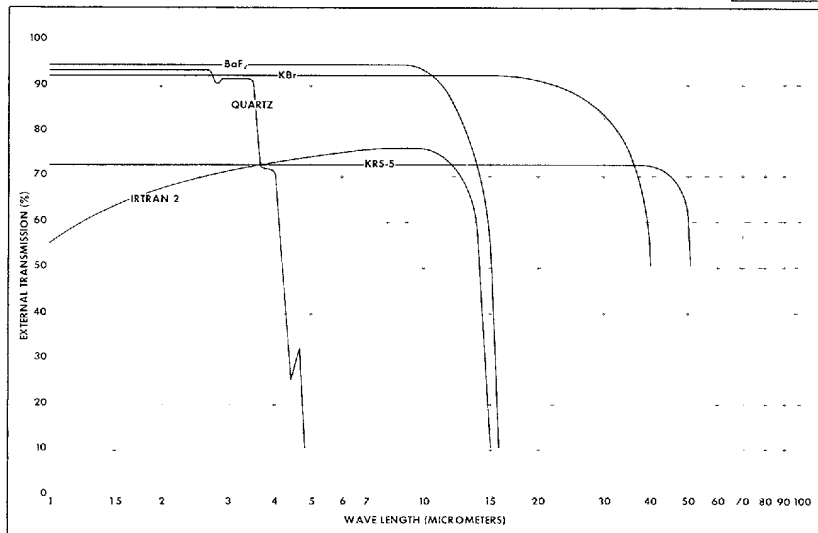
TYPICAL NORMALIZED ANGULAR RESPONSE



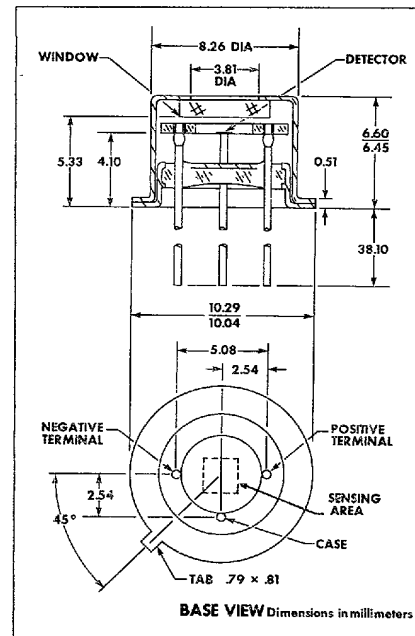
RELATIVE RESPONSE AS A FUNCTION OF FREQUENCY



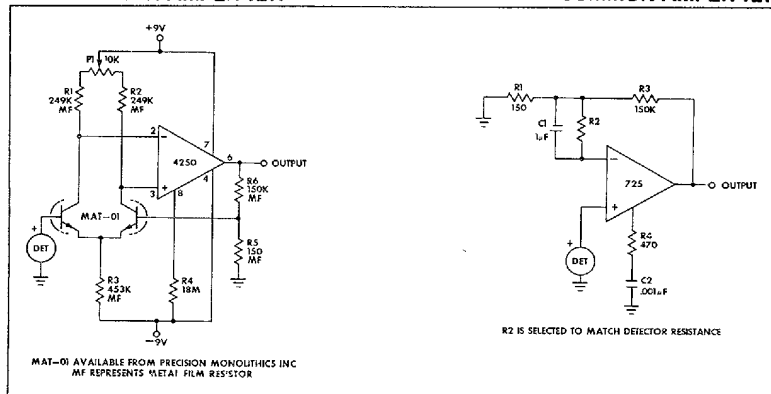
TYPICAL TRANSMISSION OF FIVE WINDOW MATERIALS FOR 1MM THICKNESS



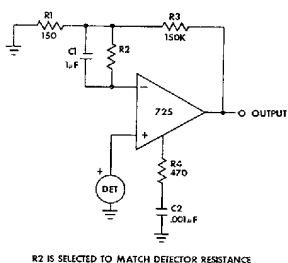
DETECTOR DIMENSIONS



MICRO POWER AMPLIFIER



COMMON AMPLIFIER



R2 IS SELECTED TO MATCH DETECTOR RESISTANCE

MAT-01 AVAILABLE FROM PRECISION MONOLITHICS INC
MF REPRESENTS METAL FILM RESISTOR