Model 404VM

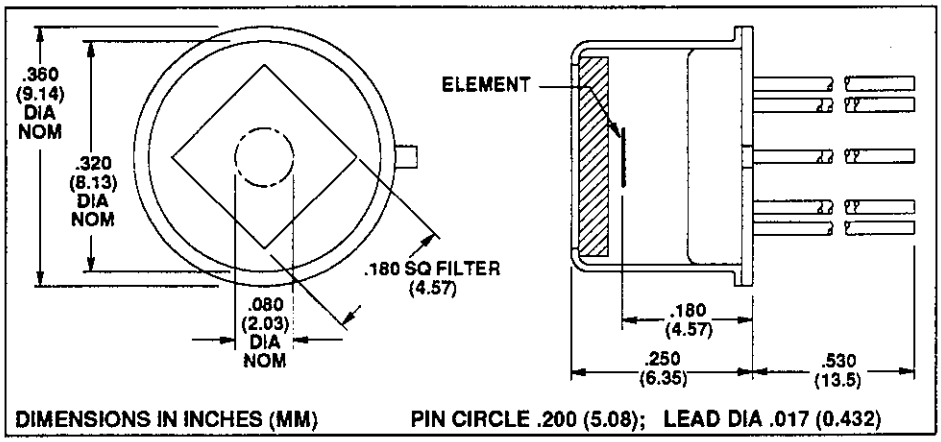
High Performance Pyroelectric IR Detector with Source Follower

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

Model 404VM consists of a single lithium tantalate sensing element and voltage mode electronic circuit sealed into a modified TO-99 transistor housing with an optical filter (optional).

The voltage mode circuit is configured as a JFET source follower with a 6.2 KΩ source resistor to provide a voltage output. Other source resistors can be specified or the unit can be provided without a source resistor.

The Model 404VM is identical to the voltage mode operation of the Model 404 and has the highest possible performance over the full frequency range from .1 to 1000Hz.



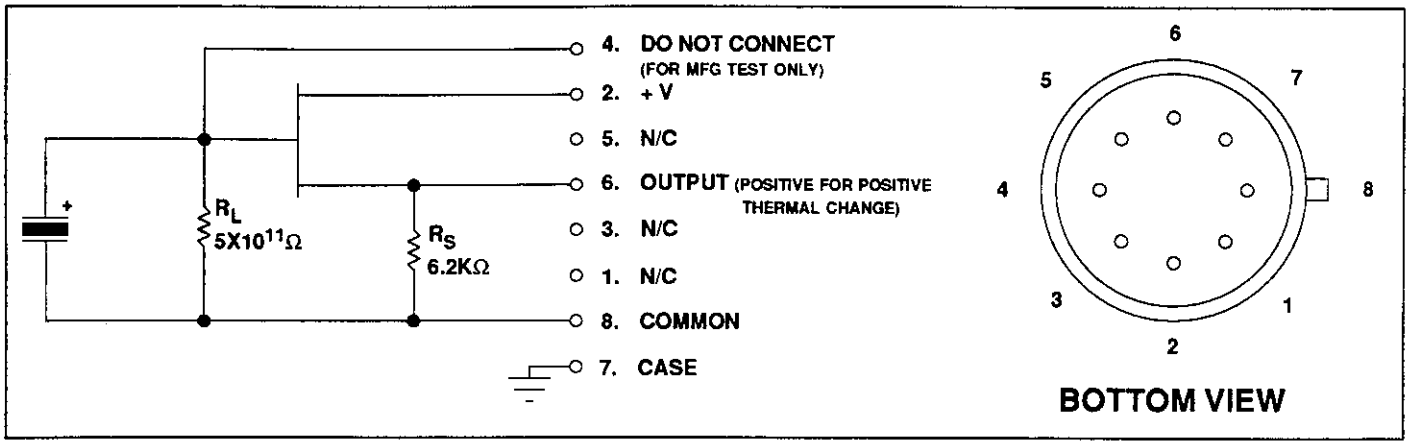
DIMENSIONS IN INCHES (MM) PIN CIRCLE .200 (5.08); LEAD DIA .017 (0.432)

Characteristics		404Vm	Unit	Test Conditions	ELTECdata Reference
Detector Type:		Single			
Element Size:		2.03	mm,DIA	Nominal	
Optical Bandwidth:		0.0001 to 1000	µm	Without Optical Filter	101
Responsivity	(Typ):	3600	V/W	8-14µm,1Hz	
Responsivity	(Typ):	50	V/W	8-14µm,100Hz	
NEP	(Typ):	$5.2X10^{-10}$	W/√Hz	8 - 14µm 1Hz, BW 1Hz	100
NEP	(Typ):	$7.6X10^{-9}$	W/√Hz	8 - 14µm 1KHz, BW 1Hz	100
D*	(Typ):	$3.4X10^{8}$	cm√Hz/W	8 - 14µm 1Hz, BW 1 Hz	100
D*	(Typ):	$2.3X10^{7}$	cm√Hz/W	8 - 14µm 1KHz, BW 1 Hz	100
Operating Voltage	(Min):	5	VDC		104
	(Max):	15			(4.1.c)
Operating Current	(Max):	0.19	mA	R_S = 6.2KΩ	104 (4.1.c)
Offset Voltage	(Min):	0.2	VDC	R_S = 6.2KΩ	104
	(Max):	1.2			Fig.4
Output Impedance:		< 6.2	KΩ		
Thermal Breakpoint f_T	(Typ):	0.25	Hz		102
Electrical Breakpoint f_e	(Typ):	0.011	Hz	R_L= $5X10^{11}$Ω	102
Recommended Operating Temperature:		-10 +40	°C	ΔT<1 C°/minute	
Storage Temperature (Max):		-55 +125	°C	ΔT<50 C°/minute	

Characteristics at 25°C, V_S = 10 VDC.
Data established on a sample basis and is believed to be representative.

Applications

- **Pyrometery**
- **FT Spectroscopy**
- **Gas Analysis**
- **Material Transmission/ Reflectance Studies**
- **UV Curing Instrumentation**
- **Total Energy Plasma Studies**



For best results, the following precautions and recommendations should be observed. (See ELTECdata # 101):

Field of View: Approximately 110° (50% powerpoints)

Mounting: Avoid mechanical stresses on case and leads.

Soldering: Use minimum heat and a heat sink between case and leads. Leave minimum lead length of .250 inch (6.35mm). 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 (<50C°/min.) to prevent damage.

Optical Filter: This Model can be used with any standard ELTEC detector filter or used without a filter. For more information. please refer to ELTECdata # 101.

Turn-on Time: The high value load resistor and excellent low frequency response of this detector may require a warm-up of approximately 3 minutes.

Calculations (for operation with only crystal and load resistor): When calculating response from basic formula, (see ELTECdata # 100) use crystal thickness os 0.005 cm (0.002 inch) and 30 pF capacitance.

Noise: As a resolution or lower information limit, noise is established not only by 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 capacitors (tantalum and aluminum electrolytic)
- Mechanical contacts and weak solder joints
- Vibration excited microphonics
- Outside thermal influences on the detector other than the desired infrared input, i.e. drafts.

All of these noise sources should be considered carefully when the information signal is <1mV.

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

Optical Design: Use of a detector with a filter in an optical system may require consideration of the image displacement toward the filter. This displacement (s) caused by the insertion of a planoparallel plate (filter thickness = t; refractive index = N) is given by $s = (t / N)(N - 1)$.