

BUFOI103A-24V Datasheet

Overview

The BUFOI103A-24V provides three buffer channels having open-drain (low-side, sinking) outputs that are inverted relative to the inputs. Inputs are optimized for interfacing to a 24V PLC with sourcing outputs, and the inputs feature overvoltage protection and reverse-polarity protection. The outputs are rated up to 50V and also feature reverse-polarity protection. For each channel, the indicator LED is lit when the input is high, output is low. Terminal blocks provide easy access to the signals while maintaining a compact form factor.

This product is ideally suited as an interface between a PLC having sourcing outputs and a load that is designed for a PLC with sinking outputs.

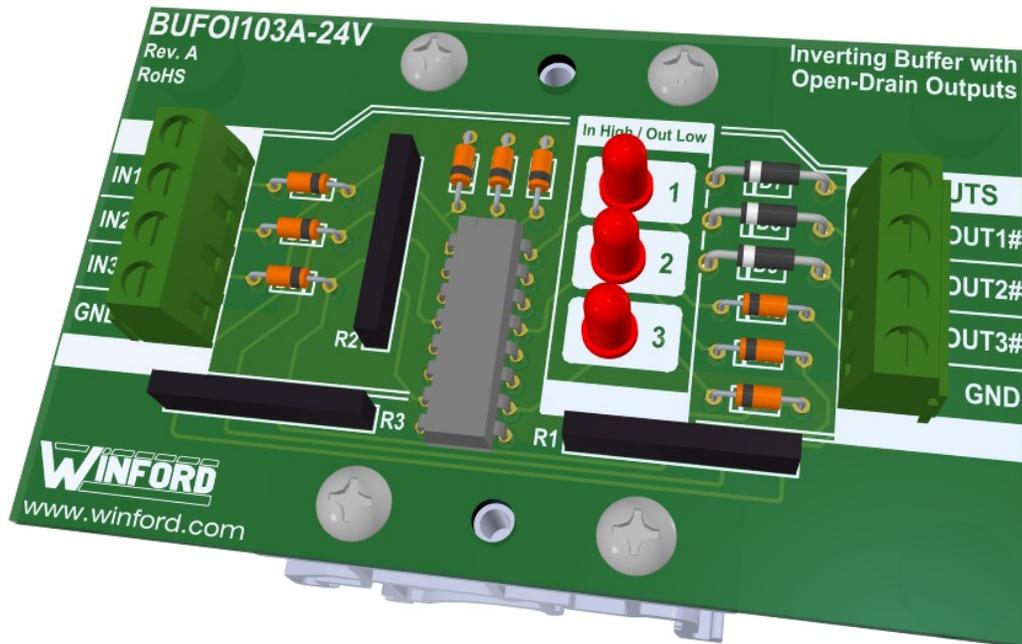
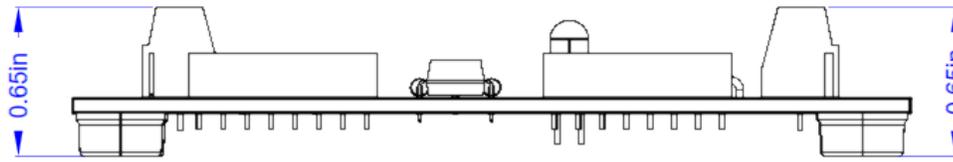
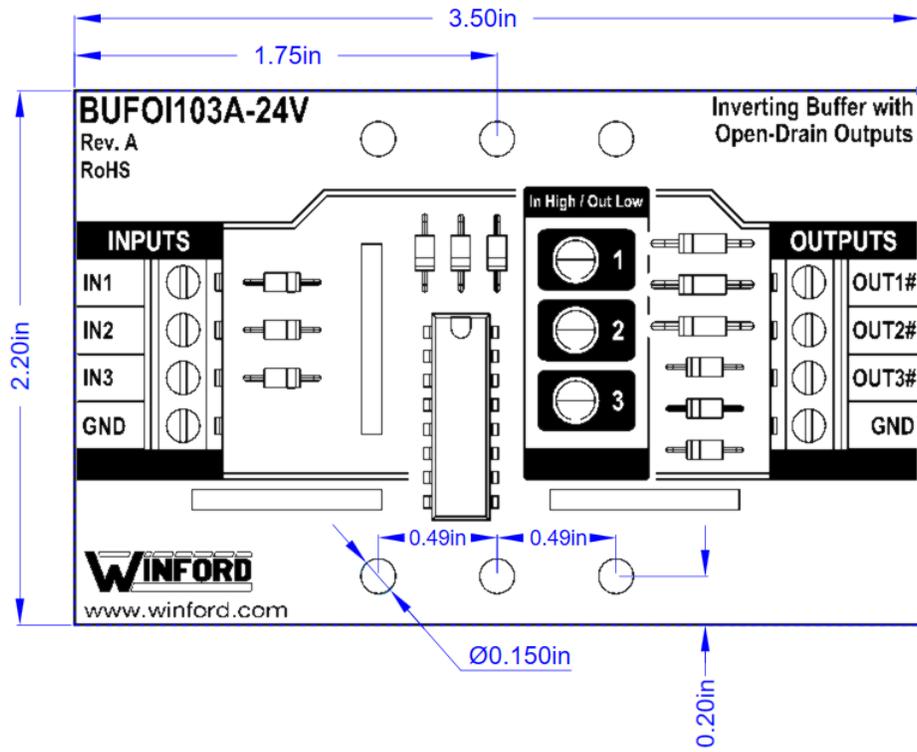
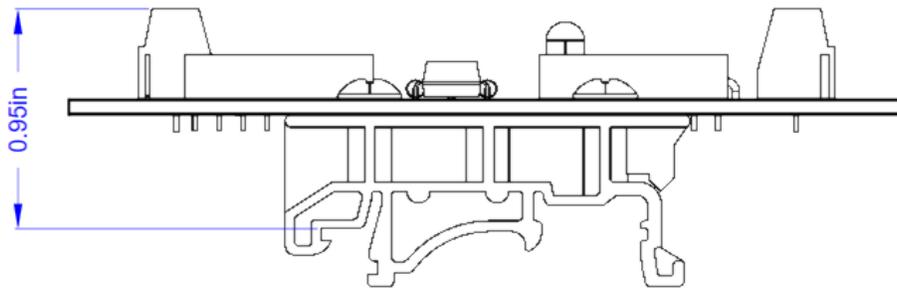


