

Model 4202

Quad Pyroelectric Laser Detector for UV/Vis/IR



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 4202 is a 4 element laser detector with the elements in a quadrant configuration. Lithium tantalate is the pyroelectric sensing material. The elements are heat-sunk to the TO-5 transistor header for rapid heat dissipation. The housing contains an optical filter to limit optical bandwidth. See ELTECdata #101 for filter selection guide.

The Model 4202 is recommended for beam alignment, monitoring beam wander, or for quadrant diagnostics. If each channel's output is terminated in a resistance and the optical radiation input is chopped or pulsed faster than 5 Hz, the voltage output will be approximately

$$R_V = R_i \times Z_{\text{eff}}$$

$$(V/W = A/W \times \Omega)$$

where:

- R_V = Voltage Responsivity (V/W)
- R_i = Current Responsivity (A/W)
- Z_{eff} = Lumped Impedance (Ω)

$$Z_{\text{eff}} = \frac{R_L}{\sqrt{1 + (R_L C_T \omega)^2}}$$

where:

- R_L = Load Resistance
- C_T = Total Capacitance ($C_{\text{det.}} + C_{\text{stray}}$)
- ω = Angular Frequency ($2\pi f$)

and:

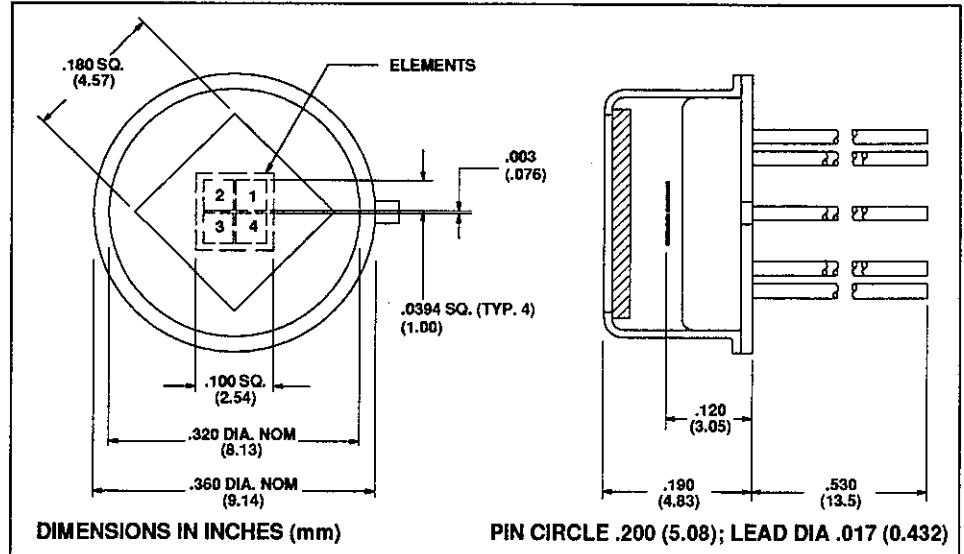
$$\tau_t \gg \tau_e$$

where:

- τ_t = Thermal Time Constant
- τ_e = Electrical Time Constant

While the choice of R directly influences the magnitude of the signal, it also determines the ability to follow a pulse. When a pulse is within one percent of the RC time constant, the decay is less than one percent (as per the relation, $\exp(-t/RC)$ where t is the pulse width).

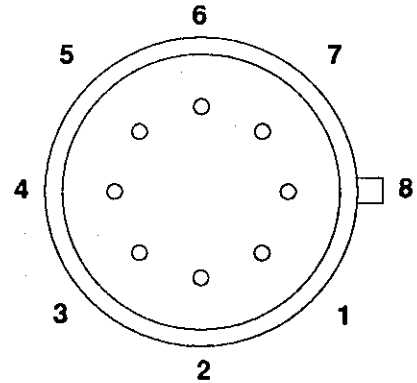
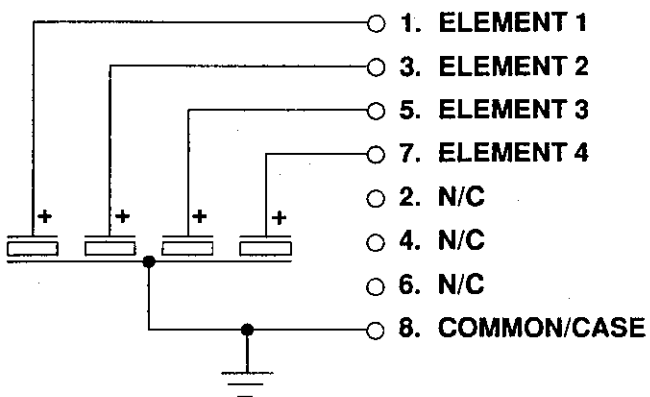
For information on power limits of lithium tantalate laser detectors, see ELTECdata #109.



Characteristics	4202	Unit	Test Conditions	ELTECdata Reference
Detector Type	Quad	—		
Element Size	1.0 x 1.0	mm	Nominal	
Element Spacing	0.076	mm		
Element Resistance	>5x10 ¹²	Ω		
Optical Bandwidth	.0001 to 1000	μm	Without Filter	101
Current Responsivity (typ)	0.48	$\mu\text{A/W}$	10Hz (each element) (8.3 to 14.2 μm)	
Response Uniformity (typ)	16	%		
Capacitance (min)	7	pF	Each	
(max)	12	pF	Element	
Thermal Breakpoint (typ)	5	Hz		102
Electrical Time Constant τ_e (typ)	475	pSec	$R_L = 50\Omega$	102
Recommended Operating Temperature	-55 to +125	$^{\circ}\text{C}$		
Curie Temperature (max)	610	$^{\circ}\text{C}$		
Storage Temperature	-55 to +125	$^{\circ}\text{C}$		
Incident Power Limit	5	W/cm^2		
Output Polarity	+ for + Change			

Characteristics at 25°C with -25 filter, unless otherwise noted. Data established on a sample basis and is believed to be representative.

Model 4202 Pin Connections



BOTTOM VIEW (NO SCALE)

SAMPLE CIRCUITS (Typical for each channel)

