

Dual Bidirectional I²C Bus and SMBus Voltage-Level Translator

Features

- 2-Bit Bidirectional Translator for SDA and SCL Lines in Mix-Mode I²C Applications
- I²C and SMBus Compatible
- Less than 1.5ns Maximum Propagation Delay to Accommodate Standard-Mode and Fast-Model I²C Devices and Multiple Masters
- Allows Voltage-Level Translator Between
 - ◆ 1.2V V_{REF1} and 2.5V, 3.3V, 5V V_{REF2}
 - ◆ 1.8V V_{REF1} and 3.3V, 5V V_{REF2}
 - ◆ 3.3V V_{REF1} and 5V V_{REF2}
- Provides Bidirectional Voltage Translation without Direction Pin
- Low 3.5Ω ON-State Connection Between Input and Output Ports Provides Less Signal Distortion
- Open-Drain I²C I/O Ports
- 5V Tolerant I²C I/O Ports to Support Mixed Mode Signal Operation
- High Impedance SCL1, SDA1, SCL2 and SDA2 Pins for EN=Low
- Lock-up-Free Operation for Isolation When EN=Low

General Description

The G3401 is a dual bidirectional I²C and SMBUS voltage-level translator with an enable (EN) input, and is operational from 1.2V to 3.3V V_{REF1} and 2.5V to 5.5V V_{REF2}. It allows bidirectional voltage translations between 1.2V and 5V, without use of 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 SCL1 I/O 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 exists between ports.

In I²C 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 G3401; thus, more I²C devices or longer trace length can be accommodated.

In standard I²C 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 G3401 is designed to work with standard-mode and fast-mode I²C devices. Standard mode I²C devices only specify 3mA in a generic I²C system where standard mode devices and multiple masters are possible. Under certain conditions, high termination currents can be used.

When the SDA1 or SDA2 port is low, the clamp is in the ON state, and a low resistance connection exists between the SDA1 and SDA2 ports. Assuming the higher voltage is on the SDA2 port, when the SDA2 port is high, the voltage on the SDA1 port is limited to the voltage set by V_{REF1}. When the SDA1 is high the SDA2 port is pulled up to the drain pull-up supply voltage (V_{DPU}) by pull-up resistors. This function allows a seamless translation between higher and lower voltages selected by the user, without any directional control. The SCL1/SCL2 channel works like the SDA1/SDA2 channel.

All channels 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 translation solutions, since the fabrication of the switch is symmetrical.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)	REMARK
G3401V11U	3401	-40°C to 85°C	VSSOP-8	OBsolete
G3401KC1G	3401	-40°C to 85°C	TDFN3X2-8	
G3401A91G	3401	-40°C to 85°C	ADFN3X2-8	
G3401A71U	34 1x	-40°C to 85°C	AQFN1.5X1.5-8	

Note: V1: VSSOP-8 KC: TDFN3X2-8 A9: ADFN3X2-8 A7: AQFN1.5X1.5-8

1: Bonding Code

U & G: Tape & reel

Pin Configuration