Figure 1 DIN Mounting Option Shown

Dimensions (typical shown)



Rubber Feet



DIN Mount

Figure 2

Part Number Ordering Information

BUFOI103A-24V - 24V -
1

1. Mounting Option

- **FT** Rubber Feet on bottom side of PCB
- **DIN** DIN Rail Mounting Clips

Simplified Schematic Drawing (one channel)

Implementation is the same for all channels.

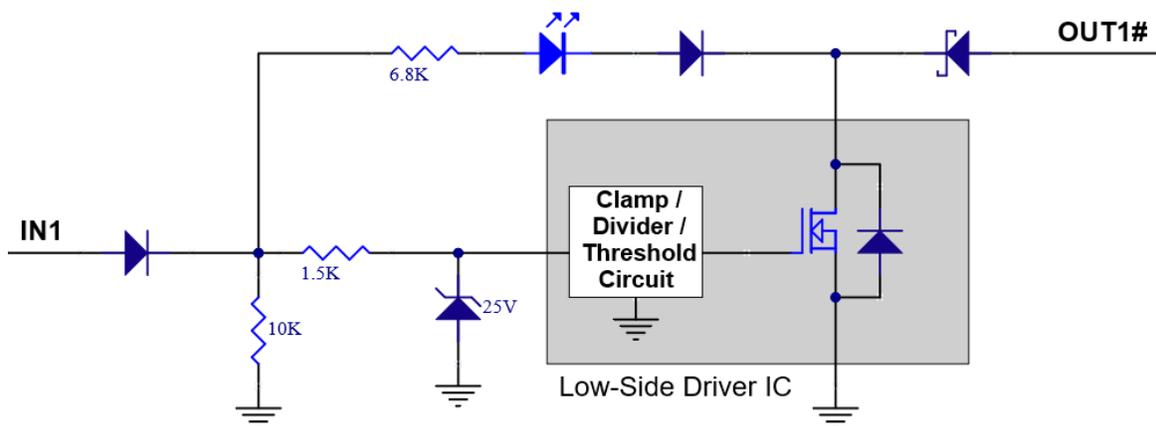


Figure 3

When the input is high, the low-side output FET is on (active), pulling the output down.

When the input is low, the low-side output FET is off (inactive), so the output is essentially floating.

