

Protecting Your Digital Isolator Using Overvoltage Tolerant Inputs

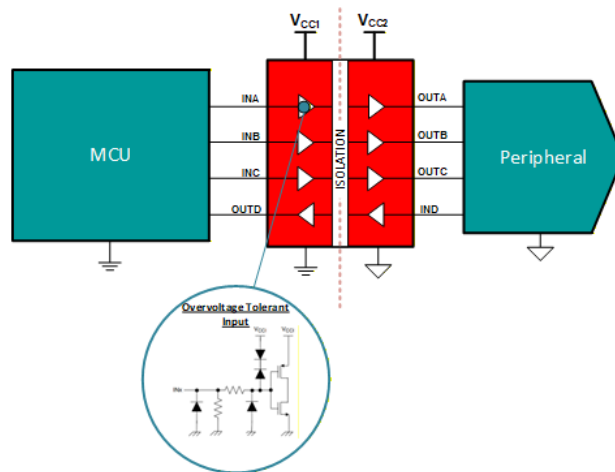


Figure 1. Overvoltage Tolerant Input

Overview

Overvoltage-tolerant inputs are digital isolator input pins that accept logic signals at voltages higher than the isolator input-side supply, within specified datasheet limits, without causing latch-up or back-feeding current into that input-side supply. This allows for signals to be applied when the digital isolator is powered off, without damaging the digital isolator.

This is achieved with internal protection structures (such as reverse-protection diodes and clamp circuitry) that prevent current from flowing into the device supply rail when the input is driven above VCC.

This allows the digital isolator to remain undamaged when a signal is applied while powered down and to interface directly with higher-voltage logic standards or other overvoltage conditions, while still meeting the absolute maximum ratings.

Overvoltage-tolerant inputs of a digital isolator, such as the ISO6441, allow a low-voltage isolated domain (for example, 3.3V) to receive signals from a higher-voltage domain (for example, 5V) without requiring extra level-shifting ICs, thereby simplifying the design and reducing component count.

Overvoltage tolerant inputs are especially helpful in:

- Industrial I/O
- PLC modules
- Motor drives
- Power-electronics gate-driver interfaces

In such applications, overvoltage tolerant inputs help with field-side logic levels or fault conditions that momentarily exceed the isolator supply, while also providing robust isolation, noise immunity, and compliance with safety standards.

Additional Resources

- Texas Instruments, [\[FAQ\] What are overvoltage tolerant inputs of digital isolators?](#) TI E2E™ support forums
- Texas Instruments, [\[FAQ\] Can a digital isolator signal voltage be different from its power supply voltage?](#) TI E2E™ support forums
- Texas Instruments, [Digital Isolator Design Guide](#) application note
- Texas Instruments, [Top design questions about digital isolators](#) technical article

Table 1. Recommended Parts

Commercial Devices	Automotive Devices (AEC-Q100)	Supply Voltage (VCC) Range	Integrated DC/DC	Features
ISO6041	-	1.71 to 5.5V	-	Highest bandwidth: 200Mbps, 1.2ns (max.) PWD and channel to channel skew Low power (ICC) per Mbps (635µA/ch max. at 1Mbps) Reinforced isolation Small footprint package options
ISO6441	ISO64xx-Q1	2.25 to 5.5V	-	200kV/µs (min.) CMTI 150Mbps Reinforced and basic isolation Small footprint package options
ISOW6441	ISOW64xx-Q1	2.25 to 5.5V	Yes	100kV/µs (min.) CMTI Reinforced digital isolator with integrated DC/DC Low emissions

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