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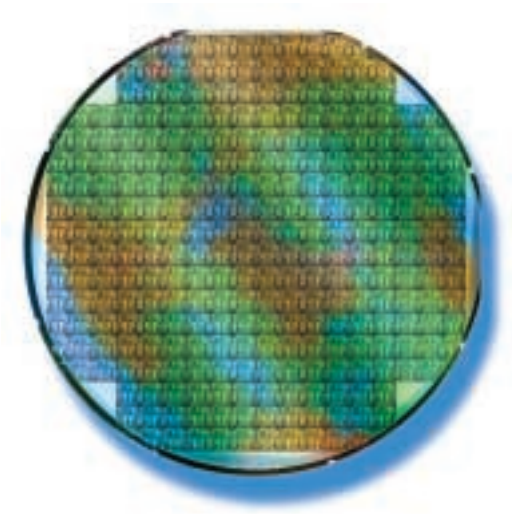
Intel® 10Gbps Physical Medium Dependent Chipset

Intel® LXT17001 Laser Driver, LXT14002 Transimpedance Amplifier, LXT13002 Limiting Amplifier

Product Description

The expanding demand for data communications is driving the advancement of high-speed optical networks. The IEEE, ASNI, and the ITU have converged at 10Gbps in defining the next performance increase for Ethernet, Fibre Channel and SONET. With the 10Gbps Physical Medium Dependent chipset, Intel has increased the efficiency of 10Gbps optical networks by providing high-performance signaling while driving down the power of the transmitter and receiver functions.

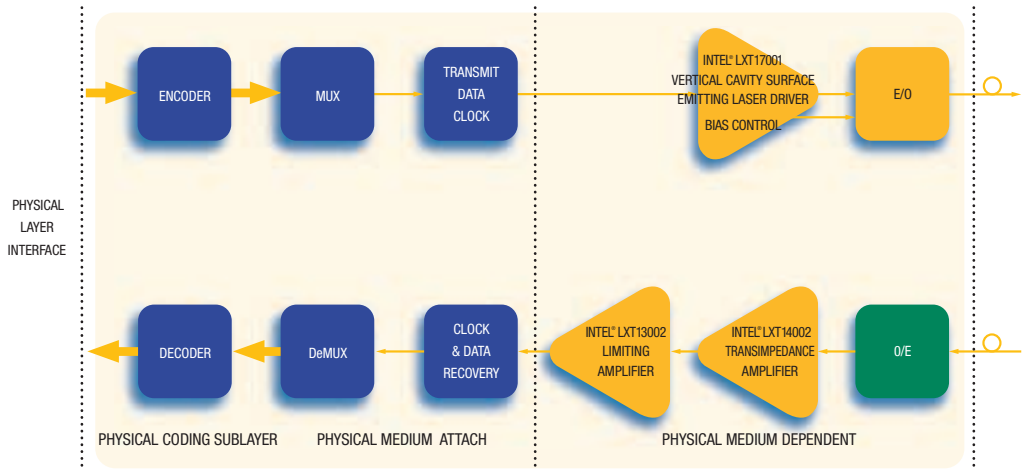
The Intel® 10Gbps Physical Medium Dependent chipset provides a high-bandwidth/low-power solution for optical-electronic interfaces. Innovative design techniques and a standard CMOS process combine to create a high-performance, low-cost chipset.



Key Features

The Physical Medium Dependent chipset features three distinct components:

- Intel® LXT17001 Laser Driver
  - Up to 10Gbps operation
  - Over 35mA modulation current
  - Less than 30pS rise and fall times
- Intel® LXT14002 Transimpedance Amplifier (TIA)
  - Up to 10Gbps operation
  - Single 1.8V power supply
  - Small signal transimpedance of 500Ω (single ended)
- Intel® LXT13002 Limiting Amplifier (LIA)
  - Up to 10Gpbs operation
  - Input sensitivity of less than 10mV
  - Adjustable Loss of Signal (LOS) threshold
  - Single 1.8V power supply



Typical 10Gbps Optical Module

The CMOS Advantage

Designed for use in fiber-optic transceiver modules, the Physical Medium Dependent chipset utilizes CMOS technology to achieve considerable power savings over bipolar alternatives. Reduction in power enables the realization of small form factor optical modules. The large-scale availability of CMOS also allows the devices to be manufactured at a lower cost, compared to devices that depend on GaAs, SiGe or other bipolar process technologies.

