

## Bidirectional I<sup>2</sup>C Bus and SMBus Voltage Level Translator

### Features

- 1-Bit Bidirectional Translator
- I<sup>2</sup>C and SMBus Compatible
- Less than 1.5ns Maximum Propagation Delay to Accommodate Standard-Mode and Fast-Model I<sup>2</sup>C Devices and Multiple Masters
- Allows Voltage-Level Translator Between
  - ◆ 1.2V V<sub>REF1</sub> and 2.5V, 3.3V, 5V V<sub>REF2</sub>
  - ◆ 1.8V V<sub>REF1</sub> and 3.3V, 5V V<sub>REF2</sub>
  - ◆ 3.3V V<sub>REF1</sub> and 5V V<sub>REF2</sub>
- Provides Bidirectional Voltage Translation without Direction Pin
- Low 3.5Ω ON-State Connection Between Input and Output Ports Provides Less Signal Distortion
- Open-Drain I<sup>2</sup>C I/O Ports
- 5V Tolerant I<sup>2</sup>C I/O Ports to Support Mixed Mode Signal Operation
- High Impedance for SCL1 and SCL2 as EN=Low
- Lock-up-Free Operation for Isolation When EN=Low

### General Description

The G3403 is a bidirectional I<sup>2</sup>C and SMBUS voltage-level translator with an enable (EN) input, and is operational from 1.2V to 3.3V V<sub>REF1</sub> and 2.5V to 5.5V V<sub>REF2</sub>. It allows bidirectional voltage translations between 1.2V and 5V, without use of directional pin. The low ON-state resistance (r<sub>ON</sub>) of the switch ensures the connections to be with minimal propagation delay. When EN is high, the translator switch is ON, and the SCL1 I/O is connected to the SCL2 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 system designer could isolate two halves of a bus by using the G3403; thus, more I<sup>2</sup>C devices or longer trace length can be accommodated.

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. The G3403 is designed to work with standard-mode and fast-mode I<sup>2</sup>C devices. Standard mode I<sup>2</sup>C devices only specify 3mA in a generic I<sup>2</sup>C system where standard mode devices and multiple masters are possible. Under certain conditions, high termination currents can be used.

When the SCL1 or SCL2 port is low, the clamp is in the ON state, and a low resistance connection exists between the SCL1 and SCL2 ports. Assuming the higher voltage is on the SCL2 port, when the SCL2 port is high, the voltage on the SCL1 port is limited to the voltage set by V<sub>REF1</sub>. When the SCL1 is high, the SCL2 port is pulled up to the drain pull-up supply voltage (V<sub>DPU</sub>) by pull-up resistors. This function allows a seamless translation between higher and lower voltages selected by the user, without any directional control.

### Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G3403TL1U	343x	-40°C to +85°C	SC-70-6 (SOT-363)

Note: TL: SC-70-6 (SOT-363)

1: Bonding Code

U: Tape & reel

### Pin Configuration

