

Model 406M39

Single Element Pyroelectric Detector with Enhanced 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

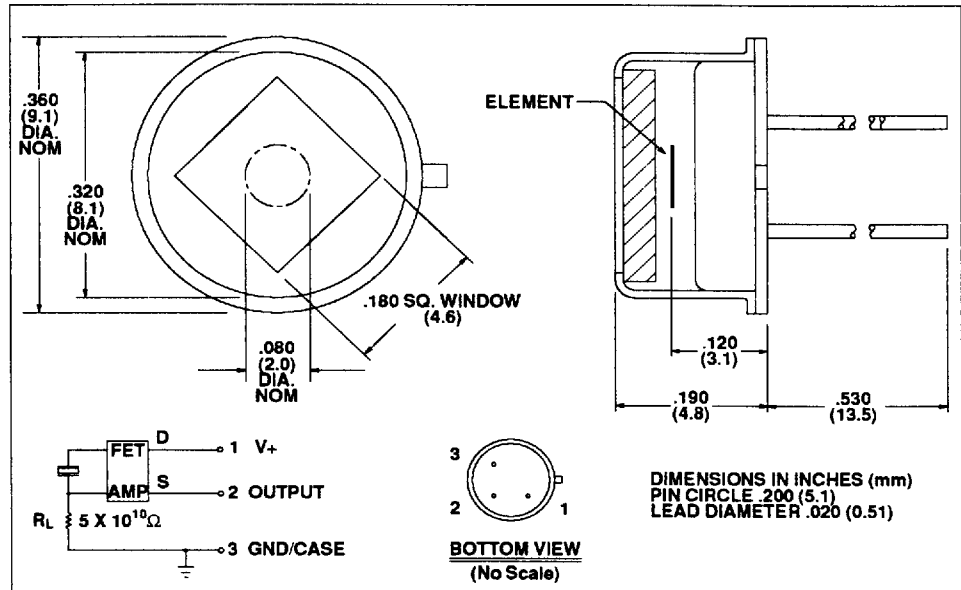
Model 406M39 pyroelectric detector incorporates enhanced voltage mode circuitry to provide higher responsivity than traditional source followers. The amount of gain realized is dependent on the value of the external source resistor chosen. Typically, 100,000 ohms provides excellent performance. For applications where a single element detector is indicated, Eltec recommends evaluation of both the 406M39 and 406 units.

Like the Model 406, the Model 406M39 utilizes a 2 mm diameter lithium tantalate crystal mounted with Eltec's patented loop suspension. As regards interfacing, it is recommended that the signal be taken between the source and ground (or artificial ground) rather than with a "common" source circuit.

Applications

- Motion Sensing
- Lighting Control
- Intrusion Detection
- Industrial Control
- Gas Analysis
- Heating/AC Control
- Pyrometry
- Low-power Laser Detection
- Robotics
- Instrumentation

ELTEC INSTRUMENTS, INC.
PO BOX 9610
DAYTONA BEACH, FLORIDA 32120
TEL (800)874-7780
FAX (904)258-3791



Detector Specifications - - Model 406M39

Detector Type:	Single Element
Element Size:	2mm Diameter
Element Type:	Lithium Tantalate
Optical Bandwidth (Window Dependent):	1.5 to 1000 μm
Responsivity (typ):	3190 V/W
Noise (typ):	3.4 μV
NEP (typ):	$1.09 \times 10^{-9} \text{ W}/\sqrt{\text{Hz}}$
D Star (typ):	$1.72 \times 10^8 \text{ cm}/\sqrt{\text{Hz}/\text{W}}$
Thermal Breakpoint (typ):	0.25 Hz
Electrical Breakpoint (typ):	0.11 Hz ($R_L = 5.0 \times 10^{10} \Omega$)
Recommended Operating Temperature:	-40 to +70 $^{\circ}\text{C}$
Recommended Operating Voltage (min & max):	5 to 10 VDC
Offset Voltage (min & max):	0.8 to 3.0 V, $R_S = 100\text{K} \Omega$
Current Draw (min & max):	8.0 to 30 μA , $R_S = 100\text{K} \Omega$
Storage Temperature:	-55 to +125 $^{\circ}\text{C}$
Responsivity vs. Temperature (max):	+0.2%/ $^{\circ}\text{C}$
Incident Power Limit:	0.2W
Pressure Sensitivity (max):	200 $\mu\text{V}/\text{mbar}$ (Step Response)
Output Polarity:	Positive for Positive Change
Microphony (max):	50 $\mu\text{V}/\text{g}$
Recommended Source Resistance:	100K Ω to 1M Ω
Package Sealing (max):	10-8 cm^3/sec (helium)
Output Protection:	Do not exceed a maximum drain current of 1 mA

Characteristics at: 7.6 to 14.6 μm , 10Hz, 1Hz BW, $R_T = 25^{\circ}\text{C}$, $R_S = 100\text{K} \Omega$

Performance data from production units of the Eltec Model 406M39-3 pyroelectric detectors at 1, 10, 100, and 1,000 Hz modulation.

