UM10540

NVT2001GM and NVT2002DP demo boards

Rev. 1 — 7 March 2012 **User manual**

Document information

Info	Content
Keywords	NVT, voltage translator, level translator, level shift, passive voltage translator, passive level translator, passive level shift, I2C-bus, SMBus, SPI, NVT2001, NVT2002
Abstract	NXP Voltage Translators (NVT) are used in bidirectional signaling voltage level translation applications for I/O buses with incompatible logic levels. The NVT2001 and NVT2002 are single- and dual-channel voltage translators, operational from 1.0 V to 3.6 V at $V_{CC(A)}$ (low voltage side) and 1.8 V to 5.5 V at $V_{CC(B)}$ (high voltage side) without direction control for open-drain or push-pull I/O devices.

Revision history

Rev	Date	Description
v.1	20120307	user manual; initial release

Contact information

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1. Introduction

The NVT2001GM (OM13315) and NVT2002DP (OM13318) demo boards are designed to evaluate the NXP 1-channel or 2-channel bidirectional voltage level translators. The demo boards interface between device I/Os operating at different voltage levels. Since the NVT2001GM and NVT2002DP devices are passive devices, pull-up resistors may be needed depending on the I/O interface type (totem pole or open-drain), difference in translation voltage, and the translation direction (high to low voltage, low to high voltage, or bidirectional). The NVT2001GM and NVT2002DP devices allow translations between any voltages from 1.0 V to 5.5 V.

Please refer to NVT2001/NVT2002 data sheet (Ref. 1) and application note *AN11127* (Ref. 2) for more detailed information.

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019aac712

a. NVT2001GM (OM13315)

b. NVT2002DP (OM13318)

Fig 1. Bidirectional voltage level translators demo boards

2. Hardware description

2.1 Schematic

The demo boards contain footprints for the NVT2001GM and NVT2002DP devices, where the jumpers, headers, and passive components are shared. The NVT2001GM and NVT2002DP demo board schematic is shown in Figure 2. Pins 2 and 3 on J1 must be shorted to enable the part. Pins 4 and 1 on J3 are power and GND for the low voltage side. Pins 4 and 1 on J4 are power and GND for the high voltage side. All Bn I/O pins on the right side have 10 kΩ pull-up resistors to VREFB and all An I/O pins on the left side have 10 kΩ pull-up resistors to VREFA through jumper J2. A shunt needs to be installed at J2 if VREFB − VREFA < 1 V. If VREFB − VREFA ≥ 1 V, then J2 should be open and resistors R2 and R3 must be removed. If they are not removed, then a resistive path exists between the A-side I/Os that can impact the efficiency and signal integrity of the solution.

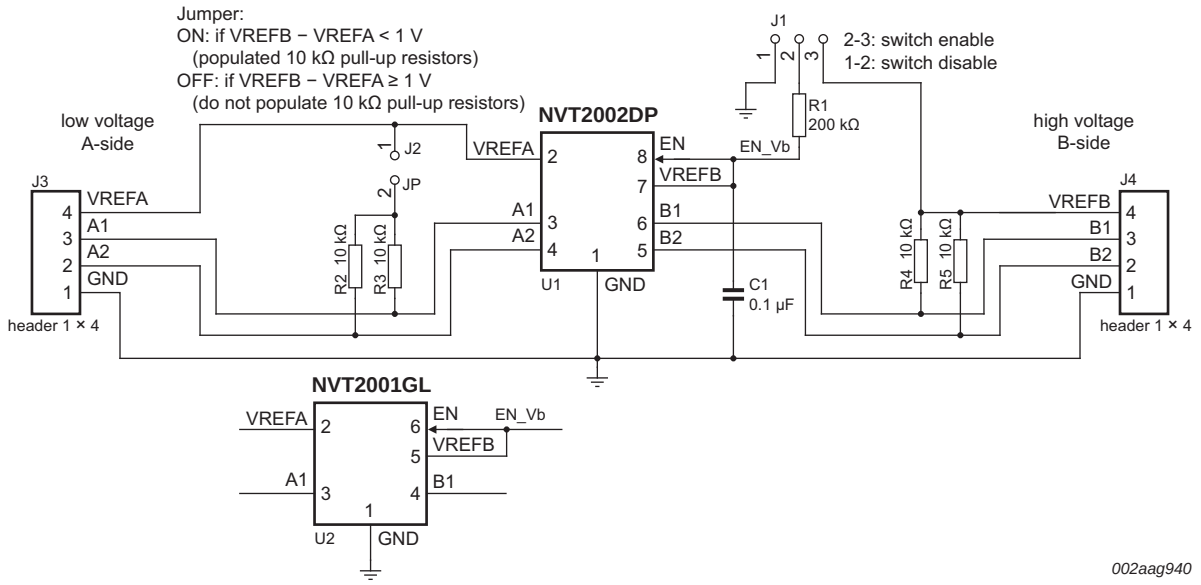

Fig 2. NVT2001GM and NVT2002DP demo board schematic

2.2 Jumper and header functions

The functions of the jumpers and headers on these demo boards are shown in Table 1.

Table 1. Header descriptions for NVT2001GM (OM13315) and NVT2002DP (OM13318) demo boards

Jumper/header	Function	Notes
J1 (3-pin)	Device switch enable or disable control	Short pins 2 and 3 to enable the NVT2001GM or NVT2002DP device (default). When pins 1 and 2 are shorted, the device is disabled.
J2 (2-pin)	Connects 10 kΩ pull-up resistors to VREFA on low voltage side for VREFB – VREFA < 1 V	Short pins 1 and 2 to connect 10 kΩ pull-up resistors to VREFA on low voltage side (default). **Remark:** Pins 1 and 2 must be open and 10 kΩ pull-up resistors must be removed when VREFB – VREFA ≥ 1 V.
J3 (4-pin)	Low voltage VREFA, GND and An I/O signal connect pins	Pin 1 = VREFA: low voltage power. Pin 4 = GND: low voltage ground. A1 is low voltage signal for NVT2001GM. A[1:2] are low voltage signals for NVT2002DP.
J4 (4-pin)	High voltage VREFB, GND and Bn I/O signal connect pins	Pin 1 = VREFB: high voltage power. Pin 4 = GND: high voltage ground. B1 is high voltage signal for NVT2001GM. B[1:2] are high voltage signals for NVT2002DP.

3. Abbreviations

Table 2. Abbreviations

Acronym	Description
I^2C-bus	Inter-Integrated Circuit bus
I/O	Input/Output
SMBus	System Management Bus
SPI	Serial Peripheral Interface

4. References

[1] **NVT2001; NVT2002, “Bidirectional voltage level translator for open-drain and push-pull applications” —** Product data sheet; NXP Semiconductors; www.nxp.com/documents/data_sheet/NVT2001_NVT2002.pdf

[2] **AN11127, “Bidirectional voltage level translators NVT20xx, PCA9306, GTL2000, GTL2002, GTL2003, GTL2010” —** application note; NXP Semiconductors; www.nxp.com/documents/application_note/AN11127.pdf

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