

**OT-301SL
SINGLE AXIS
POSITION SENSING AMPLIFIER
USERS MANUAL**

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OT-301SL Amplifier for Single Axis Position Sensing Detectors

1.0 Introduction

The OT-301SL is a printed circuit board amplifier designed for direct integration into users instrumentation. It is optimized for Single Axis Position Sensing Detectors (PSD's) with selectable bias voltages and three switch selectable gain ranges of 1X, 10X and 100X. The PSD is used to accurately measure the position of a small beam of light incident on the detector surface. See the ON-TRAK Position Sensing Detector and Theory of Position Sensing Detector data sheets.

The Single Axis PSD devices have either two anode connections with a common cathode or two cathode connections with a common anode. The ON-TRAK single axis PSD's are anode connections with a common cathode. The beam's position is calculated from the ratios of these signals. The OT-301SL has two transimpedance amplifiers designed to accurately amplify the PSD two anode signal currents. These amplifiers have excellent DC and AC characteristics.

$$X \text{ Position} = ((X1 - X2) / (X1 + X2)) \times L/2$$

where X is the coordinate of the centroid of the beam spot on the PSD surface (measured from the detector center); and L is the length of the detector's active area in mm (e.g. 2.5mm, 5mm, 10mm, 20mm 30mm).

The OT-301SL contains all the circuit elements to add, subtract and divide the detector signals very accurately. Precision op amps and precision resistor networks provide the addition and subtraction operations and optimized analog dividers provide the final ratio.

The analog divider provides the highest linearity available (0.25%) over a very wide signal range. The final stages provide +/- 10% adjustment in the X outputs and also serve as low impedance output buffers. A sum signal is also provided which equals the total detector signal and is proportional to the incident beam wattage.

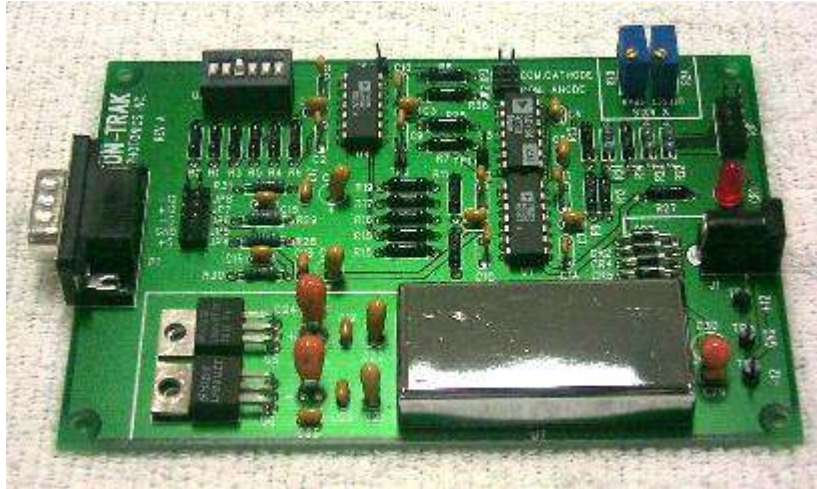
The bias voltage is applied to the detector's common anodes or common cathodes to improve frequency response and signal collection at high irradiance levels. The anode or cathode bias can be set at 0V, +/-5V or +/- 12V. A positive voltage is applied to the common cathode and negative voltage to the common anode. Typically, 12V is used for high wattage laser beams (1mW).

2.0 Specifications

Detector Type	-----Single Axis Position Sensing Detectors
	- Anode outputs (Common Cathode)
	- Cathode outputs (Common Anode)
	- Bi-Cell Detectors
Input Sensitivity	-----10 ⁻³ A/V, 10 ⁻⁴ A/V, 10 ⁻⁵ A/V
X Output Signals	-----0V +/- 10V
Sum Output Signal	-----0-10V Max.
X CAL (Span)	-----+/- 10% Full Scale (+/- 1V)
X Zero Offset	-----+/- 10% Full Scale (+/- 1V)
Bias Voltage	-----0V, +/- 5V or +/- 12V
Linearity	-----+/- 1%
Range to Range Accuracy	-----+/- 1%
Frequency Response	-----16 kHz 10-3 A/V range
	16 kHz 10-4 A/V range
	1.6 kHz 10-5 A/V range
Power	-----+12VDC 300mA AC Adapter
Size	-----3.5" x 5.0"
Input Connector	-----Sub DB9
Output Connector	-----10 Pin Header

3.0 Installation

Power to the OT-301SL can be supplied three different ways depending on the users system requirement.



