

# Dual Bidirectional I<sup>2</sup>C Bus and SMBus Voltage-Level Translator for Open-Drain Application

## 1. General Description

The FA8202 is a dual bidirectional I<sup>2</sup>C and SMBUS voltage-level translator with an enable (EN) input, and is operational from 0.7V to 5.5V for  $V_{REF1}$  and  $V_{REF2}$ .

It allows bidirectional voltage translations between 0.7V and 5.5V, without the use of a directional pin. The low ON-state resistance ( $R_{ON}$ ) of the switch ensures the connections to be with minimal propagation delay. When EN is high, the translator switch is ON, and the A I/O are connected to the B I/O, respectively, allowing bidirectional data flow between ports. When EN is low, the translator switch is off, and a high-impedance exists between ports.

In I<sup>2</sup>C applications, the bus capacitance limit of 400pF restricts the number of devices and bus length. The capacitive load on both sides of the FA8202 must be considered when approximating the total load of the system, ensuring the sum of both sides is under 400pF.

All channels of the FA8202 have the same electrical characteristics, and there is minimal deviation from one output to another in voltage or propagation delay. This is a benefit over discrete transistor voltage translation solutions, since the fabrication of the switch is symmetrical. The translator provides excellent ESD protection to lower-voltage devices and at the same time protects less ESD-resistant devices. In standard I<sup>2</sup>C system, pull-up resistors are required to provide the logic high levels on the translator's bus. The size of these pull-up resistors depends on the system, but each side of the repeater must have a pull-up resistor.

When the A port is low, the clamp is in the ON state, and a low resistance connection exists the B port. Assuming the higher voltage is on the B port, when the B port is high, the voltage on the A port is limited to the voltage set by  $V_{REF1}$ . When the A is high, the B port is pulled up to the supply voltage by pull-up resistors. This function allows a seamless translation between higher and lower voltages selected by the user, without any directional control.

## Features

- Allows Arbitrary Voltage-Level Translator Between Port A and Port B from 0.7V to 5.5V
- 1-bit, 2-Bit, and 4-bit Bidirectional Translator
- Open-Drain I<sup>2</sup>C and SMBus Compatible
- Support I<sup>2</sup>C 3.4Mbit/s High Speed Mode
- Less than 1.5ns Propagation Delay to Accommodate Standard-Mode and Fast-Mode I<sup>2</sup>C Devices and Multiple Masters
- Provides Bidirectional Voltage Translation without Direction Pin
- Low R<sub>ON</sub> Connection Between Input and Output Ports Provides Less Signal Distortion
- 5V Tolerant I<sup>2</sup>C I/O Ports to Support Mixed Mode Signal Operation
- High Impedance for I/O Ports when EN=Low
- Lock-up-Free Operation for Isolation when EN=Low
- Halogen Free, RoHS and TSCA Regulations Compliant

## Ordering Information

P/N	Package	Top Side Marking
FA8202OTR	DFN2x3mm <sup>2</sup> -8L	8202 YWZZ
FA8202AOTR	DFN2x2mm <sup>2</sup> -8L	8202 YWZZ
FA8202BOTR	DFN3x2mm <sup>2</sup> -14L	8202B YWZZ
FA8202COTR	DFN1.4x1mm <sup>2</sup> -8L	Ab
FA8202K6R	SC-70-6L (SOT-363)	AbZW
FA8202MR	MSOP-8	8202 YWZZ

※Topside Marking Rule:

Y : Year 2024→K、2025→L。

W : Week 01~26→A~Z、27~52→a~z、53→0。

ZZ : Series Code。

Ab : Product Code → 8202。