

## FORX102 Datasheet

### Overview

The FORX102 board provides two fiber optic receiver channels (digital) with a non-inverting open-collector output for each channel. Onboard pull-up resistors on the outputs are included in the design. Terminal blocks provide easy access to the signals while maintaining a compact form factor. A wide operating voltage range allows this product to be used in a wide variety of applications.

The fiber optic receivers are designed for detection of visible red light and directly interface with economical fiber cable without the need for connectors. This product is suitable for use with fiber cable having a 1mm core / 2.2mm jacket. It is typically used with the Winford Engineering FOTX102 transmitter board.

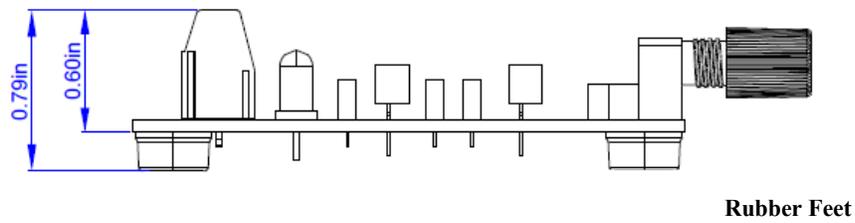
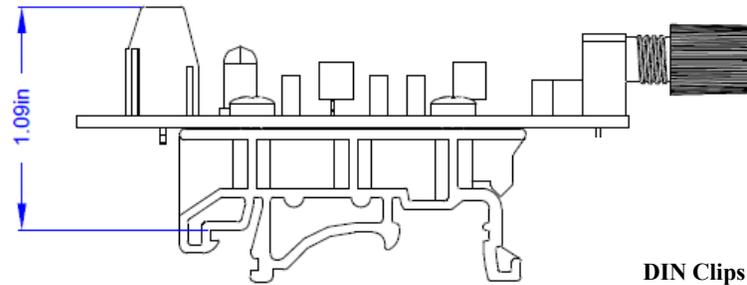
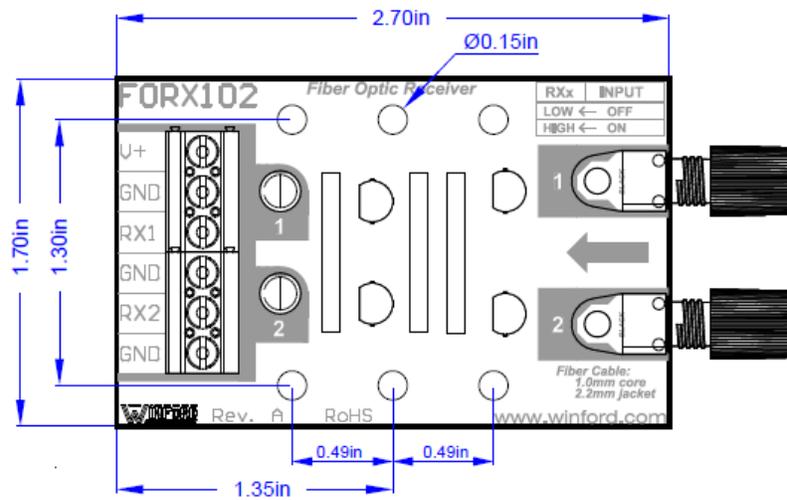
A fiber optic connection provides high levels of electrical isolation and electromagnetic immunity. Since the link uses a fiber optic cable instead of wires, the typical signal-corruption concerns associated with low voltages and long wires (particularly in electrically noisy environments) is eliminated. This allows a low-voltage signal (e.g., 3.3V, 5V) to be used to control a device up to 75m away.\* Furthermore, due to the operating voltage range of this device and its companion device, logic level translation can be easily achieved.

\*The maximum allowed length of the fiber optic link depends on a number of factors. See the applications section for more information.