As shown in the simplified schematic, both the input and output circuitry share a common ground. This product does not provide electrical isolation. (If isolation is needed in a particular application, please contact Winford Engineering for recommended products.)

Detailed Description

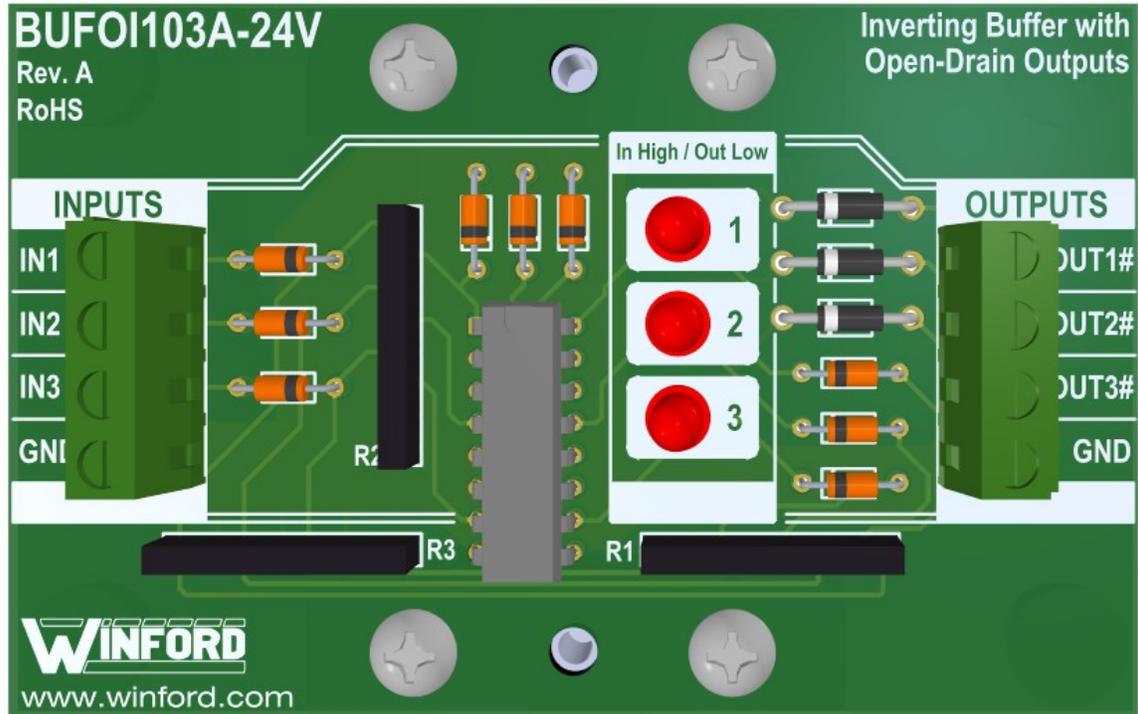


Figure 4

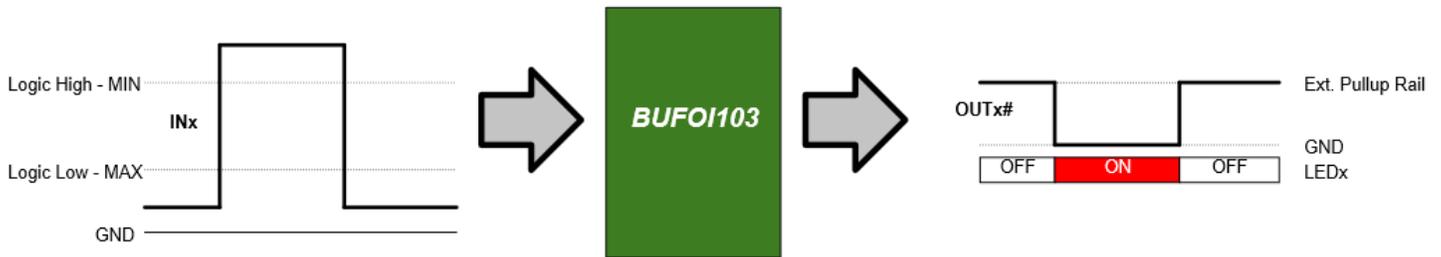
| SIGNAL | DESCRIPTION |
|--------|----------------------------|
| INx | Input signal for Channel x |
| GND | Ground reference |

| SIGNAL | DESCRIPTION |
|--------|--------------------------------|
| OUTx# | Inverting output for Channel x |
| GND | Ground reference |

Note that all GND positions (both input side and output side) are connected together on the PCB. Thus, the signals connected to the input side and the output side must all share a common ground reference.

