BDMICRO OPTO-4

4-Channel Optical Isolation Board w/Independent Channels

Technical Manual (Revision 4)

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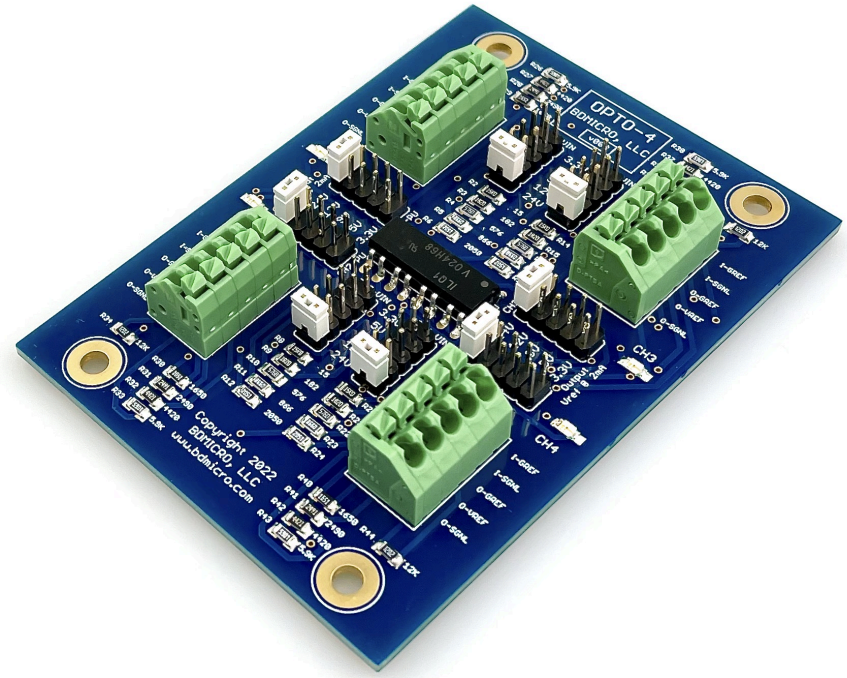

BDMICRO, LLC
https://www.bdmicro.com/
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1 DISCLAIMER

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2 General Description

The OPTO-4 is a 4-channel optical isolation board with independent grounds and voltage references for each channel. Each channel presents five connections:

- I-GREF : Input Ground Reference
- I-SGNL : Input Signal
- O-GREF : OutputGround Reference
- O-VREF : Output Voltage Reference
- O-SGNL : Output Signal

Each channel is completely independent from one another, allowing connections to multiple ground and voltage references or different equipment with this single board.

Each channel presents individual LED feedback for the input signal. When the channel I-SGNL input is active, the channel's LED engages, providing positive, visual input feedback. The chanel input LEDs are useful for rapid debugging and verification of connection to external equipment, saving time tracing and troubleshooting connections and input activation.

Independent channel V-ref and GND-ref allow one to provide connection isolation for multiple equipment assemblies that some or all have separate V-ref and GND requirements, making it flexible in environments where equipment from multiple manufacturers and equipment locations may be required.

Additionally, OPTO-4 provides jumper settings for both input and output signals for all channels that are suitable for a variety of common voltage inputs and voltage output requirements. These configurations are extremely flexible allowing for a wide range of common input and output reference requirements for each channel individually.

OPTO-4 includes robost, industrial grade clamping connector terminals that provide solid, vibration-resistant connections suitable for harsh environments.

3 Features

- 3.3V - 24V operation
- 4,420 V(rms) Isolation
- 10 kHz switching frequency
- High quality clamp connectors
- Fully independent channels
- Individually configurable Input and Output for each channel
- Convenient DIN Rail mounting
- Convenient for level shifting applications
- Great for eliminating troublesome ground loop and noise problems

NOTE : The OPTO-4's primary function provides electrical isolation between equipment. And with each channel's input and output sides being individually configurable, the OPTO-4's high degree of flexibility allow it to be utilized for level shifting. Level shifting is a common requirement when interfacing 3.3V logic with 5V logic and interfacing equipment from different manufacturers.

4 Connectors

OPTO-4 connectors are high quality Phoenix Combicon clamp connectors for easy and reliable connection. Clamp connectors reduce wire strain, and have higher vibration resistance than screw terminals, making them suitable for harsh environments and industrial applications.

5 Voltage and Current Specs

The OPTO-4 presents two voltage/current selection banks for each channel, one for the input side, and one for the output side. These accommodate a variety of common voltages: 3.3V, 5V, 9V, 12V, and 24V, for both input and output.

