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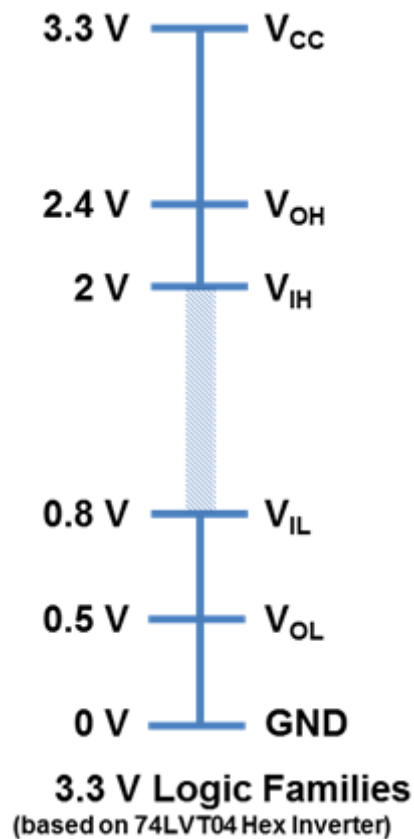
Logic Levels

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3.3 V CMOS Logic Levels

As technology has advanced, we have created devices that require lower power consumption and run off a lower base voltage (V_{cc} = 3.3 V instead of 5 V). The fabrication technique is also a bit different for 3.3 V devices that allows a smaller footprint and lower overall system costs.

3.3 V Logic Families
(based on 74LVT04 Hex Inverter)

In order to ensure general compatibility, you will notice that most of the voltage levels are almost all the same as 5 V devices. A 3.3 V device can interface with a 5V device without any additional components. For example, a logic 1 (HIGH) from a 3.3 V device will be at least 2.4 V. This will still be interpreted as a logic 1 (HIGH) to a 5V system because it is above the V_{IH} of 2 V.

A word of caution, however, is when going the other direction and interfacing from a 5 V to a 3.3 V device to ensure that the 3.3 V device is 5 V tolerant. The specification you are interested in is the *maximum* input voltage. On certain 3.3 V devices, any voltages above 3.6 V will cause permanent damage to the chip. You can use a simple voltage divider (like a 1KΩ and a 2KΩ) to knock down 5 V signals to 3.3 V levels or use one of our logic level shifters.
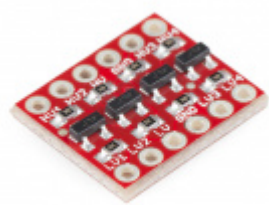
SparkFun Logic Level Converter - Bi-Directional
◉ BOB-12009

$3.50
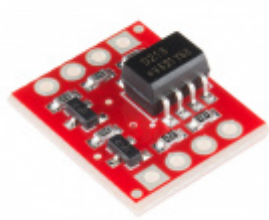
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SparkFun Logic Level Converter - Single Supply
◯ PRT-14765

SparkFun Opto-isolator Breakout
◉ BOB-09118

$5.50

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SparkFun Voltage-Level Translator Breakout - TXB0104
◉ BOB-11771

$4.95

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