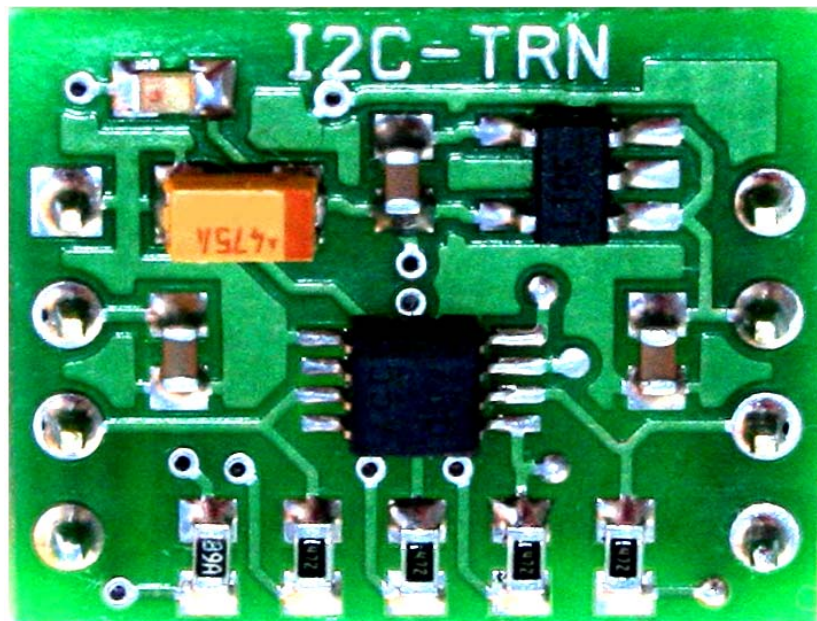


**I2C-TRN™ Dual Bidirectional I<sup>2</sup>C Voltage-Level Translator  
User Manual**

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# I2C-TRN™ Dual Bidirectional I<sup>2</sup>C Voltage-Level Translator User Manual

## Description

The I2C-TRN board is an 8-pin CMOS device that translates voltage level. It allows bidirectional voltage translation between 1.2V and 5V, without the use of a direction pin. The low ON-state resistance of the switch allows connections to be made with minimal propagation delay. There are no external components required. This makes it perfect for embedded systems that require voltage translation between the master and slave.

**This I2C-TRN designed ready for 5V to 3.3V translator. It allows 5V system to communicate to 3.3V device without having external 3.3V supply.**

This board features innovations that set it apart from other voltage-level translator module. Innovations feature like on-board pull-up resistors, power LED and 3.3 V regulator, which make it ready for 5V to 3.3V translator. **It can also use to power up external devices for up to 90mA.** The module can be quickly connected directly on to the breadboard. The board is small and compact in size 0.70 x 0.57 inches.

The I2C-TRN is designed base on PCA9306 IC. This dual bidirectional I<sup>2</sup>C voltage-level translator, with an enable (EN) input, is operational from 1.2-V to 3.3-V  $V_{REF1}$  and 1.8-V to 5.5-V  $V_{REF2}$ . When EN is high, the translator switch is ON, and the SCL1 and SDA1 I/O are connected to the SCL2 and SDA2 I/O, respectively, allowing bidirectional data flow between ports. When EN is low, the translator switch is off, and a high-impedance state exists between ports.

## Features

- Stand alone module, no external components required
- On-board 3.3 voltage regulator, pull-up resistors and power LED
- 2-Bit bidirectional translator for SDA and SCL lines in mixed-mode I<sup>2</sup>C applications
- Less than 4.5-ns maximum propagation delay to accommodate standard-mode and fast-mode I<sup>2</sup>C devices
- Allows voltage-level translator between
  - ✓ 1.2V  $V_{REF1}$  and 1.8V, 2.5V, 3.3V, or 5V  $V_{REF2}$
  - ✓ 1.8V  $V_{REF1}$  and 2.5V, 3.3V, or 5V  $V_{REF2}$
  - ✓ 2.5V  $V_{REF1}$  and 3.3V, or 5V  $V_{REF2}$
  - ✓ 3.3V  $V_{REF1}$  and 5V  $V_{REF2}$
- Provide bidirectional voltage translation with no direction pin
- Open-drain I<sup>2</sup>C I/O ports provides less signal distortion
- Design easy for breadboard
- High quality double sided PCB
- Small and compact in size 0.70 x 0.57 inches
- Dual row 0.6" width, 0.1" pitch header pins

## Applications

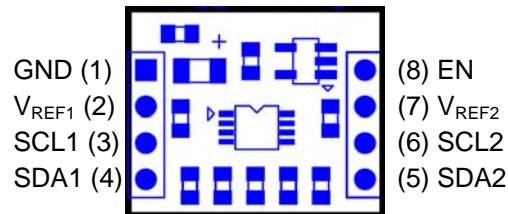
- Voltage-level translation for I<sup>2</sup>C bus

\* I<sup>2</sup>C is a trademark of Philips Semiconductors Corporation.

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## Pin Configuration



Pin No.	Name	Type	Description
1	GND	PWR	Supply ground
2	$V_{REF1}$	PWR	Low-voltage-side reference supply voltage for SCL1 and SDA1
3	SCL1	I/O	Serial clock line, low-voltage side
4	SDA1	I/O	Serial data line, low-voltage side
5	SDA2	I/O	Serial data line, high-voltage side
6	SCL2	I/O	Serial clock line, high-voltage side
7	$V_{REF2}$	PWR	High-voltage-side reference supply voltage for SCL1 and SDA1
8	EN	Input	Switch enable input

## Interfaces

### Power:

For 5.0V to 3.3V translation:

- Power the I2C-TRN board with 5V supply on  $V_{REF2}$  pin.
- Solder a bridge on “3V3” at the bottom of the module (default from manufacture).



- 3.3V is available on  $V_{REF2}$  pin. It can be use to power external devices up to 90mA.

For other level translation:

- Remove solder bridge “3V3” at the bottom of the module.
- Apply high-voltage-side reference supply to  $V_{REF2}$  and low-voltage-side reference to  $V_{REF1}$

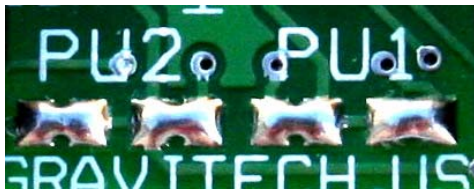
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## Module Configuration

### I<sup>2</sup>C pull-up resistors:

I<sup>2</sup>C bus specification required to have pull-up resistors on SDA and SCL pin. I2C-TRN comes with these two pull-up resistors on both sides (total of 4 resistors) enabled from the manufacture. It can be disabling when connect to I<sup>2</sup>C bus that already have pull-up resistors by remove the solder bridge on the "PU1" for low-side, and "PU2" for high-side at the bottom of the module.



### EN pin:

When EN is high, the translator switch is ON, and the SCL1 and SDA1 I/O are connected to the SCL2 and SDA2 I/O, respectively, allowing bidirectional data flow between ports. When EN is low, the translator switch is off, and a high-impedance state exists between ports.

To always enable the translation, solder a bridge on "EN" at the bottom of the module (default from manufacture). To use external signal to control enable line simply remove the solder bridge and connect enable signal to EN pin8.



### Power-on LED:

The green LED on the module is illuminating when the power applied. The power-on LED is enabled from the manufacture. It can be disabling for light sensitive or low current requirement application by remove the solder bridge on "PW" at the bottom of the module.



Below is the default setting from the manufacture.



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