

T-41-41

- Room Temperature Operation
- Flat Spectral Response

- High Responsivity
- Preamplifiers Available

Type LTO-B and Type LTO-T pyroelectric detectors are fabricated from high quality, single crystal lithium tantalate material (LiTaO_3). Lithium tantalate is a very stable, non-hygroscopic ferroelectric material with an exceptionally high Curie temperature. The stability of LiTaO_3 in air allows the detector to be packaged without a window for extended spectral response. The high Curie temperature (in excess of 600°C) eliminates the need for repoling the detector in normal service use.

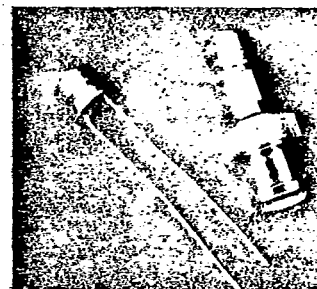
For many infrared system applications, especially where detector cooling is not appropriate, the combination of room temperature operation and the BNC package configuration offers unique advantages. For laser applications with high signal levels, the BNC package can be coupled directly to an oscilloscope; or, a standard

coaxial cable extension may be used. For applications involving low signal levels, the BNC package interfaces directly with the matching low-noise preamplifiers, OPF-L.

The equivalent electrical circuit of the LiTaO_3 pyroelectric detector consists of a current generator in parallel with the detector capacitance. The signal current generated is proportional to the rate of change of the detector temperature induced by the incident radiation. Tradeoffs between voltage responsivity and speed of response can be made by selecting different high impedance or low impedance terminations for the detector.

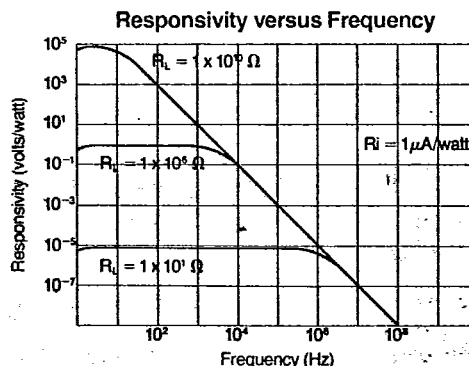
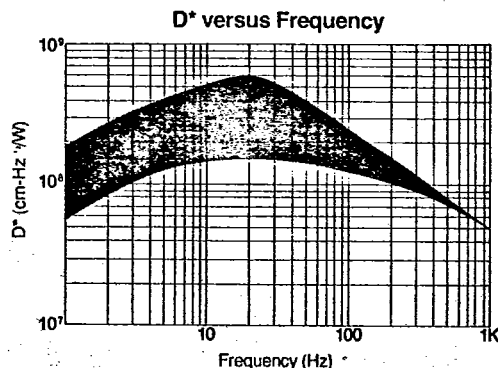
Applications of these devices include intrusion alarms, radiometry, temperature measurement, pollution detection and spectroscopy.

LiTaO_3 Pyroelectric Infrared Detectors



Typical Performance Specifications

Current Responsivity:	1 to 2 microamps/watt
Spectral Response:	Flat from 2.5 to beyond 14 microns
Detector Capacitance:	20 pf Nominal
$D^*(10.6\mu, 10\text{ Hz}, 1\text{ Hz})$:	$1 \times 10^8 \text{ cmHz}^{1/2}/\text{watt}$
Power Handling Capacity:	10 watts/cm ² (maximum)
Operating Temperature:	-55°C to 100°C
Response Time (short circuit mode)	150 nanoseconds
Package	BNC or TO-5



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LiTaO₃ Pyroelectric Infrared Detectors**Model OPF-L
Preamplifier**

Model OPF-L preamplifier is designed for use with pyroelectric detectors. Operating in the current mode, this operational amplifier with FET-input stage can be optimized for maximum sensitivity, for maximum bandwidth, or for intermediate gain-bandwidth values. Unless otherwise specified, Model OPF-L preamplifier is supplied with the internal feedback resistor, R_{FB} , selected for optimum sensitivity. For LiTaO₃ detectors, the standard roll-off frequency (-3db) is 15 Hz ($R_{FB} = 5 \times 10^{11} \Omega$). Alternate values of R_{FB} are available to extend the frequency response at the expense of detectivity.

Specifications

Power Requirements:	± 10 to 15 volts
Case Dimensions:	1 in. x 1 in. x 1.5 in. (excluding connectors)
Connectors:	Standard BNC, input and output. Solder lugs for supply voltage.
Output Levels:	50,000 v/W $R_{FB} = 5 \times 10^{11} \Omega$

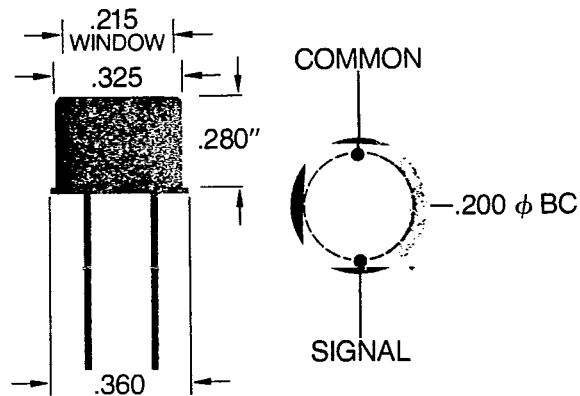
Related Products

A variety of pyroelectric products is offered by NERC. These include integral JFET/resistor packages with single elements of various sizes or dual elements, quadrant detectors for position sensing, high volume low cost units, custom configurations, space flight qualified packages and PVF₂ detectors.

A complete line of Mercury Cadmium Telluride detectors is also available. These products range from single element photoconductive devices to two dimensional photovoltaic mosaics. Thermoelectric and cryogenic cooling options are available.

New England Research Center is committed to delivering high quality products to its customers.

If your detector needs are not reflected on any of our data sheets please call or write us with your requirements.

**TO-5 Package****Product Listing**

Model Number	Description
LTO-1.25-T	LITHIUM TANTALATE, LiTaO ₃ Active Area 1.25 mm (0.050 inch) diameter TO-5 Package
LTO-1.25-B	Active Area 1.25mm (0.050 inch) diameter BNC Package
LTO-1.25-BT	As LTO-1.25-B but mounted for high speed laser applications
LTO-1.25-TT	As LTO-1.25-T but mounted for high speed laser applications
LTO-2.00-B	LITHIUM TANTALATE, LiTaO ₃ Active Area 2.00mm (0.080 inch) diameter BNC Package
LTO-2.00-T	LITHIUM TANTALATE, LiTaO ₃ Active Area 2.00mm (0.080 inch) diameter TO-5 Package
LTO-2.00-BT	As LTO-2.00-B but mounted for high speed laser applications
LTO-2.00-TT	As LTO-2.00-T but mounted for high speed laser applications
LTO-5.00-Q	Quadrant detector 5mm total diameter, .002 inch Space TO-8 package
OPF-L	Preamplifier for use with all LiTaO ₃ listed above $R_{FB} = 5 \times 10^{11}$ Ohms BNC Connector



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