The following figure illustrates the functional behavior of this device. On each channel, an LED provides a visual indication of the channel state. An LED that is lit indicates that the given input is high and the output is low.

As indicated in the figure, when the output is off, the voltage level of the output signals depends on whatever external circuitry is pulling up the output.



Output Signal and LED Indicator vs Input Signal

Figure 5

Operating Conditions

| | |
|---|---------------|
| Ambient Temperature Range | -30°C to 85°C |
| Relative Humidity Range - not icing or condensing | 5% to 85% RH |

Absolute Maximum Ratings (25 degC, all voltages relative to GND)

| <i>Specification</i> | <i>Symbol</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---|---------------|------------|------------|------------|-------------|
| Input Signal Voltages | V_INx | -50 | | 35 | V |
| Output Signal Voltages (input low, output floating) | V_OUTx | -50 | | 50 | V |
| Output Signal DC Sink Current | I_OUTx | | | 200 | mA |

Exceeding the absolute maximum ratings may result in damage to the product.

Electrical Performance and Recommended Operating Conditions (at 25 degC, all voltages relative to GND)

| <i>Specification</i> | <i>Symbol</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---|---------------|------------|------------|------------|-------------|
| Input Signal Voltage Range for logic HIGH | V_IH | 16.5 | | 30 | V |
| Input Signal Voltage Range for logic LOW | V_IL | 0.0 | | 7.0 | V |
| Input Signal Current (V_INx = 24V) | I_INx | | 7 | | mA |
| Output Leakage (INx = 0.0V, OUTx# = 24V) | I_R | | | 2 | uA |

Screw Terminal Blocks

- Wire sizes (all positions): 16-30 AWG
- Terminal block pitch: 5.00mm

Output Stage Component Details

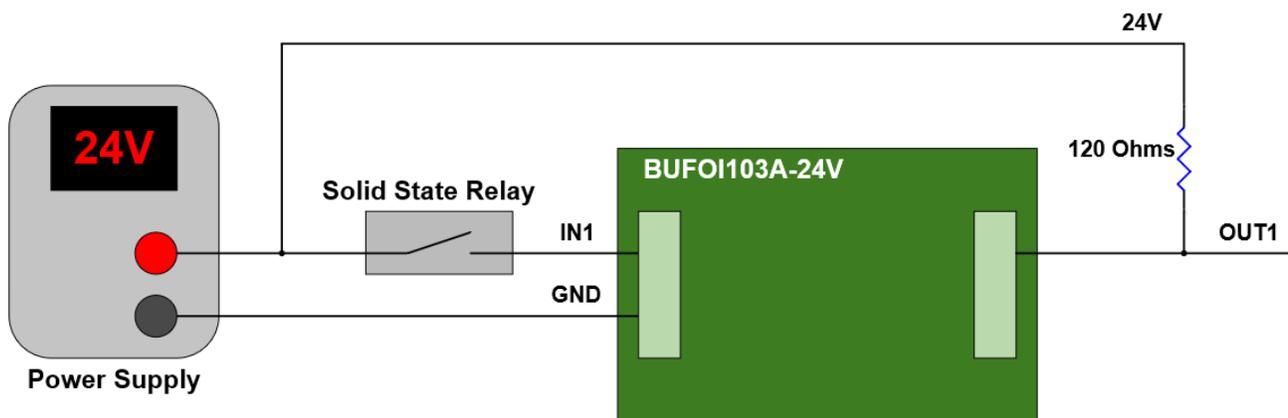
The signal path is provided in the simplified schematic drawing shown previously in this document. Additional information is provided below.

| <i>Component</i> | <i>Manufacturer</i> | <i>Manuf. Part Number</i> |
|------------------|---------------------|---------------------------|
| Buffer IC | Toshiba | TBD62502A |

