

Article Overview

Transimpedance amplifiers (TIAs) for SFP modules convert photodiode current to voltage, offering high-speed, low-noise performance with RSSI for optical communication.

Overview

A transimpedance amplifier (TIA) is a critical component in SFP optical receivers, converting the small current from a photodiode into a usable voltage signal. TIAs are designed for high-speed data transmission, low input-referred noise, and often include a Received Signal Strength Indicator (RSSI) to monitor optical input power .

Key Features of SFP TIAs

- o Data Rates: TIAs for SFP modules typically support speeds from 2.5 Gbps up to 12.5 Gbps. For example, the ONET8551T supports up to 11.3 Gbps, while the ONET8501T reaches 12.5 Gbps . Lower-speed options like the MAX3744/MAX3745 operate up to 2.7 Gbps .
- o Bandwidth: High-speed TIAs feature bandwidths from 2.1 GHz (MAX3744) to 10 GHz (ONET8501T) to accommodate fast optical signals .
- o Noise Performance: Low input-referred noise is essential for sensitivity. Devices like the MAX3744 have 330 nA input-referred noise, while high-speed TIAs like ONET8551T are optimized for low-noise operation .
- o RSSI: Many TIAs include an RSSI output to provide a voltage proportional to the received optical power, enabling monitoring and diagnostics in SFP modules .
- o Power Supply and Consumption: Most SFP TIAs operate from a single +3.3V supply, with power consumption typically under 105 mW, making them suitable for compact SFP modules .
- o Temperature Range: TIAs are characterized for operation from -40°C to +85°C or +100°C, ensuring reliability in various environments .

Implementation Technologies

- o CMOS TIAs: Offer low power and integration flexibility, suitable for cost-sensitive SFP modules. Example: HLR2G50 supports 2.5 Gbps with AGC and RSSI in pure CMOS .
- o SiGe TIAs: Provide higher bandwidth and sensitivity, often used in high-speed SFP or burst-mode applications. Mignal's MG3650 and MG3250 series are examples, supporting up to 10 Gbps and 2.7 Gbps respectively, with high linearity and optical sensitivity .

Functional Design

Typical SFP TIA architecture includes:

Spanish Transimpedance Amplifier SFP

- o Transimpedance Stage: Converts photodiode current to voltage using a high-gain amplifier with shunt feedback.
- o Voltage Amplifier Stage: Provides additional gain and converts single-ended input to differential output.
- o DC Cancellation Circuit: Removes DC offset to maintain linearity and reduce pulse-width distortion.
- o RSSI Output: Provides a voltage proportional to optical input for monitoring purposes .

Applications

- o SFP Optical Transceivers: For Ethernet, GPON, XG-PON, and SDI video transmission.
- o Burst-Mode Receivers: For optical networks requiring variable data rates.
- o High-Speed Optical Links: Supporting up to 12.5 Gbps in telecom and data center applications.

Summary

Spanish or international SFP TIAs are designed to provide high-speed, low-noise optical signal conversion with integrated RSSI for monitoring. Selection depends on required data rate, bandwidth, power consumption, and technology (CMOS vs SiGe). Devices like ONET8551T, ONET8501T, MAX3744/MAX3745, and Mignal MG3250 series illustrate the range of options available for SFP modules .

This chapter examines some representative transistor-level transimpedance amplifier (TIA) circuits taken from the

The MAX3724/MAX3725 are transimpedance amplifiers designed for up to 3.2Gbps SFF/SFP transceiver modules. A functional

The high-sensitivity limiting amplifier limits the differential input signal generated by a transimpedance amplifier into a

This feature centers the input signal within the transimpedance amplifier's linear range, thereby reducing pulse-width distortion

Select from TI's Transimpedance amplifiers family of devices. Transimpedance amplifiers parameters, data sheets, and design

MG3650 is a dual rate burst mode transimpedance amplifier (TIA) with reset and data rate selection. When the part is operating in

This current-voltage (I-V) conversion intrinsically provides signal amplification by the gain Z TIA, commonly called transimpedance

Spanish Transimpedance Amplifier SFP

2.5 Gbps Transimpedance Amplifier with RSSI in pure CMOS CMOS Transimpedance Amplifier suitable for 2.5Gbps APD and PIN

Description: 3.2Gbps SFP Transimpedance Amplifiers with RSSI. Manufacturer: Maxim Integrated Products.

The Gennum® GN1058 is a fully integrated silicon germanium (SiGe) BiCMOS transimpedance amplifier, providing wideband low

The MAX3744/MAX3745 transimpedance amplifiers provide a compact, low-power solution for communication to 2.7Gbps. They

The MAX3945 is +3.3V, multirate, low-power limiting amplifier optimized for Fibre Channel

Transimpedance Amplifiers Mignal offers a portfolio of high performance Silicon Germanium (SiGe) and commercial CMOS

MAX3744 is SFP Transimpedance Amplifiers manufactured by Maxim Integrated. The MAX3744/MAX3745 transimpedance

Tunable 1550 nm ITU-T C-band DWDM SFP+ transceiver with 50 GHz channel spacing Supports 9.95-11.3 Gbps data rates and link

This Texas Instruments Reference Design was designed to demonstrate the optical performance of the ONET1151L Laser Driver, the

Web: <https://www.in-au.co.za>