DIN Mounting Option Shown

## Dimensions (typical shown)



## Part Number Ordering Information

FORX102 -   
1

### 1. Mounting Option

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

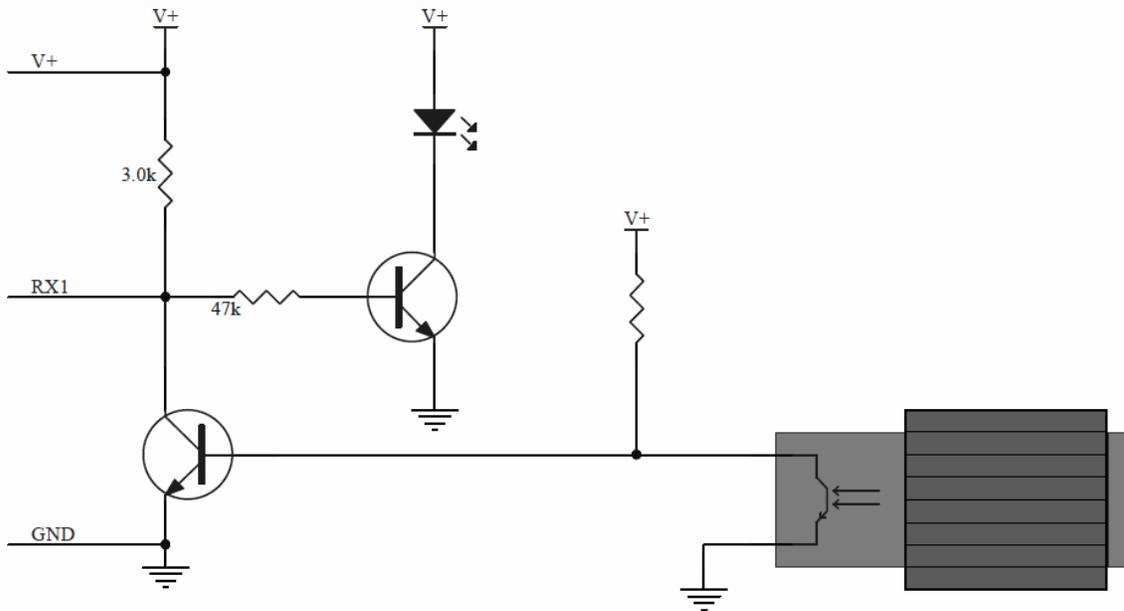
### FORX102 Stocked Part Numbers

The following part numbers represent standard options that are normally stocked:

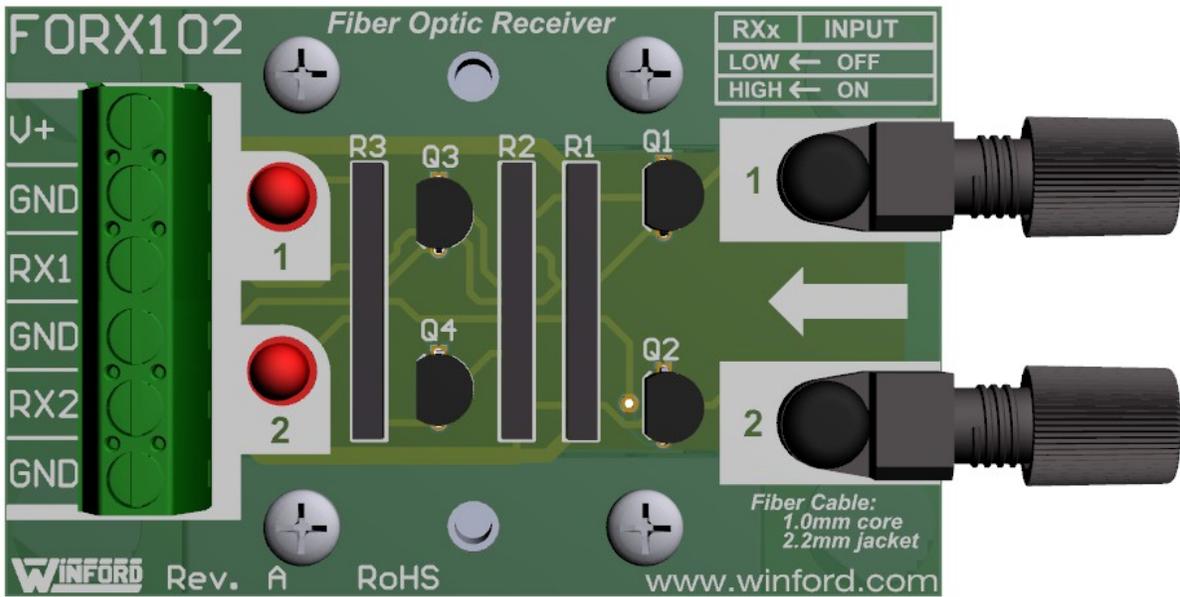
- FORX102-FT
- FORX102-DIN

### Simplified Schematic Drawing (one channel)

*Implementation is the same for both channels. Channel 1 is shown in the figure.*



