

What's inside a PLC splitter

Article Overview

A PLC splitter uses a silica-based planar lightwave circuit chip with integrated waveguides to evenly divide a single optical input into multiple outputs.

Internal Structure

Inside a PLC splitter, the core component is a planar lightwave circuit (PLC) chip made of silica glass. This chip contains optical waveguides etched onto a flat substrate using photolithography and semiconductor-like fabrication techniques. The waveguides guide light from the input fiber through a network of branching paths, ensuring precise and uniform distribution to multiple output fibers. The chip is typically housed in a compact module that protects it from environmental factors and maximizes optical coupling efficiency.

Working Principle

- o **Input Coupling:** The optical signal enters the splitter through an input fiber and is coupled into the input waveguide on the PLC chip.
- o **Propagation:** Light travels through the waveguides via total internal reflection, maintaining signal integrity.
- o **Splitting:** The waveguides branch out in Y-shaped or cross-shaped patterns, dividing the optical power equally or according to a specified split ratio (e.g., 1x2, 1x4, 1x8, up to 1x64). Each Y-branch splits the light into two paths, and this process is repeated in cascaded stages to achieve the desired number of outputs.
- o **Output Coupling:** The divided signals exit through output fibers, each carrying a portion of the original signal. The slight reduction in power, known as insertion loss, is consistent across outputs due to the precise waveguide design.

Fabrication Process

PLC splitters are manufactured using techniques adapted from semiconductor production:

- o **Silica Deposition:** Layers of substrate and cladding are built using flame hydrolysis deposition.
- o **Photomask Printing:** The circuit layout is transferred to a chromium glass mask.
- o **Photoresist Application and UV Exposure:** A light-sensitive polymer is applied and patterned with ultraviolet light to define the waveguides.
- o **Etching and Assembly:** The waveguides are etched, and the chip is integrated with input/output fiber arrays and protective housing.

Applications

PLC splitters are widely used in Passive Optical Networks (PON), FTTx deployments, and 5G front-haul networks. They allow a single fiber from a central office or distribution hub to serve multiple endpoints.

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reliably without requiring power. Their compact size, high reliability, and uniform signal distribution make them ideal for both centralized and distributed network architectures. In summary, the PLC splitter's internal design combines precision waveguides, Y-branch splitting, and robust packaging to efficiently distribute optical signals across multiple outputs while maintaining consistent performance.

PLC splitter is widely installed between Optical Line Terminal (OLT) and the Optical

A steel tube PLC splitter looks like a bare fiber splitter. The main difference from the bare fiber splitter is that the steel tube PLC

PLC splitter provides a low-cost light distribution solution with high stability and reliability. PLC optical splitter can offer a splitting ratio

A PLC splitter is made with techniques much like those to manufacture semiconductors, and these optical splitters are very compact,

Discover the importance and working principle of PLC splitters in fiber optic networks. Learn about the types, benefits,

According to the Broadband Forum, PLC splitters are essential for achieving scalable and

PLC splitters are capable of deployment in a central office (CO) by an OLT, or inside an outside plant (OSP) cabinet located closer to

Unlike electrical splitters, PLC splitters manage light transmission within fiber optic cables. They are built using silica

Learn what a PLC splitter is, how it works, and its main types including bare fiber, ABS box, LGX, and rack mount.

PLC fiber splitter design consists of one optical PLC chip and several optical arrays

PLC Splitter: Planar Waveguide Circuit splitter PLC Splitter uses semiconductor technology (lithography, etching,

A PLC splitter (Planar Lightwave Circuit Splitter) is an essential passive component in fiber optic networks. Its job is to

In-Depth Guide: Selecting the Right PLC Splitter for Your Network As network wiring

What s inside a PLC splitter

In this guide, we'll talk about what a PLC splitter is, why it's useful, what types there are, and

Understanding PLC Splitters: Essential Components of Modern Fiber-Optic Networks As fiber-optic technology continues to advance

In conclusion, the PLC Fiber Splitter is a critical component in modern fiber optic infrastructure. Its ability to efficiently

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