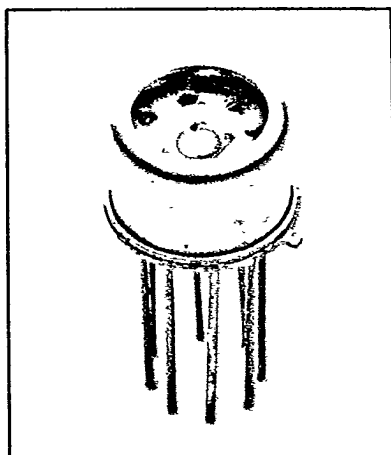




P1-50/P1-60

High Frequency Pyroelectric Detector/FET Preamp

Molectron
 DETECTOR, INCORPORATED

T-65-13

Features

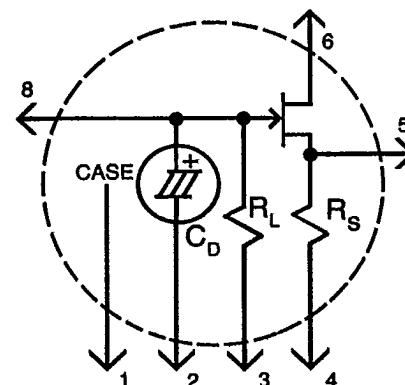
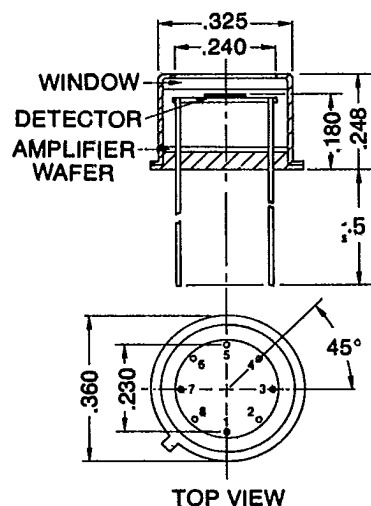
- Rugged LiTaO_3 material
- 610°C Curie temperature
- $0.2\%/^\circ\text{C}$ temperature stability
- Non-hygroscopic
- Broad spectral range .001 to 1000 microns
- Low noise
- 0°C to $+70^\circ\text{C}$ operation
- Optional windows
- Hybrid FET preamplifier
- Broadband to 70 MHz

Applications

- Laser power and energy measurement
- Non-contact temperature measurement
- Security and surveillance systems
- Process control
- X-ray calorimetry
- Gas analyzer instrumentation
- Solar instrumentation

The P1-50 series features a 1, 2, 3, or 5 mm standard detector element with a complete hybrid FET preamplifier stage inside the miniature transistor package with the detector. A 10^8 -ohm resistor plus source resistor are included in the package. Convenient pin connections are available for using the P1-50 in either a source follower or gain configuration as a first stage for either a voltage or current mode amplifier. External parallel load resistors can increase the uniform response bandwidth to frequencies as high as 10 MHz. Operation is from +9VDC with -20dB supply rejection.

The P1-60 series consists of P1-50 series detector/preamplifiers that are specially tested and selected for frequency response capability out to 70 MHz.



Performance Specifications P1-50/P1-60

CHARACTERISTICS (25°C unless otherwise noted)		P1-51		P1-52		P1-53		P1-55		UNIT	CONDITIONS
		Min	Typ Max	Min	Typ Max	Min	Typ Max	Min	Typ Max		
ELEMENT ONLY											
Dia	Active Diameter	1		2		3		5		mm	
R _i	Current Responsivity	.5	1	.25	.5	.25	.5	.13	.25	μA/Watt	λ = 632.8 nm, f ≥ 15 Hz
C _D	Element Capacitance	15		24		54		75		pF	f = 1 kHz
f _T	Thermal 3db Frequency	3.5	6	1.6	3	.8	2	.5	1	Hz	P _{Ave} ≤ 10 mW

