

BCM83640-DIE

3-nm CMOS 1.6T (8:4) PAM-4 Transceiver PHY



Applications

- 1.6T 8 x 200G to 4 x 400G PAM-4 OSFP DR4 pluggable for InfiniBand and Ethernet in AI/ML clusters
- 1.6T 8 x 200G to 4 x 400G PAM-4 OSFP DR4 and FR4 pluggable for Ethernet switch ASIC in hyperscale data centers

Overview

The Broadcom® BCM83640-DIE is the industry's first 400G/lane PAM-4 DSP with gearbox functionality from client to line side. The BCM83640-DIE is designed with advanced 3-nm CMOS technology to enable next-generation 400G/lane PAM-4 1.6T DR4 and FR4 pluggable transceivers for high-performance and high-density AI/ML clusters and Ethernet networking of hyperscale data centers.

The BCM83640-DIE is a monolithic 1.6T (8:4) PAM-4 DSP. It converts eight lanes of 212.5 Gb/s from the client side into four lanes of 425 Gb/s or higher with inner forward error correction (FEC) to drive next-generation high-density optical PAM-4 links inside an octal small form-factor pluggable (OSFP) module.

The BCM83640-DIE line (optical) transmitter supports multiple advanced 400G/lane laser optics, including a thin-film lithium niobate (TFLN) modulator, differential electro-absorption modulated lasers (D-EMLs), and advanced high-bandwidth silicon photonics (SiPh) modulators. The BCM83640-DIE line (optical) receiver incorporates the most advanced Broadcom DSP technology to compensate for the most stringent optical impairments to deliver best-in-class transceiver BER performance and power consumption.

The BCM83640-DIE client (electrical) side designs with market-leading 3-nm 200G per lane SerDes technology, already proven with the Sian3 DSP and Broadcom leading switch silicon Tomahawk-6. This design guarantees interoperability when paired with a Broadcom switch and, thus, provides an unmatched competitive advantage to the market.

The BCM83640-DIE also features a crossbar on the client side for easier routing in the PCBs.

Features

- Supports multiple chip modes:
 - 8:4 retimer mode with client 212.5G PAM-4 and line 425G PAM-4
 - 8:4 retimer mode with client 212.5G PAM-4 and line 425G+ PAM-4 advanced inner FEC
- Line transmitter supports multiple advanced 400G/lane optics, including TFLN modulators, D-EML laser, and advanced SiPh optics
- Line transmitter supports direct drive to advanced low V_{pi} TFLN modulators
- Most advanced DSP technology to compensate for 400G/lane optical impairment
- Full compliance with IEEE 802.3dj D2.3
- Client side supports medium reach and chip-to-chip reach for switch-to-module pluggable interface
- Supports client-side crossbar for flexible routing
- Supports FEC monitoring in the repeater modes with a subsampling feature available for reduced power
- Lowest-power 3-nm CMOS design

Figure 1: BCM83640-DIE Block Diagram

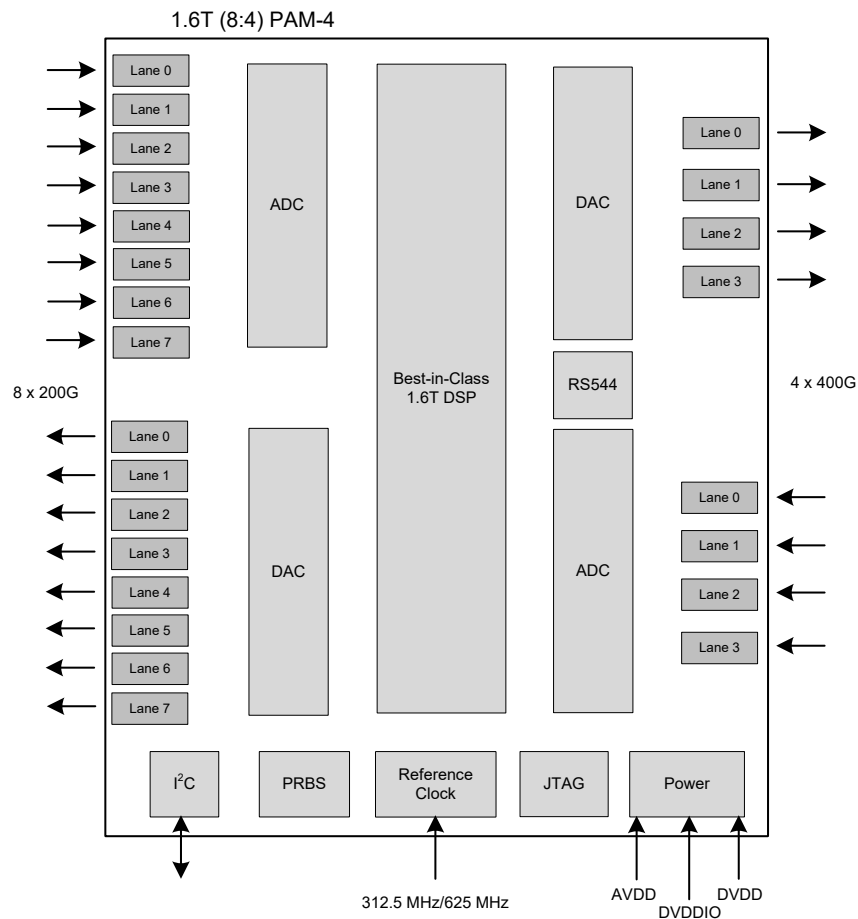


Figure 2: BCM83640-DIE Application Diagram