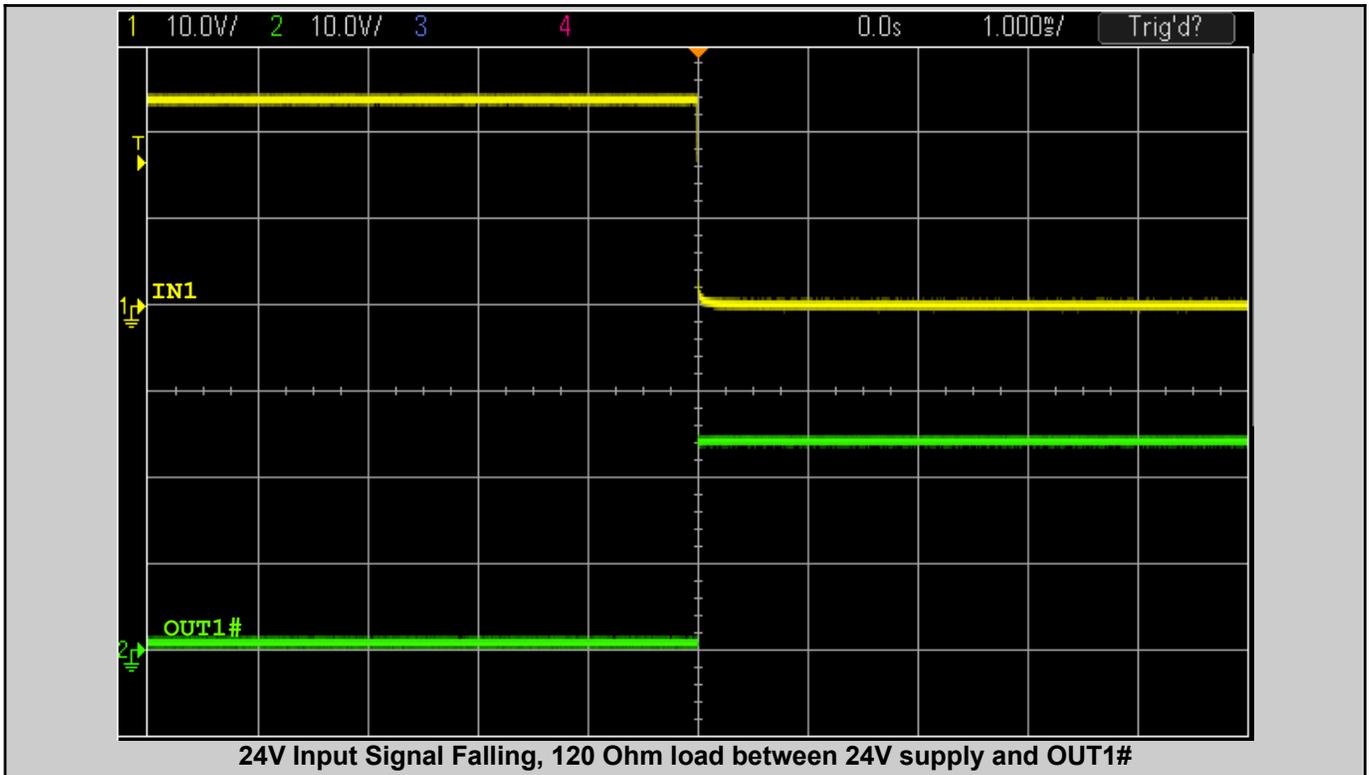
Typical Timing Performance

For reference, some typical output transition timing plots are provided on the following pages (for a single channel). In all plots, the horizontal time scale is 1ms/division, and vertical scaling is 10V/div.

