



Bidirectional Voltage Level Translator for Open-Drain and Push-Pull Applications

NVT2002

Last Updated: Jan 19, 2026

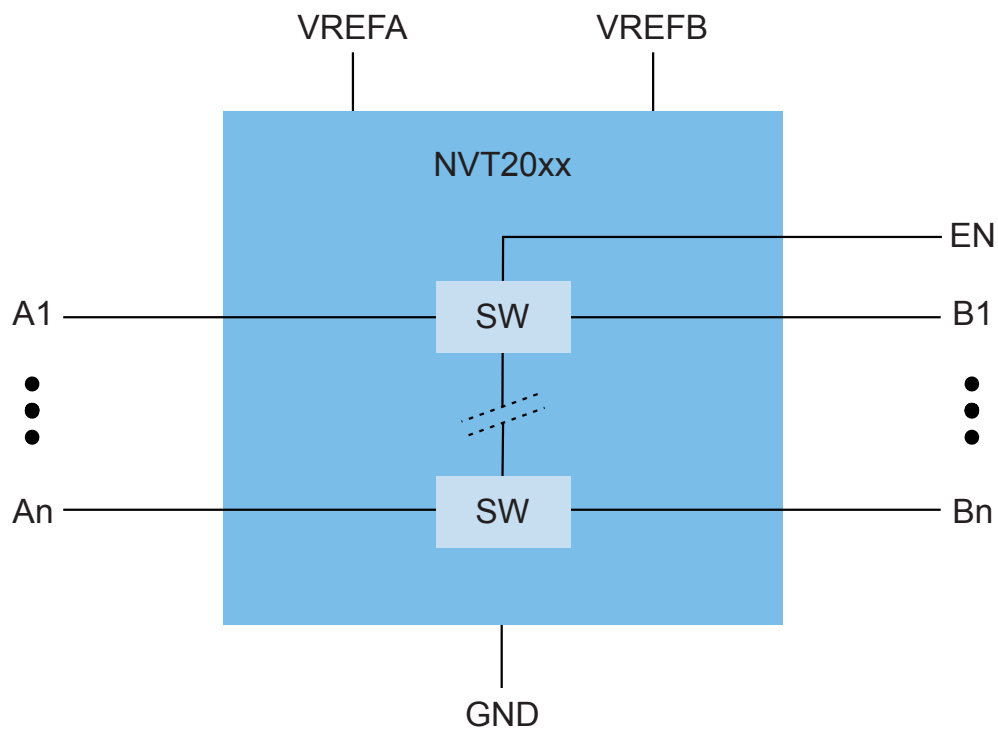
The NVT2002 is a 2-bit bidirectional voltage-level translator that operates from 1.0 V to 3.6 V on the A side and from 1.8 V to 5.5 V on the B side. It allows bidirectional voltage translation between 1.0 V and 5 V without requiring a direction pin in open-drain or push-pull applications.

When the An or Bn port is LOW, the clamp is in the ON-state and a low resistance connection exists between the An and Bn ports. The low ON-state resistance (R_{on}) of the switch allows connections to be made with minimal propagation delay. Assuming the higher voltage is on the Bn port when the Bn port is HIGH, the voltage on the An port is limited to the voltage set by VREFA. When the An port is HIGH, the Bn port is pulled to the drain pull-up supply voltage ($V_{pu(D)}$) by the pull-up resistors. This functionality allows a seamless translation between higher and lower voltages selected by the user without the need for directional control.

When EN is HIGH, the translator switch is on, and the An I/O are connected to the Bn 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. The EN input circuit is designed to be supplied by Vref(B). To ensure the high-impedance state during power-up or power-down, EN must be LOW.

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 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.

NVT2002 Block Diagram



View additional information for [Bidirectional Voltage Level Translator for Open-Drain and Push-Pull Applications](#).

Note: The information on this document is subject to change without notice.

www.nxp.com

NXP and the NXP logo are trademarks of NXP B.V. All other product or service names are the property of their respective owners. The related technology may be protected by any or all of patents, copyrights, designs and trade secrets. All rights reserved. © 2026 NXP B.V.