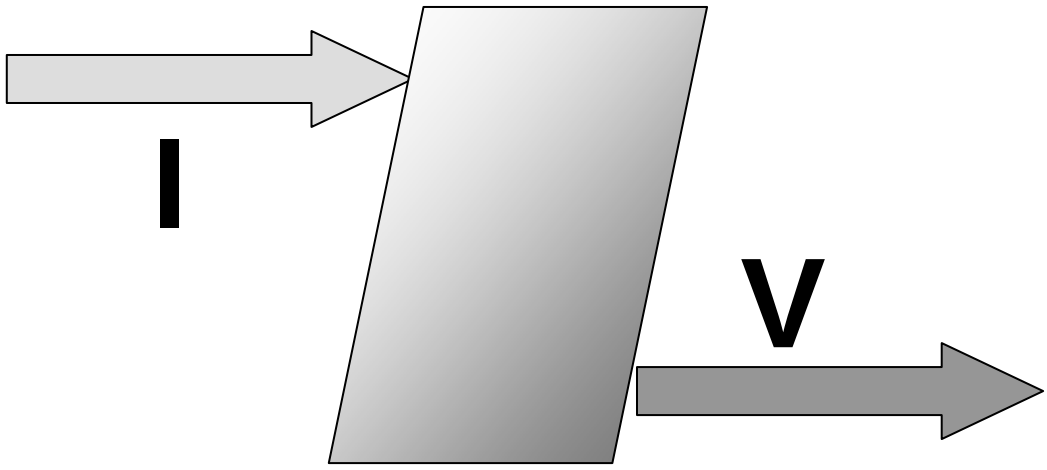
TURTLE
TURTLE INDUSTRY Co., Ltd.

T-IVA001BZ

Simplified I/V Convertor

Operating Instruction Manual



April 9, 2012

Features

This RoHS compliant product is an amplifier for use with current source sensors that include photodiodes and photomultiplier tubes.

An improvement and successor to the T-IVA001. The power supply, which previously required ±2 lines, has been integrated into a single unit, thus increasing usability. The GND line for signals and 0V line for the power supply cannot be made common.

A revamped board structure has contributed to less current leakage and greater accuracy. The accuracy of this type of amplifier is typically determined by the accuracy of the transistors, the current leaked from the connectors, the connection cables, printed boards, and input current of the amplifiers used.

Careful attention was paid to those issues when the product was designed and manufactured. And although referred to as “Simplified” the product incorporates the necessary and more than adequate performance. Furthermore, thanks to its extremely simple structure the transistor and band adjustment capacitor can be easily and freely changed in accordance with the desired specifications.

The direct current power supply method is utilized, thus providing the edge of a better SN ratio and lower level of current consumed. In addition, it is equipped with a voltage level indication function via an LED, thus enabling reliable use of the product with dry batteries as well.

Specifications

Conversion Gain: 1E6 (standard conversion resistance 1MΩ)

Conversion Error: Within approx. ±1%

Frequency Property (small signals): approx. 140KHz ± 3dB (on a test circuit with a signal source of 1MΩ resistance)

Maximum Output Voltage: approx. ±12Vp (power supply voltage of 30V)

Noise Voltage: 0.2mVrms or less (input open, electrostatic shield)

Output Resistance: 50Ω

Power Supply Voltage: DC6V ~ 30V

Consumed Current: approx. 6mA (power supply voltage of 30V)

Operating Temperature: 5C ~ 45C

Dimensions: 80 (W) x 35 (H) x 75 (D) mm

Weight: approx. 200 g (cables and other accessories not included)