The input side current requirements are 10mA for optocoupler engagement. Thus, with a 3.3V signal input, and the jumper set at 3.3V input position, the current draw from the I-SGNL input will be 10mA, meeting the ILQ1 specifications. And similarly for all input settings, respectively. For example, with a 24V input, and the jumper set at 24V input position, the current draw from the I-SGNL will also be 10mA. Thus, the OPTO-4 provides built-in current limiting configurations for all of the common voltage levels needed for most applications.

The output side resistors are chosen such that if the O-VREF is set to the indicated jumper voltage location, the output current draw will be 2mA. The 2mA value was chosen so that it will drive standard TTL logic inputs (1.6 mA) with 25% headroom. If you are using a microcontroller or other high-Z input, the output jumper can be set to a larger resistor value for reduced current consumption. When set to the actual O-VREF being used, the guaranteed current is 2mA. Thus, the OPTO-4 provides configurable, built-in, output pull-up resistors guaranteed to meet the current levels for all of the common voltages needed for most applications on the output-side as well.

NOTE : All resistors are 1/4 Watt, so one may use multiple jumpers on the input side or the output side for higher current pull-up on the output or any variation on the input or output side that accommodate your electrical requirements. When using non-standard jumper settings, be sure that the power consumption does not exceed 1/4 Watt per channel input or output, and the overall input current does not exceed 10mA.

6 Quick Start

Getting started with the OPTO-4 is quick and easy. All input and output signals are provided on the silkscreen and allow one to quickly and easily connect the OPTO-4 without referencing the manual. Additionally, the robost and convenient clamp connectors make fast and easy work of connecting to your application.

Initial jumper settings are set to the most safe setting regarding input voltage and output references. Depending on the input and output equipment, each channel jumper settings should be set to the requirements of the particular equipment connected to that channel.

7 Signal Diagram and Jumper Settings

See **Figure 1** for the OPTO-4 signal diagram and jumper settings.