ELEMENT AND FET											
R _V	Voltage Responsivity (See Figures 1-4)	50	100	25	50	25	50	13	25	Volts/Watt	λ = 632.8 nm, f = 25 Hz
NEP	Noise Equivalent Power (See Figures 1-4)	2	4	4	8	4	8	10	20	×10 ⁻⁸ Watts/Hz ^{1/2}	λ = 632.8 nm, f = 25 Hz, BW = 1 Hz
D*	Detectivity	2.2	4.5	2.2	4.5	3.3	6.7	2.2	4.5	×10 ⁷ cm Hz ^{1/2} /W	λ = 632.8 nm, f = 25 Hz, BW = 1 Hz
f _H	Flat Frequency Response	P1-50 10M 70M		P1-60 10M 70M		10M 70M		10M 70M		Hz Hz	External Load Resistor
R _L	Internal Load Resistor	1		1		1		1		×10 ⁸ Ohms	
R _O	Output Impedance Source Follower Gain Configuration	5K 50K		5K 50K		5K 50K		5K 50K		Ohms Ohms	
P _{MAX AVG}	Maximum Average Power	50		50		50		50		m Watts	
V _{DD}	Supply Voltage	+9 +15		+9 +15		+9 +15		+9 +15		Volts	

Note: 1. R_i, R_V, NEP and D* are specified at 632.8nm with windowless detector. These parameters improve 30% at 10.6μm.

2. If CC Black Absorbing Coating is specified R_i, R_V, NEP and D* can improve by 20 to 40% at all wavelengths. However, this coating limits their use to frequencies <100 Hz.

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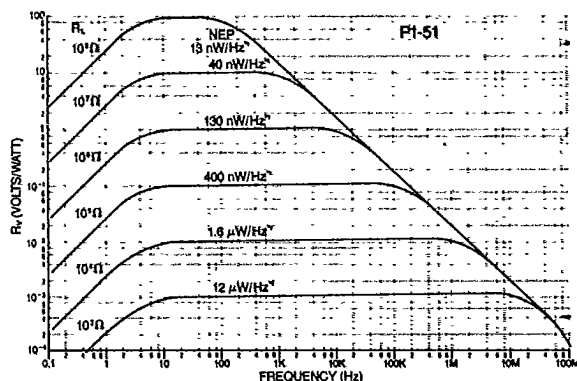


Fig. 1 Plot of typical responsivity R_v versus frequency for P1-51 Pyroelectric Detectors with various external load resistors

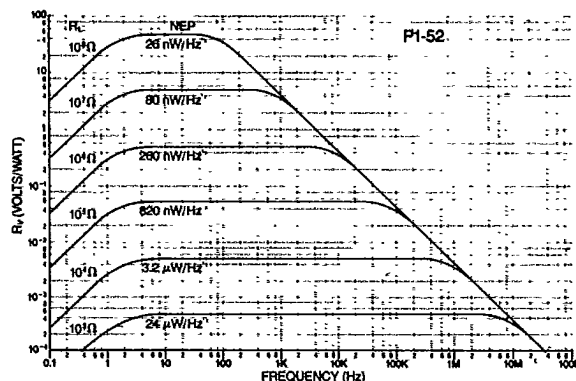


Fig. 2 Plot of typical responsivity R_v versus frequency for P1-52 Pyroelectric Detectors with various external load resistors

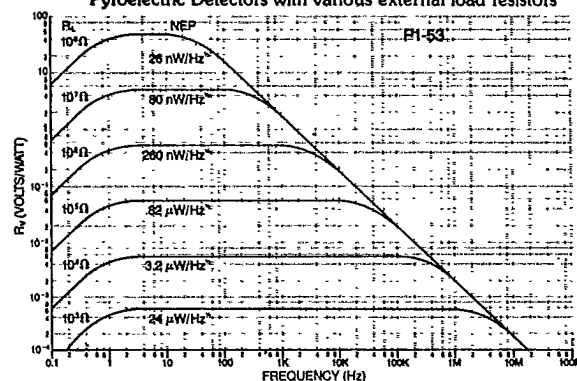


Fig. 3 Plot of typical responsivity R_v versus frequency for P1-53 Pyroelectric Detectors with various external load resistors

