



Autosense Translators - 1, 2, 4, 8 channel level translator

**Low power consumption,
wide supply voltage range**

Over the last decade semiconductor CMOS technology has advanced to produce high-performance systems with lower voltage and lower power I/O standards, especially in portable applications. There is an inherent requirement that many applications utilize a mix of i/o voltages and power-supplies which has been driven by design and manufacturing of lower power systems. When older legacy peripherals are used in multi-voltage applications these higher voltage devices need to be interfaced with the lower voltages of the latest application processors that are used widely today. Nexperia's autosense translators enable these voltage translating interfaces and can be used for both push-pull buffered and open-drain applications.

Overview

Nexperia's Voltage Level Translators offer lower voltage and excellent performance in pin-to-pin compatible packages with industry-standard footprints. These bi-directional level translators address various applications that need a transition of voltage signals through multiple domains and serves as an interface between different supply and I/O voltage levels. With auto-direction sensing, no external direction pin is required allowing these families to match up well with the latest low voltage microprocessors.

Key Features

- › Complete Family – comprising of 1, 2, 4 and 8-channel level translators
- › Easy to Use – Dual supply translating transceiver family
- › Auto-sensing bi-directional – no direction pin required
- › Wide Voltage Level Translation (wide supply voltage range)
 - › NXS
 - › $V_{CC(A)}$: 1.65 V to 3.6 V and $V_{CC(B)}$: 2.3 V to 5.5 V
 - › NXB
 - › $V_{CC(A)}$: 1.2 V to 3.6 V and $V_{CC(B)}$: 1.65 V to 5.5 V
- › Overvoltage tolerant inputs up to 5.5V
- › Multiple pin-compatible package options
- › I_{OFF} circuitry provides partial power-down mode operation
- › Low power consumption
- › Specified from -40 °C to +85 °C and -40 °C to +125 °C

NXS010x level shifters are switch-type translators that include a one-shot pull-up that delivers better operation in higher capacitance systems with minimal overshoot and are optimized for I²C-bus and other open-drain applications.

NXB010x level shifters comprising of one-shot pull-ups and pull-downs are ideal for use as push-pull drivers for long-trace, capacitive, or high-impedance loads in applications that use SPI, Secure Digital, or UART interfaces.

Applications

NXS

- › Open-drain applications
- › I²C, SMBus, UART, GPIO and other telecom infrastructure
- › Mobile and computing
- › Automotive

NXB

- › Push-Pull based applications
- › General Portable consumer applications
- › Bluetooth headsets
- › Mobile and computing
- › Communications systems
- › Automotive

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EFFICIENCY WINS.

NXS level shifters are switch-type translators suitable for open-drain application. They are FET based devices that use an N-channel pass-gate transistor that ties two ports together (Figure1.) and do not need an input signal to change the direction from port A to B or from Port B to A.

The combination of an N-channel pass FET, integrated with 10 kΩ pull-up resistors, and edge-rate acceleration circuits makes NXS translators ideal for interfacing devices or systems operating at disparate voltage levels, while also allowing for simple interfacing with open-drain drivers, as is required in I²C, 1-wire, and SD/MMC-card interface applications.

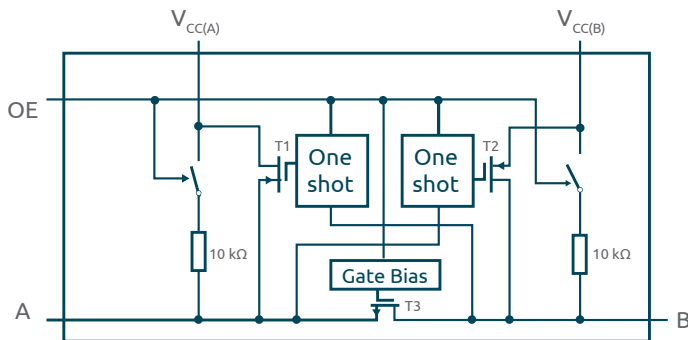


Figure 1 Open-drain based NXS Autosense Translation

NXB level shifters (Figure2.) are ideal for use as push-pull or CMOS-type drivers that drive long traces, capacitive, or high-impedance loads in applications that use SPI and UART interfaces.

The architecture of one I/O channel of an NXB level translator incorporates a weak buffer with one-shot circuitry to improve the transition speeds of rising and falling edges. As an example, when the A port is connected to a system driver and driven high, the one-shot will trigger when it senses the rising edge and the high-drive buffer drives the B port high. The weaker 4 kΩ will hold B high once the one-shot pulse is complete. Similarly the same is true for driving low.

