

Article Overview

A slotted optical coupler module is a sensor that uses an infrared LED and phototransistor pair to detect objects or motion by interrupting a light beam across a slot.

Structure and Working Principle

A slotted optical coupler module consists of an infrared LED emitter and a phototransistor detector positioned facing each other across a narrow slot . The LED emits infrared light, which normally reaches the phototransistor. When an object, such as a slotted disc or opaque interrupter, passes through the slot, it blocks the light, causing a change in the output signal. This interruption generates digital pulses that can be counted or timed to measure motion, speed, or presence . The module provides electrical isolation between the input and output circuits, allowing safe interfacing with microcontrollers or high-voltage systems without direct electrical contact . This isolation is particularly useful in protecting sensitive electronics from voltage spikes or noise.

Applications

Slotted optical coupler modules are widely used in:

- o Non-contact object detection: Detecting the presence or absence of objects in automation systems .
- o Speed and RPM measurement: Counting pulses from a rotating slotted disc to calculate rotational speed in motors, wheels, or encoders .
- o Position sensing: Determining the position of moving parts in machinery.
- o Limit switching and end-of-tape detection: Common in industrial automation and tape-based systems .
- o Liquid level detection: Using opaque floats or markers to interrupt the light beam.

Key Parameters

- o Current Transfer Ratio (CTR): Ratio of output current to input LED current, indicating optocoupling efficiency .
- o Input-to-Output Isolation Voltage (Viso): Maximum voltage difference allowed between input and output, typically 500 V to 4 kV .
- o Response Time: Determines how fast the module can detect changes, important for high-speed applications.

Interfacing

Slotted optical coupler modules can be easily interfaced with microcontrollers like Arduino or ESP32. The

Working Principle of Slotted Optical Coupler Module

output is typically a digital signal, which can be read directly by GPIO pins. For speed measurement, the pulses generated by the module can be counted over time to calculate RPM or linear speed . Power is usually supplied at low voltage (3.3V or 5V), while the module can safely detect higher voltage signals through optical isolation .

Summary

In essence, a slotted optical coupler module is a compact, reliable, and electrically isolated sensor that converts mechanical motion or object presence into digital signals. Its combination of infrared optical detection and electrical isolation makes it ideal for automation, robotics, and industrial sensing applications .

Optocouplers, sometimes referred to as opto-isolators or photo-couplers, are semiconductor devices that isolate

A star coupler is defined as an $N \times N$ optical device that couples light from any input to all outputs without wavelength

In this case, the fiber optical coupler acts as a Y or T coupler (where Y or T depicts the form

This type of optocoupler configuration forms the basis of a very simple Solid State Relay application. It can be used to

The theory of coupling between different media is well-established, however the field of coupler design is perpetually adapting and

A basic fiber optic coupler has N input ports and M output ports. N and M typically range from 1 to 64. The number of

Key questions: What are some common uses of fiber couplers in fiber optics, including fiber lasers? What are dichroic couplers and

The fiber-optic waveguide couplers have attracted much attention recently due to their interesting properties of coupling the mode or

Optical Proximity Sensors Optical proximity sensors use light to detect the presence or absence of an object within a certain range,

Fiber optic couplers are optical devices that connect three or more fiber ends, dividing one input between two

Working Principle of Slotted Optical Coupler Module

or more outputs, or

These optical sensors work in a similar way to the slotted opto sensor but rely on infra red light reflected from an object (e.g. a sheet

What is an optoisolator (optical coupler or optocoupler)? An optoisolator (also known as an optical coupler,

The first concept shows a customized slotted coupler-interrupter assembly. We can see a slot in the form of an air gap

Among many optoisolators, the MOC7811 encoder sensor or a slotted coupler module is developed with top-mounted

Slotted Coupler/Opto Interrupter (Optical Proximity Sensor) Design and Operation: The slotted coupler, also known as an opto

It explains how slot-type optocouplers work, how this module converts mechanical motion into clean digital

Web: <https://bssoda.pl>