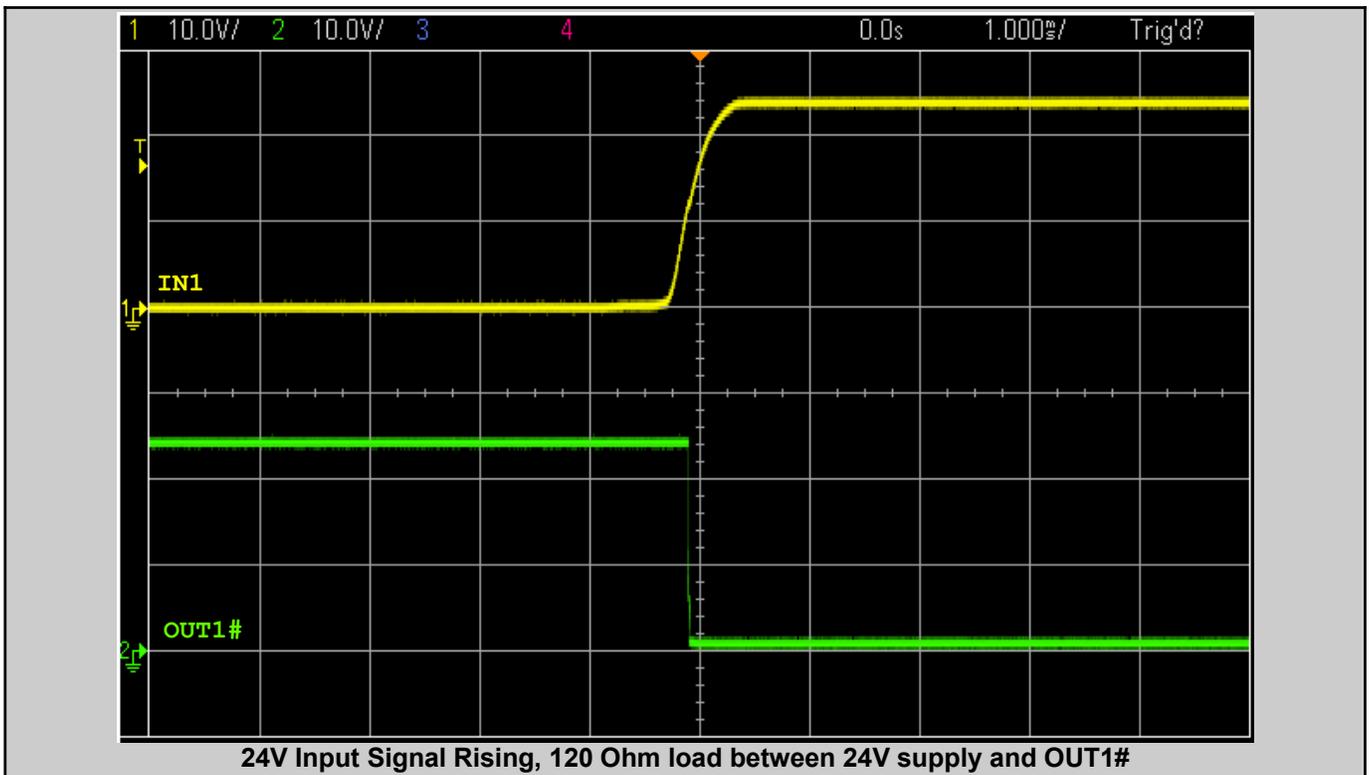
The following test setup was used for capturing the typical timing performance:



