

The on off ratio of an optical transmitter refers to

Article Overview

The on/off ratio of an optical transmitter, also called the extinction ratio, is the ratio of optical power when the transmitter is on (logic 1) to when it is off (logic 0), typically expressed in dB or as a percentage.

Definition and Formula

The on/off ratio quantifies how effectively an optical transmitter distinguishes between logic levels. It is defined as:

$$\text{Extinction Ratio (ER)} = \frac{P_{\text{on}}}{P_{\text{off}}}$$

where P_{on} is the optical power when transmitting a '1' and P_{off} is the power when transmitting a '0'. In decibels, it is expressed as:

$$\text{ER (dB)} = 10 \log_{10} \frac{P_{\text{on}}}{P_{\text{off}}}$$

A higher extinction ratio indicates a clearer distinction between logic levels, which reduces bit errors and improves system performance.

Typical Values

For practical optical transmitters using on-off keying (OOK):

- o Short-range or data center modules often have ER values around 10 dB .
- o High-performance systems may achieve 13 dB or higher, depending on the laser type and modulation scheme .
- o In percentage terms, an ER of 10 dB corresponds to an on/off power ratio of about 10:1.

Impact on System Performance

The extinction ratio directly affects the bit-error rate (BER) and the maximum transmission distance. A low ER reduces the signal contrast, making it harder for the receiver to distinguish between '1' and '0', which can increase BER and require additional amplification or regeneration . Conversely, a very high ER improves signal integrity but may increase power consumption or stress the laser.

Measurement

The ER is commonly measured using an eye diagram, which visually represents the optical signal levels over time. The vertical opening of the eye corresponds to the difference between P_{on} and P_{off} , allowing engineers to calculate the extinction ratio and assess transmitter quality . In summary, the on/off ratio (extinction ratio) is a critical parameter for optical transmitters, typically ranging from 10-13 dB in standard systems, and it plays

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a key role in ensuring reliable optical communication .

Presentations Extinction Ratio Simplified 1. Introduction This document explains extinction ratio in a simplified way. This is one of the

Measuring Reflectance or Return Loss Reflectance Reflectance (which has also been called "back reflection" or optical return loss) of

Chapter 6: Optical Amplifier Noise Origin of Ampli er Noise Optical Signal-to-Noise Ratio Electrical Signal-to-Noise Ratio Receiver

In telecommunications, extinction ratio (re) is the ratio of two optical power levels of a digital signal generated by an optical source,

Measuring Power When we make fiber optic measurements, we are measuring the power in the light coming out of the end of a fiber.

Extinction ratio refers to the ratio of optical power when a one is transmitted versus when a zero is transmitted in a communication

The necessary fundamentals for the analysis and design of optical communication links will be introduced in this

Introduction Optical transmitters used in high-speed digital communication systems are typically required to maintain a specific set of

Providing a reliable link, with sufficient signal-to-noise ratio (SNR) and bandwidth to deliver high-capacity

The optical signal parameters defining the signal level include optical transmitter output power, extinction ratio, optical amplification

compared to the previ-ously measured power when the reference transmitter was used. The ratio of the two measured power levels,

Transmitter complexity (and therefore cost) can be greatly reduced if the extinction ratio requirement is reduced. The trade-off is

Optical Communication Fundamentals The ultimate goal of the optical signal transmission is to achieve the

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predetermined bit error

17.2.1 Optical Transmitters Optical communication systems use either a light emitting diode (LED) or a laser diode (LD)

An optical transmitter is defined as a device that generates an optical modulated signal using a laser, either through direct

? Introduction In optical communication, performance depends not only on average launch power or wavelength

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