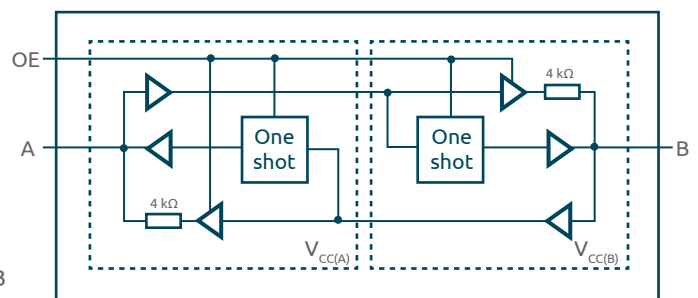


Figure 2 Push-pull based, NXB Autosense Translation

Output edge-rate accelerator

The addition of one-shot circuitry, provides the NXB / NXS family with output edge-rate accelerators to improve LOW-to-HIGH transition time (NXS devices) or both HIGH-to-LOW and LOW-to-HIGH (NXB devices). During a transition the output one-shot switches on the NMOS transistor (HIGH-to-LOW transitions) or the PMOS transistor (LOW-to-HIGH transitions). This lowers the output impedance increasing current drive and reducing the output transition time. The one-shot is activated once the input transition reaches half of its reference supply voltage and a low ohmic pulse is generated producing a fast transient on the output.

Autosense Voltage level Translator Families

Product	Description	V _{CC(A)} (V)	V _{CC(B)} (V)	T _{amb} (°C)	Product type
NXS0101	Switch based, 1-bit dual supply translating transceiver with auto-direction sensing	1.65 - 3.6	2.3 - 5.5	-40 °C to +125 °C	NXS0101GM, NXS0101GS
NXB0101	Push-Pull, 1-bit dual supply translating transceiver with auto-direction sensing	1.2 - 3.6	1.65 - 5.5	-40 °C to +125 °C	NXB0101GM, NXB0101GS
NXS0102	Switch based, 2-bit dual supply translating transceiver with auto-direction sensing	1.65 - 3.6	2.3 - 5.5	-40 °C to +125 °C	NXS0102GT, NXS0102GX, NXS0102DC
NXB0102	Push-Pull, 2-bit dual supply translating transceiver with auto-direction sensing	1.2 - 3.6	1.65 - 5.5	-40 °C to +125 °C	NXB0102GT*, NXB0102DC
NXS0104	Switch based, 1-bit dual supply translating transceiver with auto-direction sensing	1.65 - 3.6	2.3 - 5.5	-40 °C to +125 °C	NXS0104BQ, NXS0104BQ-Q100, NXS0104PW, NXS0104PW-Q100
NXB0104	Push-Pull, 1-bit dual supply translating transceiver with auto-direction sensing	1.2 - 3.6	1.65 - 5.5	-40 °C to +125 °C	NXB0104BQ, NXB0104PW, NXB0104BQ-Q100, NXB0104PW-Q100
NXS0108	Switch based, 8-bit dual supply translating transceiver with auto-direction sensing	1.2 - 3.6	1.65 - 5.5	-40 °C to +125 °C	NXS0108BQ, NXS0108BQ-Q100, NXS0108PW, NXS0108PW-Q100
NXB0108	Push-Pull, 8-bit dual supply translating transceiver with auto-direction sensing	1.2 - 3.6	1.65 - 5.5	-40 °C to +125 °C	NXB0108BQ, NXB0108BQ-Q100, NXB0108PW, NXB0108PW-Q100

Packages

SOT	Package Suffix	Package Name	No of pins	Package dimensions L x W x H (mm)	Lead pitch (mm)	Package
SOT1202	GS	XSON6	6	1 x 1 x 0.35	0.35	
SOT886	GM	XSON6	6	1.45 x 1 x 0.5	0.5	
SOT1174-1	GU12	XQFN12	12	1.7 x 2 x 0.5	0.4	
SOT833-1	GT	XSON8	8	1.95 x 1 x 0.5	0.5	
SOT363	GW	TSSOP6	6	2.1 x 2 x 0.95	0.65	
SOT765-1	DC	VSSOP8	8	2 x 3.1 x 1	0.5	
SOT762-1	BQ	DHVQFN14	14	3 x 2.5 x 1	0.5	
SOT764-1	BQ	DHVQFN20	20	4.5 x 2.5 x 1	0.5	
SOT402-1	PW	TSSOP14	14	5 x 6.4 x 1.1	0.65	
SOT360-1	PW	TSSOP20	20	6.5 x 6.4 x 1.1	0.65	

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