Falling Edge on Input, Rising Output

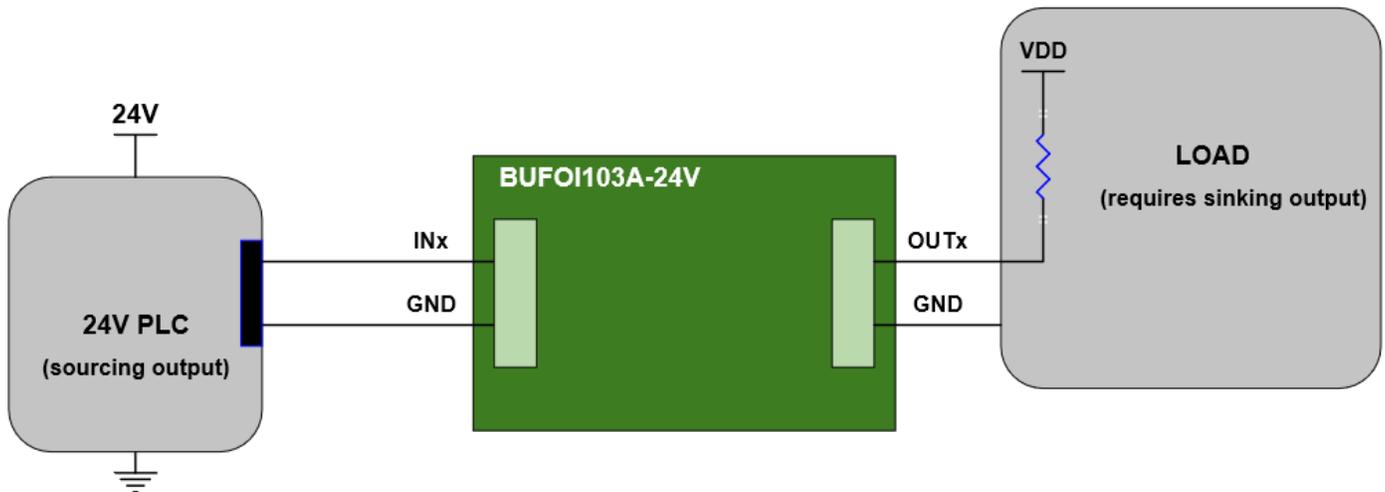


Rising Edge on Input, Falling Output



Applications

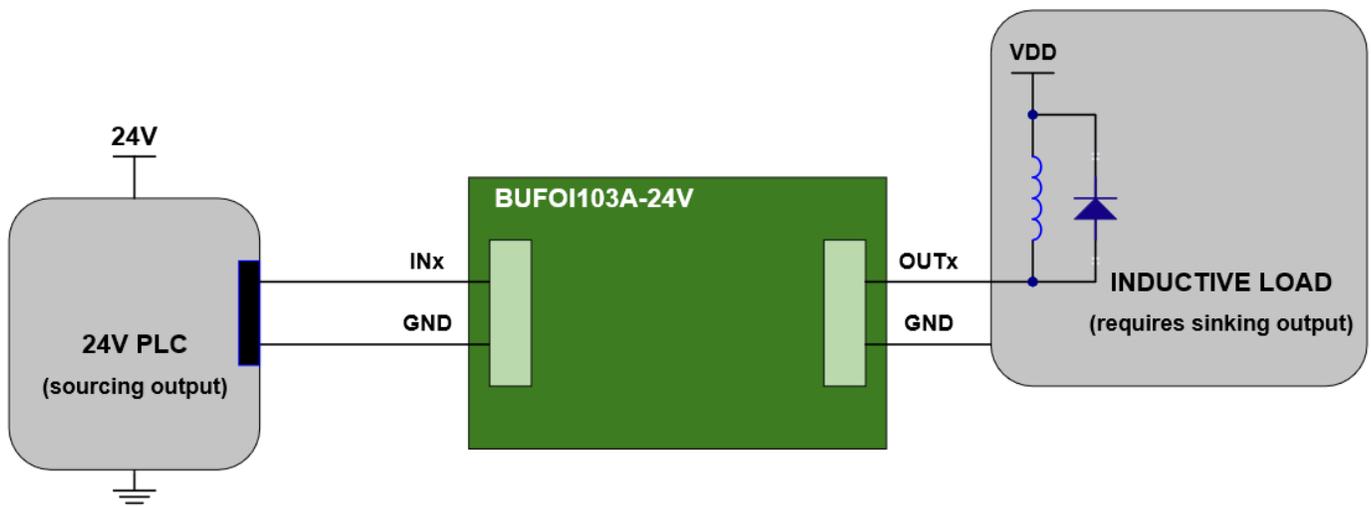
This product is designed to be used in systems with a PLC having sourcing outputs, and one or more loads that require sinking outputs. A typical application circuit is shown in the figure below.



When the PLC output turns on (goes high, providing 24V signal to BUFOI103A-24V input INx), the low-side transistor that controls OUTx will turn on. This allows OUTx to sink current to ground, activating the load.

Note that the voltage rail for the load (VDD in the figure above) does not have to be 24V. This product is rated for a load rail voltage up to 50V DC.

If driving an inductive load, please ensure that there is some sort of clamping device that is suitable for absorbing the spike that will occur when the OUTx output turns off (interrupting the current thru the load). A typical case which uses a diode across the load is shown below.



System Analysis: Failure Modes & Effects

When designing any system, it is advisable to ensure that there is a thorough understanding of what will happen when each piece of the system fails. It is the responsibility of the system designer to ensure that the failure effects are understood, and that appropriate countermeasures or redundancies are implemented if warranted.

If there are additional questions about using this product in a particular application, please contact Winford Engineering for more information.

Notice

Winford Engineering, LLC does not authorize any of its products for use in military, medical or other life-critical systems and/or devices. Life-critical devices/systems include devices or systems which, a) are intended for surgical implantation into the body, or b) support or sustain life and whose failure to perform can be reasonably expected to result in injury. Winford Engineering, LLC products are not designed with the components required, and are not subject to the testing required to ensure a level of reliability suitable for the treatment and diagnosis of people. Winford Engineering, LLC shall not be held responsible or liable for damages or injury that occur as a result of the use of this product.