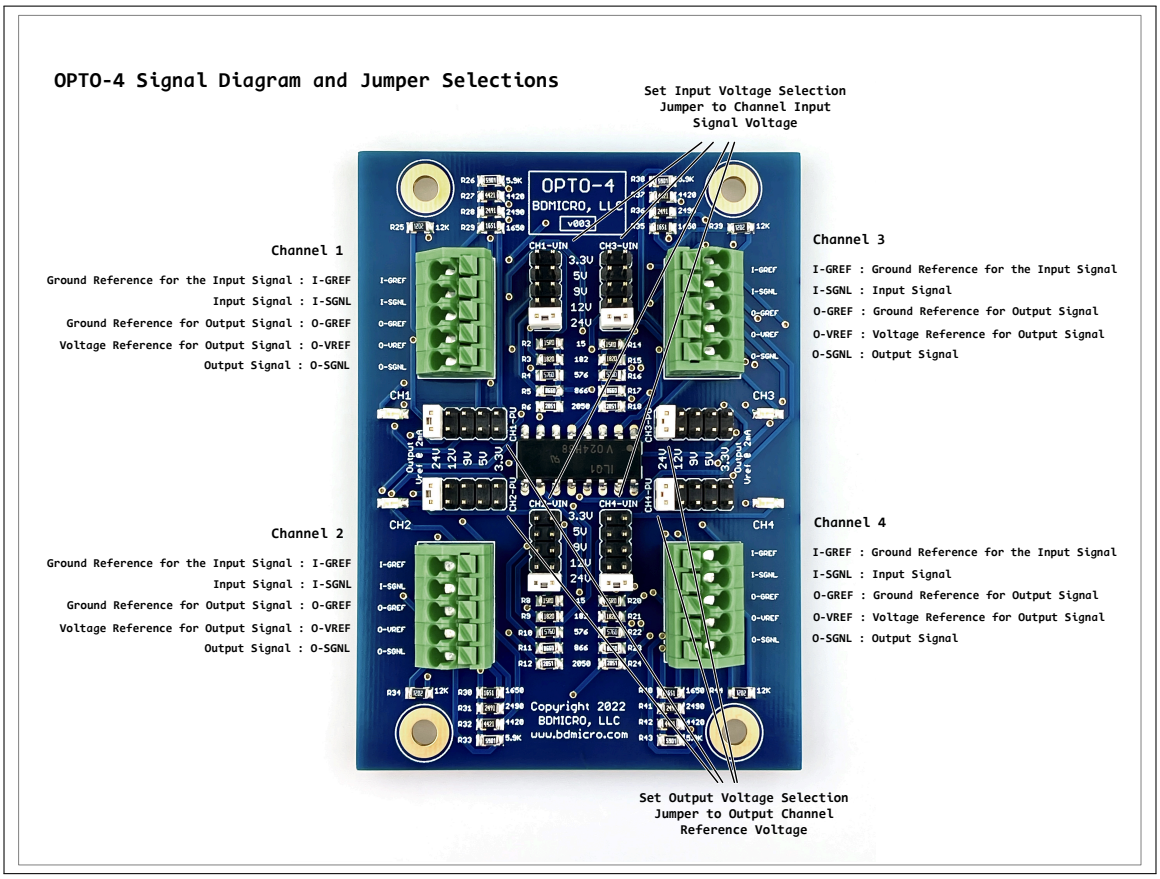

Figure 1: OPTO-4 Signal Diagram and Jumper Settings

8 Mechanical Diagram, Physical Dimentions, and DIN Rail Mounting

The OPTO-4's width and length are 72mm x 100mm, and 2mm PCB thickness. These dimensions were chosen to fit commonly available 72mm by 100mm DIN rail PCB carriers used for DIN rail mounting. Note that the carrier and DIN rail are not included. Multiple sources for carriers and DIN rails are commonly available.

In addition to easy accommodations for DIN rail mounting, the OPTO-4 has 4 corner holes that can be used to securely mount within an enclosure, a panel, etc, and will easily accommodate most any mounting requirements.

See **Figure 2** for the OPTO-4 mechanical diagram and dimensions.

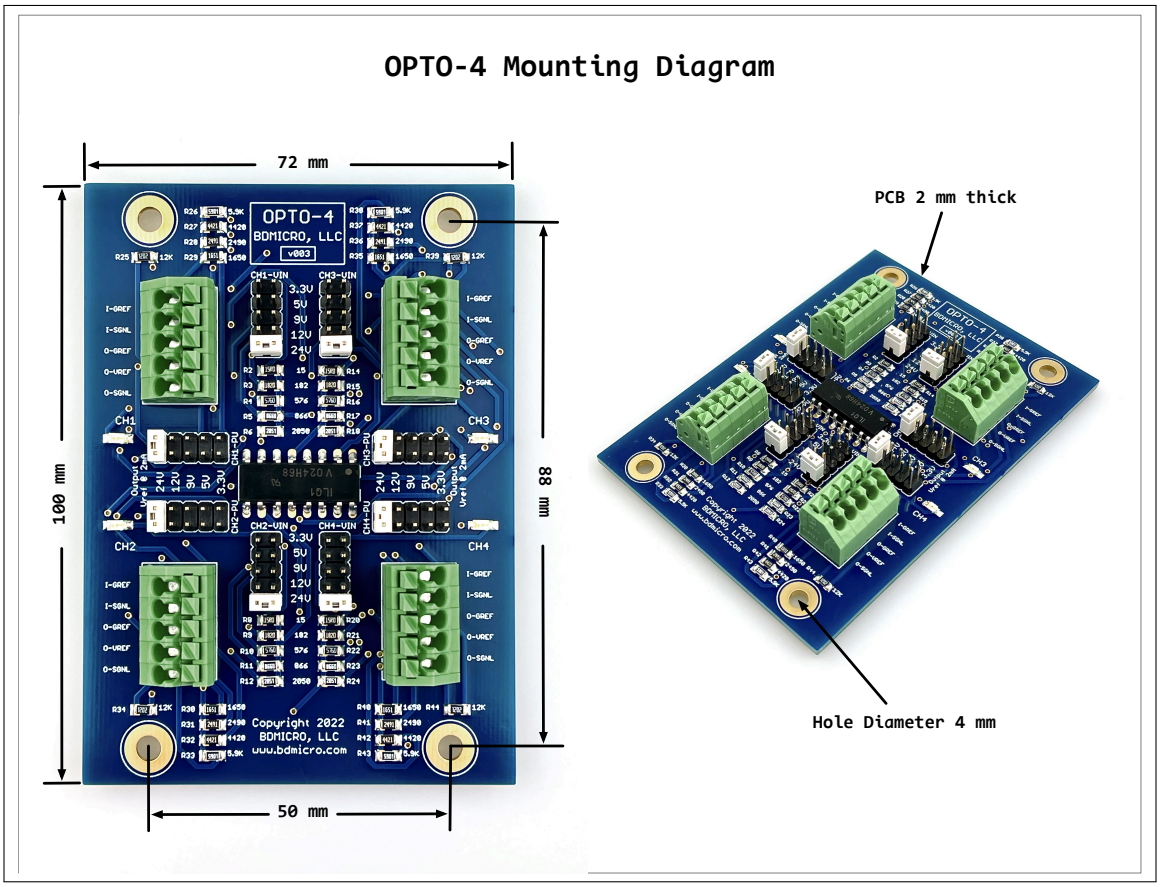

Figure 2: OPTO-4 Mechanical Diagram

A Revision History

- 2022-09-17 : Revision 1 : Initial version
- 2023-06-22 : Revision 2 : Add signal diagram and jumper selection diagram
- 2023-06-22 : Revision 3 : Fix typos
- 2023-06-23 : Revision 4 : Add mechanical diagram