

Performance of Digital Optical Receivers



AI Overview

The main performance of digital optical receivers is determined by sensitivity, bit error rate (BER), signal-to-noise ratio (SNR), and the ability to handle noise and signal distortions effectively.

Key Performance Parameters

1. Receiver Sensitivity Receiver sensitivity defines the minimum optical power required for the receiver to achieve a target BER. Higher sensitivity allows the system to operate with weaker signals, extending communication distance or reducing transmitter power requirements. Sensitivity is influenced by noise, inter-symbol interference (ISI), jitter, and transmitter relative intensity noise (RIN) in the system .
2. Bit Error Rate (BER) BER measures the probability of incorrect bit detection in digital communication. It is a critical indicator of receiver performance, as noise and signal distortions directly affect the accuracy of digital signal recovery. A lower BER indicates better receiver performance .
3. Signal-to-Noise Ratio (SNR) and Q-Factor The Q-factor quantifies the quality of the received optical signal relative to noise, including thermal noise, shot noise, and impairments like chromatic and polarization dispersion. A higher Q-factor corresponds to a higher SNR and lower BER, reflecting better overall system performance .
4. Responsivity and Photodetector Type The photodetector converts optical signals into electrical signals. PIN photodiodes are simple and fast but have lower sensitivity, while avalanche photodiodes (APDs) provide higher gain and sensitivity at the cost of increased noise. Responsivity measures the efficiency of this conversion and directly impacts receiver performance .
5. Modulation Format Compatibility Digital optical receivers must support the modulation format used in the system. Direct-detection receivers are typically insen...

Article Content

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Optical receiver performance evaluation

When designing a good optical receiver, it is critical to understand the different parameters that will impair overall

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Intelligent Optical Performance Monitoring Based on Intensity and ...

An intelligent optical performance monitoring scheme for simultaneous modulation format identification (MFI) and optical signal-to

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Receiver Performance Analysis

In our concluding chapter we will combine our photodetector and receiver-noise modeling techniques with front-end and demodulator

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Optical Receiver Operation

Noise considerations are thus important in the design of optical receivers, because the noise sources operating in the receiver

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HFAN-03.0.2: Optical Receiver Performance Evaluation

This application note provides an in-depth analysis of the complete receiver optical sensitivity and the potential power penalties

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Receiver Performance

Receiver sensitivity and power margin have been widely used to specify the performance of optical receivers and optical

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High-Speed Digital Coherent Receiver Based on Parallel Optical

We report a novel digital coherent receiver based on sampling the signal in the optical domain to overcome the speed limitations of

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Receiver performance evaluation of various digital optical modulation ...

Abstract: Error rate characteristics of various digital optical modulation-demodulation schemes are studied.

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Ultrafast one-chip optical receiver with functional metasurface

Here we present a scalable optical receiver platform that fully exploits the high spatial parallelism and ultrabroad

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Optical Receivers

The design of an optical receiver depends on the modulation format used by the transmitter. The chapter deals with

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Optical Receiver Design

The design of an optical receiver depends on the modulation format used by the transmitter. Since most lightwave systems employ

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Optical Receiver

An optical receiver is defined as a circuit that converts optical signals into electrical signals, typically involving components such as

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Optical Receiver Design | Springer Nature Link

The performance of a digital receiver is mainly determined by the signal-to-noise ratio at the decision point in the

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Receiver Performance Parameters (BER, Sensitivity & Quantum

Quantum Limits of Receiver Chapter-wise detailed Syllabus of the Optical Fiber

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Optical Receiver Sensitivity Evaluation in Presence of Noise in Digital ...

ABSTRACT: The performance of an optical receiver in a digital optical communication link is studied. In the design of an optical

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Receiver performance evaluation of various digital optical modulation ...

The receiving power level reduction in various modulation-demodulation schemes is calculated by taking into account the optical

Sep 07, 2025

Receivers for Digital Fibre Optic Communication Systems: State-of

An approach to design a digital fibre optic receiver is given. Various types of receivers designed so far are reviewed

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Optical Digital Audio Cable & Connection Explained

You can use an optical digital audio out for 5.1 surround sound, but is this the best connection to use? Learn more in

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Fundamental Receiver Operation

ü The optical signal that gets coupled from the light source to the fiber becomes attenuated and distorted as it propagates along the

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OPTICAL RECEIVER OPERATION

Optical Receiver Operation Performance Measuring: The most meaningful criterion for measuring the performance of a digital

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Optical Receiver

Optical receiver characterization and calibration are important for both optical communication and instrumentation, which directly

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Optical Performance Monitoring in Digital Coherent Receivers

In this paper, we present a method for combined fiber parameter estimation from digital filter coefficients of a

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Optical Receiver Configuration and Performance | PDF | Digital Signal ...

It discusses the fundamental components and processes in a digital optical receiver including digital signal transmission over fiber,

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Fiber Optic Receivers & Amplifiers Overview

Digital Receiver Performance -Probabilityof Error-quantum Limit, Receiver Sensitivity,Optical Ampli - Free download as PDF File

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Digital Coherent Receivers for Long-Reach Optical Access Networks

The relative merits of coherent-enabled optical access network architectures are explored, with a focus on achievable

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Optical Fiber Communication Part 3 Optical Digital Receiver

It elaborates on the factors influencing signal integrity and noise, such as receiver design, shot noise, and preamplifier types, along

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