Novel circuit architecture is used to control noise and increase bandwidth in a standard CMOS process, and the chipset supports the jitter requirements of the emerging IEEE 802.3ae specification for 10Gbps Ethernet. In addition, the chipset can be used in SONET OC-192 applications and still meet the demanding jitter requirements of the ITU G.709 specification—a milestone in CMOS circuit design.

The Physical Medium Dependent chipset consumes less than 1.0W of power. The chipset is offered in die form, allowing the use of chip-on-board assembly techniques to minimize area and maximize electrical performance. The devices may be used with a variety of clock and data recovery components developed by Intel to produce high-performance optical modules that serve a variety of data communication applications. Performance is guaranteed over a –40°C to +85°C operating range, making the 10Gbps Physical Medium Dependent chipset an ideal solution for carrier class telecommunication systems.

Key Applications

10Gbps Optical Transceiver Modules

- 10Gbps Ethernet serial LAN, MAN and WAN systems
- SONET OC-192
- Fibre Channel FC-10
- InfiniBand* 1X

Features	Benefits
Chipset	
■ Low-power Physical Medium Dependent < 1.0W	■ Reduced heat generation, enabling implementations within small form factor optical modules
■ Broadband operation with fast rise and fall time (20% to 80%) < 32ps	■ Low jitter and open eye pattern at 10Gbps data rates
■ -40C to +85C operating temperature	■ Suitable for “carrier class” telecommunication applications
■ CMOS implementation	■ Low-cost manufacturing
■ Available in die form	■ Small implementation footprint and reduced parasitic inductance and capacitance
LXT17001 Laser Driver	
■ Supply voltages • 3.3V output stage • 2.5V input stage	■ Compatible with preliminary 10GbE XGP and XENPAK module specifications
■ Drive current capability • Bias current > (35mA) • Modulation current > 35mA	■ Sufficient for biasing and driving most commercial grade Vertical Cavity Surface Emitting Laser
■ Low-power consumption < 545mW at maximum output	■ Reduced heat generation, enabling implementations within small form factor modules
■ Low signal overshoot and undershoot < 10%	■ Low jitter and open eye pattern at 10Gbps data rates

Features (continued)	Benefits (continued)
LXT14002 Transimpedance Amplifier (TIA)	
■ High transimpedance gain Z_T > 500Ω single ended	■ Good receiver dynamic range
■ 1.8V supply voltages	■ Compatible with preliminary 10GbE XGP and XENPAC module specifications
■ Low-power consumption < 140mW	■ Reduced heat generation, enabling implementations within small form factor modules
■ Tolerant to photodiode capacitance of 0.15pF	■ Broadband operations with commercial grade photodiodes
■ Low input referred noise current	■ High signal to noise ratio
LXT13002 Limiting Amplifier (LIA)	
■ High gain bandwidth product	■ 10Gbps operation
■ Adjustable LOS threshold	■ Adjustable range LOS gives user flexibility to choose what input signal level will trigger the LOS output
■ Sensitivity to low input voltage < 10mV differential	■ High dynamic range at the receiver input
■ 1.8V supply voltages	■ Compatible with preliminary 10GbE XGP and XENPAC module specifications
■ Low-power consumption < 324mW	■ Reduced heat generation, enabling implementations within small form factor modules
■ Low total Root Mean Square (RMS) jitter Typical < 3ps	■ Low system jitter at 10Gbps data rates
■ 0.500mV output voltage swing	■ Able to interface with Current Mode Logic (CML)

Intel in Communications

Intel is a leading supplier of communications building blocks, adding value at many levels of integration. Through continuous innovations and advancements in Ethernet connectivity and processing in the network, Intel is delivering, along with its customers and developer community, a wide choice of solutions that enable faster time-to-market, longer time-in-market and increased revenue opportunity.

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UNITED STATES AND CANADA
Intel Corporation
Robert Noyce Bldg.
2200 Mission College Blvd.
P.O. Box 58119
Santa Clara, CA 95052-8119
USA

EUROPE
Intel Corporation (UK) Ltd.
Pipers Way
Swindon
Wiltshire SN3 1RJ
UK

ASIA-PACIFIC
Intel Semiconductor Ltd.
32/F Two Pacific Place
88 Queensway, Central
Hong Kong

JAPAN
Intel Japan (Tsukuba HQ)
5-6
Tokodai, Tsukuba-shi
300-2635 Ibaraki-ken
Japan

SOUTH AMERICA
Intel Semicondutores do Brasil Ltda
Av. Dr. Chucri Zaidan, 940-10° andar
04583-904 São Paulo, SP
Brazil

Order Number: 249732-002 Printed in USA/0901/5K/MGS/DC