

TECH OFFER

Dispersion Compensation Device for Optical Fibers



KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Memory & Storage

Electronics - Semiconductors

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174730**

OVERVIEW

This technology offer is an integrated, CMOS-compatible, compact device that provides dispersion compensation of dispersion in optical fibers. Dispersion impairments is a well-known problem in the transmission of high-speed data over fiber, that limits both the fiber reaches, or poses lower limits on the power required. The technology developed allows a seamless, very low loss method for compensation of fiber dispersion, providing high magnitudes of dispersion for countering dispersion in optical fibers. Without dispersion compensation, signals are susceptible to degradation from optical fiber dispersion, with the extent of degradation worsening with longer fiber reaches. Without proper dispersion compensation, transmitted data will experience high Bit Error Rates (BER) at the receiver. This technology solves this important problem and increases the fiber reaches which may be served.

TECHNOLOGY FEATURES & SPECIFICATIONS

The technology has the following specifications:

- Dispersion magnitude is scalable through appropriate design, depending on the fiber lengths that need to be compensated for.
- Operating wavelength is tailorable.
- Tunability may be introduced through thermo-optic control.
- Dispersion compensation is applicable for both intensity modulated direct detection modulation formats and coherent modulation formats.
- This device is CMOS-compatible, low loss and operates in transmission mode.
- May be seamlessly integrated with photonic integrated circuits.

The technology owner has experimentally demonstrated that the technology works. High-speed characterization using 30 Gb/s NRZ and 30 Gbaud/s PAM4 data showed a restoration of the eye diagram that deteriorated after propagating through 2km of optical fiber. BER characterization showed a 1.3dB improvement in power penalty out of a 1.8dB degradation at the error-free (BER = 10⁻¹²) level. Scalable dispersion has also been experimentally proven.

POTENTIAL APPLICATIONS

The transmission of high speed data over optical fiber is well known to be impaired by dispersion in the optical fiber. This technology provides a very low loss solution to dispersion compensation and has been shown to restore the eye diagram and improve the bit error rate of high speed data. Potential applications would be pre- or post- dispersion compensation of optical fiber dispersion. Transceivers which serve long fiber reaches and/or utilize high speed data could incorporate this technology in the transceiver chip (either transmitter or receiver), to provide an integrated, low loss, CMOS-compatible means of high quality dispersion compensation that can be easily integrated with the rest of the transceiver chip.

MARKET TRENDS & OPPORTUNITIES

The silicon photonics transceiver market is projected to grow to S\$6.4 billion by 2026 with a compound annual growth rate of 25%. Asia Pacific is expected to show the fastest growth with increasing adoption of high-speed data systems, supportive government initiatives, and fast-growing consumer demand.

UNIQUE VALUE PROPOSITION

- Increases transceiver reaches
- Provides either pre- or post- dispersion compensation, with very low loss. This would allow existing transceiver products to serve longer reaches, or support higher data rates.
- It would also open up new opportunities for new product lines which provide integrated dispersion compensation, reducing the complexity of deployment for network operators.
- Very low cost, requiring only integration of the device within the transceiver chip, negligible increase in power budget.

The technology owner is looking for R&D collaboration, IP licensing/acquisition, testbedding opportunities with optical transceiver companies, data center hardware companies, telecommunications companies or silicon photonics companies.