- a) The OT-301SL has a power jack installed on the board for use with an external +12VDC 300mA AC wall adapter.
- b) The OT301SL output connector can supply the +12V and –12V power for the board. The output connector is a 10 pin (JP1) header.

Pin 7 -----+12VDC
Pin 8 -----GND
Pin 9 -----12VDC

- c) The OT301DL has three test points to apply power.

TP5 ----- GND
TP4 ----- +12VDC
TP6 ----- -12VDC

The OT301SL is supplied with a detector cable that has a Sub DB9 connector at both ends for easy installation to the ON-TRAK PSM head assemblies.

CAUTION: Use normal care in handling and avoid electrostatic discharge to the integrated circuits by proper grounding procedures.

4.0 Operation

- 1.) Select minimum gain by setting the DIP switches on U2 to

ON = 1, 4 OFF = All others

- 2) Select 0V, +/-5V or +/-12V bias using the jumpers JP4-8 located near the DB9 connector. JP4 = +5V, JP5 = 0V, JP6 = -5V, JP7 = +12V, JP8 = -12V

- 3) Connect the ON-TRAK position-sensing module (PSM) directly to the input DB9 connector using the cable supplied. If the PSM module was not purchased, connect the position sensing detector to the input DB9 connector using the wiring connection in Table 1 Input Cable chart.

- 4) Plug in the AC adapter (+12VDC 300mA).

- 5) Illuminate the detector with the light source in use.

- 6) Measure the SUM output at Pin #3 of the output cable (connector JP1). The sum should be approximately 5-9 V for optimum performance. The maximum sum output voltage is 10V. If the sum output is too low select a higher gain by setting the DIP switch (U2) as shown in Table 3.

- 7) Position output is measured from the 10-pin header JP1. The X-axis is Pin #1. The X output has a 0 to +/- 11V maximum swing. Zero volts is the detector center.

- 8) The output voltage for X can be adjusted by +/- 10% F.S. (+/- 1V)

R20 ----- X span adjust

- 9) The ZERO Offset feature allows the user to set the PSD center to some point arbitrary to the electrical center of the detector.

R24 -----X Zero

5.0 Connections

Table 1
Input Cable (DB9)

Pin # Function

1	X1 PSD Anode
2	X2 PSD Anode
3	N/C
4	N/C
5	GND
6	N/C
7	N/C
8	PSD BIAS
9	GND

Table 2
Output Cable (10 PIN)

Pin # Function

1)	X Axis Output
2)	GND
3)	SUM
4)	GND
5)	N/C
6)	GND
7)	+12V
8)	GND
9)	-12V
10)	GND

Table 3
Amplifier Gain
6 Position DIP Switch Gain

ON = 1,4	10-3 A/V
ON = 2,5	10-4 A/V
ON = 3,6	10-5 A/V

6.0 Warranty

ON-TRAK Photonics, Inc. warrants its amplifiers to be free of defects in material and workmanship for a period of one (1) year from date of shipment. This warranty extends only to the original owner of the product and is limited to repair or replacement of any parts which are defective in design, workmanship or material used in the manufacture, provided such amplifier, in the judgement of ON-TRAK Photonics, Inc. has not been damaged by accident, misuse, neglect, alteration or improper installation, repair or testing.

This warranty is exclusive or in lieu of any warranty of merchantability, fitness for purpose or other warranty of quality, whether expressed or implied, and of all other liabilities of ON-TRAK Photonics, Inc. for damages, including consequential damages occurring out of or in connection with the delivery, use or performance of the ON-TRAK Photonics, Inc. amplifiers.

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Specifications subject to change without notice.

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