

# Calculation of Positive and Negative Gain in Optical Cable Splicing



## Article Overview

Positive gain in optical splicing occurs when measured power exceeds the reference, while negative gain (loss) occurs when measured power is lower, both expressed in dB.

### Understanding Gain and Loss in Fiber Splicing

In optical fiber splicing, gain and loss are measured in decibels (dB), which is a logarithmic scale. If the measured optical power at a splice is greater than the reference power, the logarithmic calculation yields a positive dB value, indicating gain. Conversely, if the measured power is less than the reference, the dB value is negative, indicating loss. A zero dB change means the measured power equals the reference power, showing no gain or loss. The formula for calculating gain or loss in dB is:  $\text{dB} = 10 \times \log_{10}(P_{\text{measured}} / P_{\text{reference}})$

- Positive dB:  $P_{\text{measured}} > P_{\text{reference}} \rightarrow \text{gain}$
- Negative dB:  $P_{\text{measured}} < P_{\text{reference}} \rightarrow \text{loss}$
- 0 dB:  $P_{\text{measured}} = P_{\text{reference}} \rightarrow \text{no change}$

### Factors Affecting Splice Measurements

- Mode Field Diameter (MFD): Differences in MFD between fibers can create apparent gain or exaggerated loss on an OTDR. For example, splicing G.652.D fiber to G.657 bend-insensitive fiber may show a “gainer” due to MFD mismatch, even though the actual splice loss is minimal ....

## Article Content

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### Fibre Optic Cabling Loss Limits Explained – Trend Networks

Learn about fibre optic cabling loss limits & how to calculate them. Gain insights from experts on acceptable loss for

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### Uni-directional Single-mode OTDR Measurements

If the backscatter coefficients of fibers located immediately before and after a splice point are significantly different, the

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### Understanding and mitigating OTDR “gainer

Distance (km or mi) Figure 4. Exaggerated gain and loss due to MFD discontinuity (Courtesy of Corning) he exaggerated gain

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### Understanding Fiber Loss: What Is It and How to Calculate It?

This post introduces the main fiber loss types, the calculation process of link loss including fiber attenuation,

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### Calculating Fiber Loss and Distance Estimates

Estimate the total link loss across an existing fiber optic link if the fiber length and loss variables are known Estimate the maximum

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### Tutorial Passive Fiber Optics, Part 6: Fiber Joints

Also calculate fiber coupling efficiencies; simulate effects of bending, nonlinear self-focusing or gain guiding on beam propagation,

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### Are You Positive It's Negative?

Insertion Loss & its calculation explained in detail by Fluke Networks. Fluke Networks' CertiFiber® Pro and OptiFiber®

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## Introduction to Optical Fibers, dB, Attenuation and Measurements

This document is a quick reference to some of the formulas and important information related to optical technologies.

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## The FOA Reference For Fiber Optics

As you move to the right, power increases and the value in dBm gets more positive – that would be gain.

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## Optical Fiber Splice Loss

Definition Fusion splicing is a technique to join two fibers ends. Optical power loss at the splicing point is known as splice loss. How

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## OTDR Gainers: How OTDRs Work, Part 3

When the OTDR was testing a splice between high-loss fiber to a low-loss fiber, the measured loss in that direction would be greater.

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## Optical Fiber Splice Loss

When fibers with different MFD values are spliced together, a MFD mismatch occurs at splice point. With the help of the following

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## Gain – amplifier, optical amplification

The gain of an amplifier is a measure of the strength of amplification. It is often expressed in decibels. High-gain optical amplifiers

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## Fiber Optic Cable Splicing Methods: A Practical Guide

While this guide provides a solid overview of fiber optic cable splicing, the successful execution of these methods

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## The FOA Reference For Fiber Optics

The Optical Time Domain Reflectometer (OTDR) is useful for testing the integrity of fiber optic cables. It can verify splice loss,

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## The Ultimate Guide to Splicing of Fiber: Techniques and Tips

Looking to understand fiber splicing? It's the process of joining two fiber optic cables using techniques such as fusion

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## Application Note\_Splicing & OTDR Measurements

The splice effect displayed by the OTDR is a combination of the actual true splice loss and the apparent gain or loss resulting from

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## Multimode Splice Loss

However, differences in the backscattering coefficients between two fibers can also show up as an exaggerated loss or even a power

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## Optical Distance From System Gain Calculator

Calculate optical fiber distance from system gain and attenuation. Include connectors, splices, margins, and reserves. Build reliable

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## Steps of Fusion Splicing Fiber Optic Cables

Fusion Splicing means securely connecting two optical fibers by heating their end faces and pushing them together to

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## Optical Return Loss Measurement

Executive Summary To ensure the proper performance of an optical transmission system, various parameters—such as attenuation

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## The FOA Reference For Fiber Optics

If you are using a separate source and power meter, loss will be a negative number and gain will be a positive number. But because

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## The FOA Reference For Fiber Optics

They transmit voice over fiber optic cables already installed, allowing technicians splicing or testing the fiber to communicate

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Calculating Fiber Optic Loss Budgets

Calculating Cable Plant Link Loss Budget Loss budget analysis is the calculation of a fiber optic cabling system's estimated loss

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The FOA Reference For Fiber Optics

Some OTDRs can also calculate ORL for this same definition. Reflectance Testing By OTDR The OTDR can measure the amount of

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Calculating DB Power Loss and Power Gain | PDF | Decibel | Optical

The document discusses the calculation of dB loss and gain in optical power, primarily in fiber optics, using the formula  $\text{dB} = 10\text{Log}_{10}$

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Understanding Optical Loss in Fiber Networks

Optical fiber is a fantastic medium for propagating light signals, and it rarely needs amplification in contrast

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Tutorial Passive Fiber Optics, Part 6: Fiber Joints

It is relatively easy to calculate coupling losses for single-mode fibers. Essentially, the guided mode from the first fiber (the input)

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Fibre Optic Cable Splicing Guidelines | PDF | Optical Fiber | Wire

The document provides guidelines for splicing fibre optic cable. It outlines the necessary tools, materials and steps for preparing the

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Guidelines On What Loss To Expect When Testing Fiber Optic Cables

Guidelines On What Loss To Expect When Testing Fiber Optic Cables To be able to judge whether a fiber optic cable plant is good,

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## What are OTDR Gainer Events?

In practical terms, fiber optic gainer events appears when two fibers with different backscatter coefficients are spliced or connected,

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## Fibre splice loss: a simple method of calculation | Optical ...

We evaluate the loss encountered when splicing between two circular single-mode fibres with unmatched parameters.

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## What is Optical Fibre Splice Loss?

The portion of the optical power that does not pass through the splice and is radiated out of the fibre is referred to as

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## Gainer or High Splice Loss – The Effects of Mode Field Diameter

That test is the appearance of inaccurately high splice loss or “gainers” using an optical time domain reflectometer

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## Optical Fiber Splicing: The Complete Technical Guide to Methods ...

Poor fiber splicing, on the other hand, can lead to performance issues and increased maintenance costs. This guide breaks down the

## Contact Us

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