UNIT	SENSITIVITY (V)	NOISE (V)	RESPONSIVITY (V/W)	NEP (W/√Hz)	D* (cm√Hz/W)	NOTE
1	8.80E-01	4.2E-06	1.60E+04	8.28E-10	2.14E+08	I
2	8.40E-01	1.2E-06	1.53E+04	2.48E-10	7.15E+08	I
3	1.40E+00	2.6E-06	2.55E+04	3.22E-10	5.50E+08	I
4	1.80E+00	3.6E-06	3.28E+04	3.47E-10	5.11E+08	I
5	7.60E-01	4.2E-06	1.39E+04	9.59E-10	1.85E+08	I
6	5.80E-01	3.4E-06	1.06E+04	1.02E-09	1.74E+08	I
7	7.20E-01	3.0E-06	1.31E+04	7.23E-10	2.45E+08	I
8	9.20E-01	4.2E-06	1.68E+04	7.92E-10	2.24E+08	I
9	9.60E-01	2.8E-06	1.75E+04	5.06E-10	3.50E+08	I
10	7.60E-01	4.4E-06	1.39E+04	1.00E-09	1.76E+08	I
1	2.20E-01	3.8E-06	4.01E+03	9.48E-10	1.87E+08	II
2	1.90E-01	3.5E-06	3.46E+03	1.01E-09	1.75E+08	II
3	2.20E-01	3.2E-06	4.01E+03	7.98E-10	2.22E+08	II
4	2.30E-01	3.2E-06	4.19E+03	7.63E-10	2.32E+08	II
5	1.60E-01	3.6E-06	2.92E+03	1.23E-09	1.44E+08	II
6	1.30E-01	3.6E-06	2.37E+03	1.52E-09	1.17E+08	II
7	1.50E-01	3.6E-06	2.73E+03	1.32E-09	1.35E+08	II
8	1.90E-01	2.6E-06	3.46E+03	7.51E-10	2.36E+08	II
9	2.10E-01	3.0E-06	3.83E+03	7.84E-10	2.26E+08	II
10	1.70E-01	3.2E-06	3.10E+03	1.03E-09	1.72E+08	II
1	2.60E-02	7.0E-07	4.74E+02	1.48E-09	1.20E+08	III
2	2.10E-02	7.2E-07	3.83E+02	1.88E-09	9.42E+07	III
3	2.70E-02	1.5E-06	4.92E+02	3.05E-09	5.81E+07	III
4	2.70E-02	6.8E-07	4.92E+02	1.38E-09	1.28E+08	III
5	1.90E-02	1.3E-06	3.46E+02	3.75E-09	4.72E+07	III
6	1.50E-02	1.2E-06	2.73E+02	4.39E-09	4.04E+07	III
7	1.70E-02	6.0E-07	3.10E+02	1.94E-09	9.15E+07	III
8	2.50E-02	9.0E-07	4.56E+02	1.98E-09	8.97E+07	III
9	2.50E-02	8.0E-07	4.56E+02	1.76E-09	1.01E+08	III
10	2.10E-02	7.0E-07	3.83E+02	1.83E-09	9.69E+07	III
1	2.60E-03	3.2E-07	5.99E+01	5.34E-09	3.32E+07	IV
2	2.60E-03	3.4E-07	5.99E+01	5.68E-09	3.12E+07	IV
3	3.00E-03	1.2E-06	6.91E+01	1.74E-08	1.02E+07	IV
4	3.20E-03	1.7E-07	7.37E+01	2.31E-09	7.68E+07	IV
5	2.20E-03	1.1E-06	5.07E+01	2.17E-08	8.16E+06	IV
6	1.80E-03	7.2E-07	4.15E+01	1.74E-08	1.02E+07	IV
7	2.00E-03	1.6E-07	4.61E+01	3.47E-09	5.10E+07	IV
8	2.40E-03	4.8E-07	5.53E+01	8.68E-09	2.04E+07	IV
9	2.40E-03	2.8E-07	5.53E+01	5.07E-09	3.50E+07	IV
10	2.20E-03	1.6E-07	5.07E+01	3.16E-09	5.61E+07	IV

NOTES: I) 7.6 m to 14.6 m, 500K, 1 Hz, 1Hz BW, Measured with a 0.1 Hz BW and normalized to 1 Hz.
 II) 7.6 m to 14.6 m, 500K, 10 Hz, 1Hz BW
 III) 7.6 m to 14.6 m, 500K, 100 Hz, 1Hz BW
 IV) 7.6 m to 14.6 m, 500K, 1000 Hz, 1Hz BW
 Supply Voltage = + 8 V DC at 25C, 100,000 Ohms Source Resistor