Optocoupler Logic Interface



Overview

The HCPL3700M voltage/current threshold detection optocoupler consists of an AlGaAs LED connected to a threshold sensing input buffer IC which are optically coupled to a high gain darlington output.

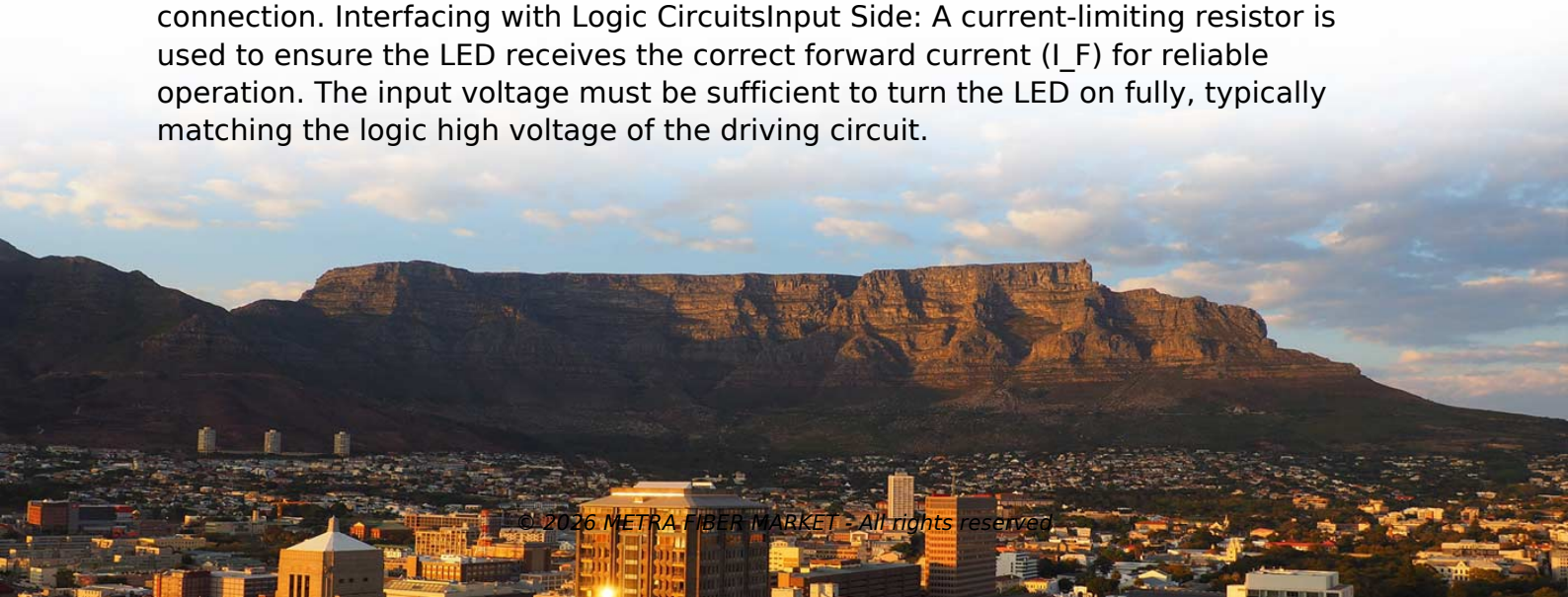
Key Takeaways

An optocoupler interfaces logic circuits by converting an input electrical signal into light, which is then detected by a photodetector to produce an isolated output signal compatible with the target logic level.

How the Logic Interface Works

An optocoupler consists of two main components: an LED on the input side and a photodetector (usually a phototransistor) on the output side. When a logic signal is applied to the input, it drives the LED, which emits infrared light proportional to the input current. This light travels across an insulating barrier to the phototransistor, which then conducts and produces a corresponding output signal.

This process electrically isolates the input and output circuits, allowing them to operate at different voltage levels or logic families without direct electrical connection. Interfacing with Logic CircuitsInput Side: A current-limiting resistor is used to ensure the LED receives the correct forward current (I_F) for reliable operation. The input voltage must be sufficient to turn the LED on fully, typically matching the logic high voltage of the driving circuit.



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Output Side: The phototransistor's collector-emitter path is connected to the output circuit, often with a pull-up resistor to define logic levels. The output may require additional circuitry, such as a Schmitt trigger, to correct signal inversion and ensure fast rise/fall times compatible with the target logic family. Logic Level Compatibility: Optocouplers can interface circuits with different logic standards (e.g., TTL, CMOS, HCT) by adjusting resistor values and ensuring the output voltage and current meet the receiving logic's requirements.

