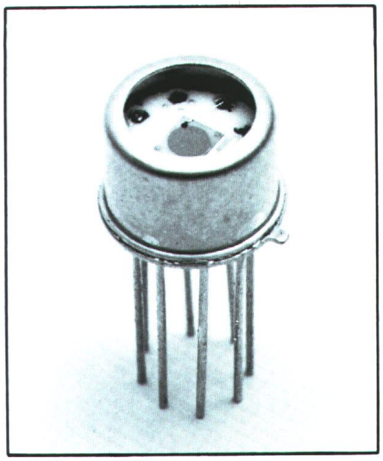
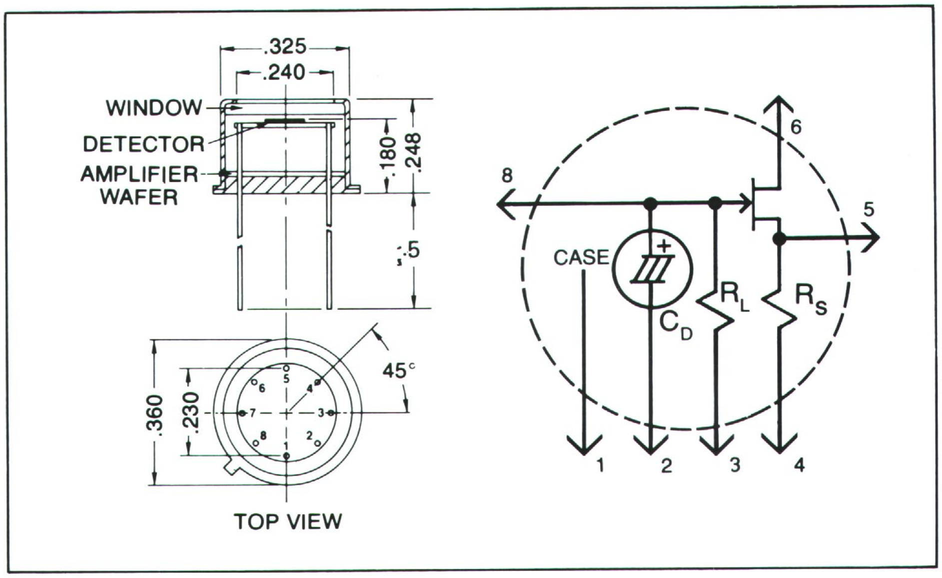


P1-50/P1-60 High Frequency Pyroelectric Detector/FET Preamp

Molectron
DETECTOR, INCORPORATED



Features

- Rugged $LiTaO_3$ material
- 610°C Curie temperature
- 0.2%/°C temperature stability
- Non-hygroscopic
- Broad spectral range .001 to 1000 microns
- Low noise
- 0°C to +70°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 Min	P1-51 Typ	P1-51 Max	P1-52 Min	P1-52 Typ	P1-52 Max	P1-53 Min	P1-53 Typ	P1-53 Max	P1-55 Min	P1-55 Typ	P1-55 Max	UNIT	CONDITIONS
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	$P_{Avg} \leq 10$ 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	$\times 10^{-8}$ Watts/Hz½	λ = 632.8 nm, f = 25 Hz, BW = 1Hz
D*	Detectivity	2.2	4.5		2.2	4.5		3.3	6 7		2.2	4.5		$\times 10^7$ cm Hz½/W	λ = 632.8 nm, f=25 FHz, BW=1Hz
f_H	Flat Frequency Response P1-50	10M			10M			10M			10M			Hz	External Load Resistor
	P1-60	70M			70M			70M			70M			Hz	
R_L	Internal Load Resistor		1			1			1			1		$\times 10^8$ Ohms	
R_O	Output Impedance Source Follower		5K			5K			5K			5K		Ohms	
	Gain Configuration		50K			50K			50K			50K		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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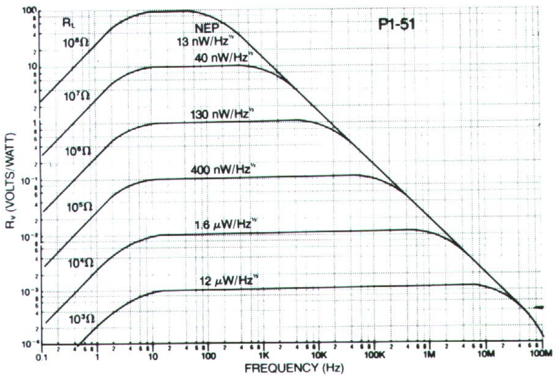

Fig. 1 Plot of typical responsivity R_v versus frequency for P1-51 Pyroelectric Detectors with various external load resistors

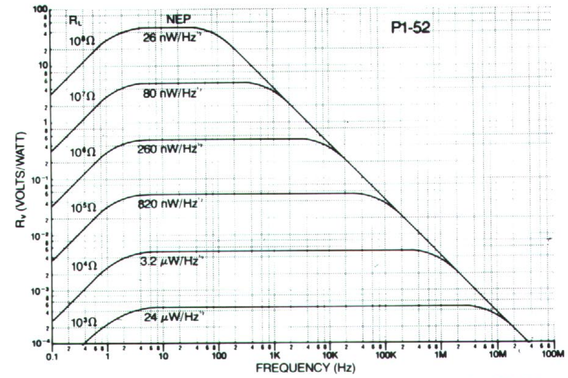

Fig. 2 Plot of typical responsivity R_v versus frequency for P1-52 Pyroelectric Detectors with various external load resistors