## Detailed Description



SIGNAL	DESCRIPTION
V+	Supply Voltage
GND	Ground reference
RX1	Output (open-collector) for Channel 1, non-inverting
GND	Ground reference
RX2	Output (open-collector) for Channel 2, non-inverting
GND	Ground reference

SIGNAL	DESCRIPTION
Input 1	Fiber optic input, Channel 1
Input 2	Fiber optic input, Channel 2

Note that there is one common ground for the board. That is, the three GND terminals are connected.

As indicated in the schematic, each channel has an open-collector output and an indicator LED.

When sufficient and appropriate light comes in on a fiber optic cable for a given channel, the receiver is activated. The indicator LED for that channel will light up, and the output for that channel is pulled high.

In the absence of the fiber optic input, the indicator LED for the given channel will be off, and the output for that channel will be low.

Fiber Optic Input	LED Indicator	Output (RX1, RX2)
<b>ON</b> (Optical signal is present)	<b>ON</b>	<b>ON (Pulled HIGH)</b> (thru pull-up resistor)
<b>OFF</b> (Optical signal is absent)	<b>OFF</b>	<b>OFF (LOW)</b>

Note that if light is being received but it is insufficient to fully activate the receiver (e.g., cable is too long, or losses due to cuts are excessive), the receiver state will be indeterminate. In this state, the LED may be lit

while the output signal is still fairly close to ground level. See the applications section of this document for information that should be observed to avoid this situation.

## Operating Conditions

Ambient Temperature Range	-20°C to 85°C
Relative Humidity Range - not icing or condensing	5% to 85% RH

## Configuration for Ratings / Specifications

### 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>
Supply Voltage	V+	-3		27.5	V
Output Signal Voltage	V_RXx	-3		27.5	V
Output Signal Sink Current	I_RXx			30	mA

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

<i>Specification / Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Input Supply Voltage (VCC)	3.2		25	V
Fiber optic light signal wavelength to be detected	600		900	nm
Fiber optic signal input power needed for detection (ON)				
V+ = 3.3V, red light	0.3			uW
V+ = 5.0V, red light	0.4			uW
V+ = 12V, red light	0.85			uW
V+ = 24V, red light	1.7			uW
Output signal voltage, HIGH state (ON), no external pullup resistor, detector photo-transistor saturated				
V+ = 3.3V, red light, 0.3uW input power (min)	2.9	3.1		V
V+ = 5.0V, red light, 0.4uW input power (min)	4.4	4.7		V
V+ = 12V, red light, 0.85uW input power (min)	10.7	11.3		V
V+ = 24V, red light, 1.7uW input power (min)	21.4	22.6		V
Output signal voltage, LOW state (OFF), only sinking current set by onboard pullup resistance				
V+ = 3.3V, no light being received, no external loading		0.1	0.25	V
V+ = 5.0V, no light being received, no external loading		0.1	0.25	V
V+ = 12V, no light being received, no external loading		0.1	0.25	V
V+ = 24V, no light being received, no external loading		0.1	0.25	V

<i>Specification / Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Output signal voltage, LOW state (OFF), sinking current from onboard and external pullup resistances				
V+ = 3.3V, no light being received, 1k external pullup		0.15		V
V+ = 5.0V, no light being received, 1k external pullup		0.15		V
V+ = 12V, no light being received, 1k external pullup		0.16		V
V+ = 24V, no light being received, 1k external pullup		0.19		V

## Screw Terminal Wire Sizes

- All Signals and Power: 12-28 AWG

## Output Stage Component Details

The output stage for each channel is shown 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>
Output Pull-up Resistor	(any)	3.0 k $\Omega$
Output Low-Side NPN BJT	(any)	2N3904

Note that the outputs are open-collector outputs. That is, each of the outputs is able to sink current thru its output transistor, but can only source current thru its output pull-up resistor.

## Applications

This device is intended to be used with fiber optic transmitter FOTX102. The performance of this device and its companion device will vary based on the particulars of the application. Please see the applications section in the FOTX102 datasheet for information on typical signal timing, fiber optic cable cutting, installation, max recommended fiber optic cable length for various applications, etc.

## 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

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