Key Parameters

Current Transfer Ratio (CTR): The ratio of output current (I_C) to input LED current (I_F), expressed as a percentage, determines how effectively the input signal is translated to the output.

CT

R varies with optocoupler type, temperature, supply voltage, and device aging. Isolation: The optocoupler provides galvanic isolation, meaning the input and output circuits can have separate power supplies, protecting sensitive components from high voltages or noise.

Practical Considerations

Use appropriate resistors to control LED current and output voltage levels. Consider adding a Schmitt trigger or inverter to improve signal integrity and match logic levels.

Verify CT

R and switching speed to ensure reliable operation at the desired logic frequency. In summary, the logic interface of an optocoupler allows safe, isolated communication between circuits with different voltage levels or logic families, using light as the medium to transfer the signal while maintaining electrical separation.

Article Content

HCPL3700M

The HCPL3700M voltage/current threshold detection optocoupler consists of an AlGaAs LED connected to a threshold sensing input buffer IC which are optically coupled to a high gain darlington output.

Optocoupler Tutorial and Optocoupler Application

The above figure shows how to interface a microcontroller or Arduino output signal (5 volts, 5 mA) with a relatively high current load through an optocoupler and BJT stages.

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AC/DC to Logic Interface Optocouplers

By combining several unique functions in a single package, the user is provided with an ideal component for industrial control computer input boards and other applications where a predeter-mined input

Specific Function Optocouplers | HCPL3700M

The HCPL3700M voltage/current threshold detection optocoupler consists of an AlGaAs LED connected to a threshold sensing input buffer IC which are optically coupled to a high gain darlington output.

Optocouplers for TTL-CMOS Logic Level Shifting

Here I''ll illustrate using optocouplers to perform voltage logic shifting between TTL and CMOS devices. Optocouplers also isolate output transistor voltages from low-voltage digital logic.

Application Examples

Optocouplers are used to isolate signals for protection and safety between a safe and a potentially hazardous or electrically noisy environment. The interfacing of the optocoupler between digital or

Optocoupler Tutorial for Beginners

An optocoupler (or opto-isolator) is a component that transfer signals between circuits using light. In this guide, you''ll learn how they work and how you

Opto-coupler Input Circuits for PLCs

Here I''ll introduce programmable logic controller (PLC) input circuits using opto-couplers. We use these devices to interface high voltage sensors to low voltage microcontroller logic and to isolate sensitive

ACPL-W60L-560E Broadcom High-Speed LVTTL Optocoupler

ACPL-W60L-560E Broadcom Component Overview ACPL-W60L-560E is a Broadcom high-speed LVTTL-compatible digital optocoupler for isolated logic signaling in 3.3 V and 5 V interface designs.

Infineon 4N37 Optocoupler, 1.3 V (Typ.), 60 mA, 5300 V ...

Phototransistor Industry Standard Single Channel 6 Pin DIP Optocoupler Interfaces with common logic familiesIt consist of a gallium arsenide infra red LED and a silicon NPN phototransistor.

ACPL-P480 PDF

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Part #: ACPL-P480. Description: High CMR Intelligent Power Module and Gate Drive Interface Optocoupler. File Size: 641.69 Kbytes. Manufacturer: Broadcom Corporation..

Application Examples

In the same way, the optocoupler can interface with other logic circuits, such as LSTTL, HCMOS, or HCTMOS components. All that needs to be done is to work the corresponding limit values VIH, VOH,

Everything You Need to Know About Optocouplers in Electronics

Have you ever heard the word isolation, especially in electronics? As you might guess, isolation is a key factor when it comes to optocouplers. Isolation is sometimes mandatory and

Optocoupler Tutorial for Beginners

An optocoupler uses light to transfer signals from one circuit over to another. This guide shows you how they work and how to use them.

Specific Function Optocouplers | HCPL3700

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Optocoupler Circuits, Working, Characteristics, Interfacing

Optocoupling devices work as logic level changeovers between two circuits, It has the ability to block noise transfer across the integrated circuits, for isolating logic levels from high voltage

Optoelectronics: Optocouplers

Optocouplers, sometimes referred to as opto-isolators or photo-couplers, are semiconductor devices that isolate unwanted signals by physically separating high-voltage circuits

Optocoupler Tutorial and Optocoupler Application

What is an Optocoupler? An optocoupler (also called an opto-isolator, photo-coupler, or optical isolator) is a solid-state semiconductor device that transfers electrical signals between two

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