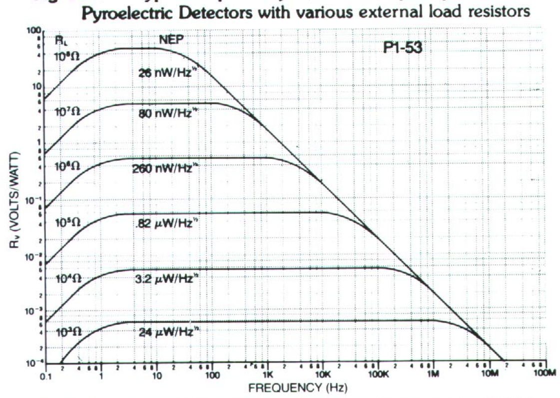

Fig. 3 Plot of typical responsivity R_v versus frequency for P1-53 Pyroelectric Detectors with various external load resistors

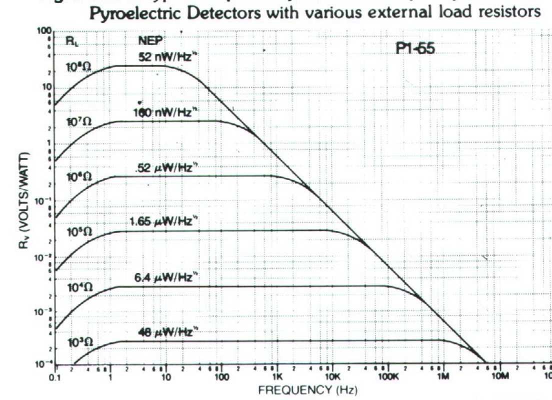

Fig. 4 Plot of typical responsivity R_v versus frequency for P1-54 Pyroelectric Detectors with various external load resistors

Typical Circuit Diagrams

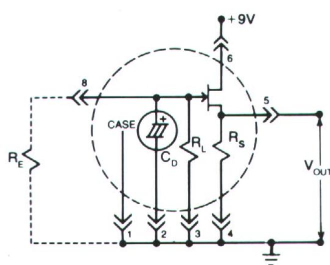

Fig. 5 Source follower circuit

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

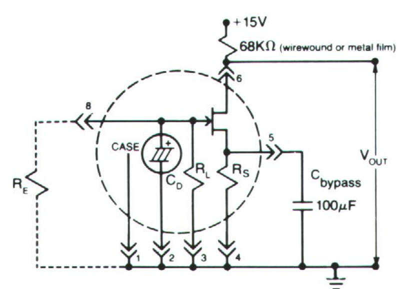

Fig. 6 Voltage gain circuit

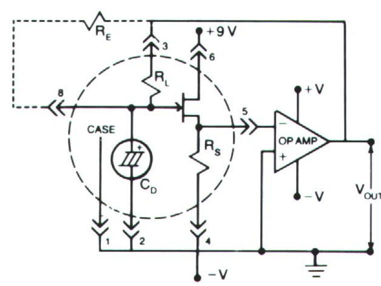

Fig. 7 Current mode circuit

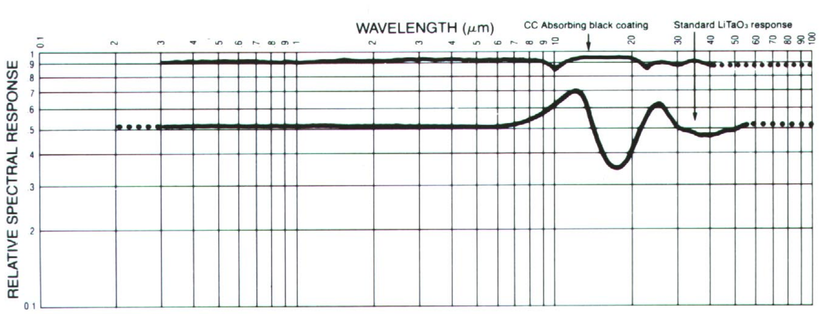

Fig. 8 Relative spectral response vs wavelength

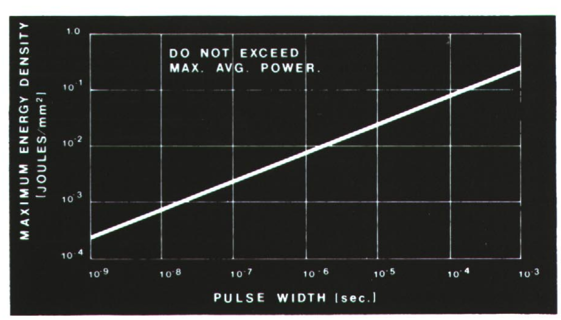

Fig. 9 Energy density damage threshold

2M/7-96/BT