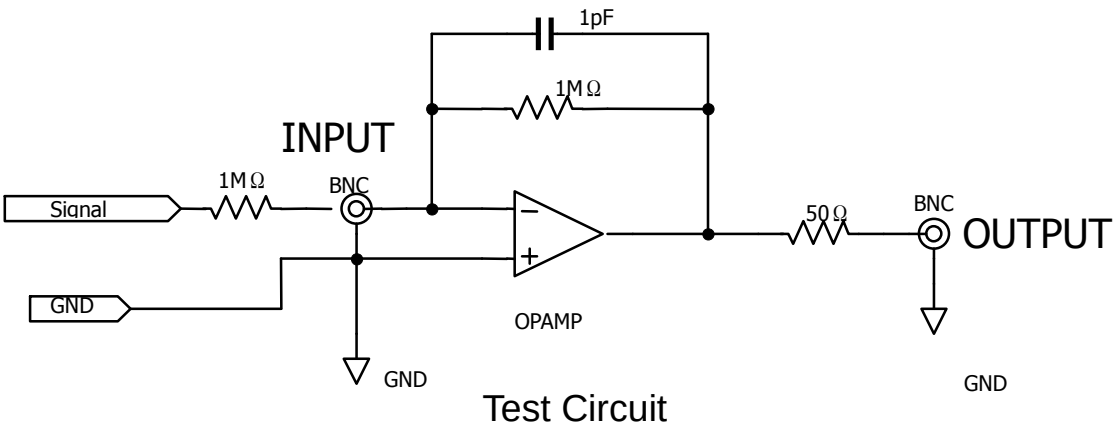
How to Use the Product (Please read this carefully because any failure to follow the instructions could result in damage to the product)

The case of the product includes a cool line (GND) in the internal circuit.

With the power supply connection of the product **the outside electrode of the connector**

plug is for positive voltage and the middle (core) for negative (or 0) voltage.
Reversing them **could damage the amplifier as there are no protection measures**.
When connecting the power supply ensure to first shift **the bar of the toggle switch off (middle)** via the front panel.
Next, shift it to the battery indication (BATT, downwards), and confirm that the LED lights up.
If the LED does not light up the polarity of the power supply may have been reversed or the voltage lower than about 9V.
If that does occur ensure not to turn the switch on.
Turn the switch off (middle) again and check the polarity and voltage level.
Only turn the switch back on (upwards) after confirming the LED has lit up.
The product will then immediately start running. The output will be reversed. An electrical charge entering the product will result in negative voltage at the output. Contrarily, an electrical charge from the product will result in positive voltage at the output.

Operating Principle
All the circuit diagrams used in the product are shown at the end of this document. The frequency property of this type of circuit largely depends on the properties of the input signal source. The frequency properties shown in the specifications were measured using the connections and method shown in the diagrams below. Note that different results may be obtained if the property or values of the signal sources differ.
High frequency signals of relatively large amplitude being input into the product may give rise to the phenomenon of the output being biased to either positive or negative. If that does occur ensure to change the sensor to one that will not generate such a high frequency component.



Test Circuit

The conversion gain can be obtained using the formula below:

Output Voltage = Input Current (A) x Conversion Resistance (1MΩ) (Ω) [V]

This then means that to enhance the sensitivity the values of the transistor can be increased and to reduce the sensitivity the resistance value can be decreased.
Please note, however, that if you increase the values of the transistor in enhancing the sensitivity more current will leak due to smudges on the surface of the insulating materials, including the printed board. Conversely, however, the resistance values being too small will limit the maximum output current of the amplifier. The range of from 100MΩ to 10KΩ is therefore considered the most reasonable.
Furthermore, any error in the resistance value used here will be reflected as a conversion error, thus making a highly precise and low temperature coefficient resistor necessary. Generally speaking metal film resistors and other types of large wattage have the best results.
When using the board take the utmost care not to damage any part of it.

Limited Warranty

The Turtle Industry (Turtle-Ind) warrants each product of its manufacture to be free from defects in material and workmanship subject to the following terms and conditions. The warranty is effective for half a year after the shipment by Turtle-Ind to the original purchaser.

The obligation of Turtle-Ind under the warranty is limited to servicing or adjusting any product returned to the head office of Turtle-Ind for this purpose and to replacing any defective part thereof. Such product must be returned by the original purchaser, transportation charges prepaid, with sufficient and detailed proof in writing of the defect. If the fault has been caused by misuse or abnormal conditions of operation, repairs must be paid for. Prior to repair, in this instance, a quotation will be submitted. Service or shipping information will be notified depending on the difficulty encountered. Model and serial numbers must be supplied by user. Batteries are specifically excluded under warranty.

Turtle-Ind shall not be liable for any injury to persons or property or for expenses incurred by the use of any Turtle-Ind product.

If you think the product is not operating properly

Immediately cut off the power supply, and then list the symptoms before contacting us at the following:

1-12-4, Nishineminami, Tsuchiura-shi, Ibaraki, Japan, 300-0842

Turtle Industry Co., Ltd.

Service Support Section, Technical Division, Technical Department

FAX: +81-29-843-2024

Email: tokyo@turtle-ind.co.jp

We will ensure to promptly handle any problem.