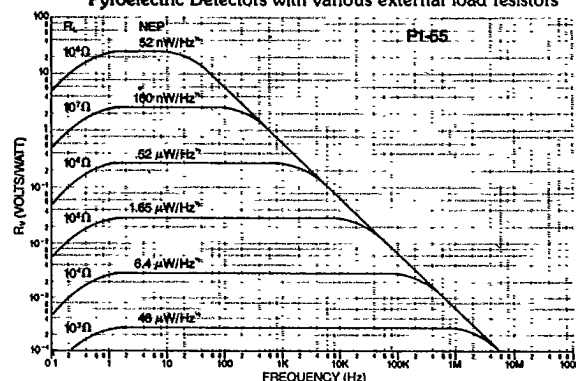


Fig. 4 Plot of typical responsivity R_v versus frequency for P1-54 Pyroelectric Detectors with various external load resistors

Typical Circuit Diagrams

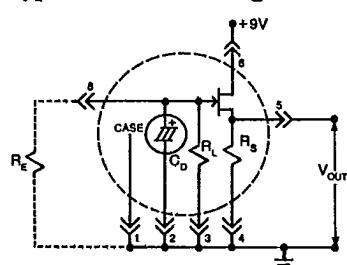


Fig. 5 Source follower circuit

Note: R_E is an optional external resistor used for wider flat bandwidth but correspondingly lower responsivity R_v .

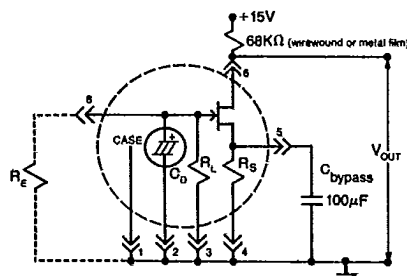


Fig. 6 Voltage gain circuit

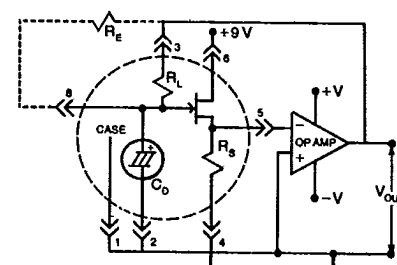


Fig. 7 Current mode circuit

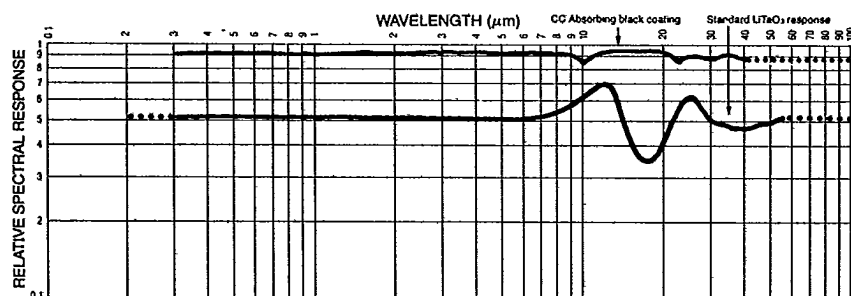


Fig. 8 Relative spectral response vs wavelength

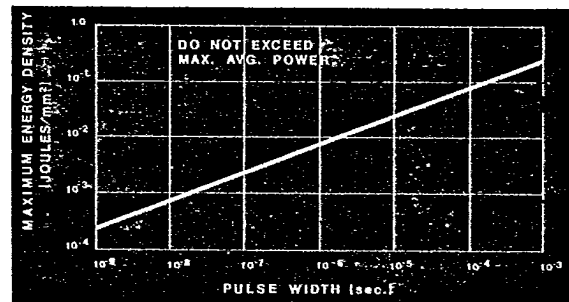


Fig. 9 Energy density damage threshold