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Intel® 10Gbps Physical Medium Dependent Chipset

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

developer.intel.com

Product Description

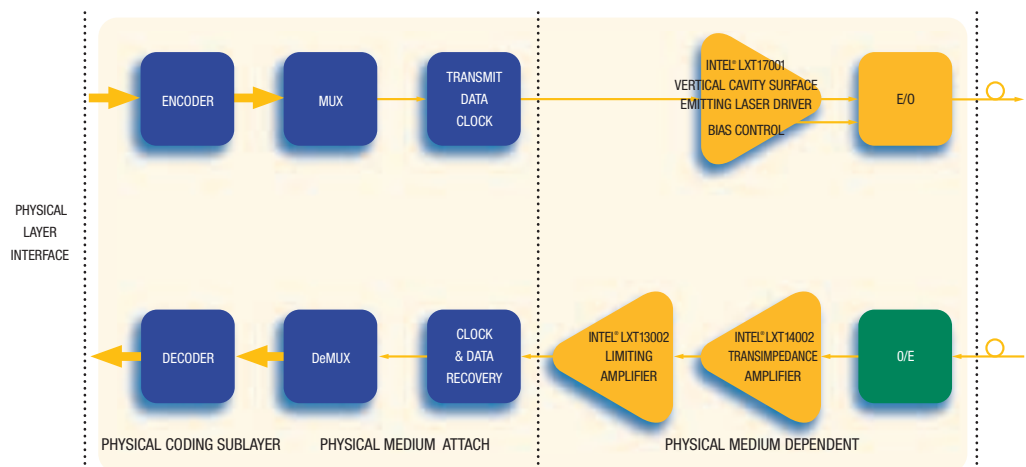
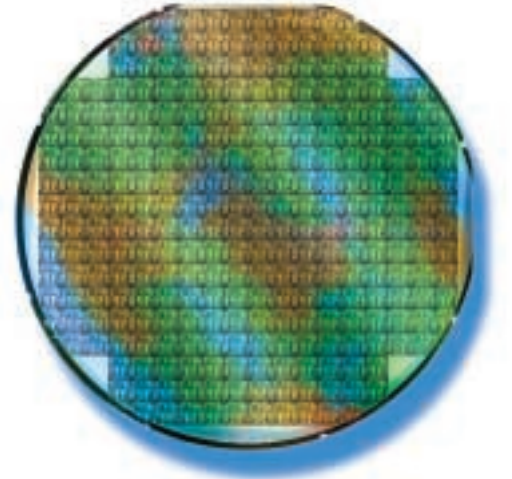
The expanding demand for data communications is driving the advancement of high-speed optical networks. The IEEE, ANSI, and the ITU have converged at 10Gbps in defining the next performance increase for Ethernet, Fibre Channel and SONET. With the 10Gbps Physical Medium Dependent chipset, Intel has increased 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 10Gbps 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 $+85^{\circ}\text{C}$ 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

Chipset

- Low-power Physical Medium Dependent < 1.0W
- Broadband operation with fast rise and fall time (20% to 80%) < 32ps
- -40°C to $+85^{\circ}\text{C}$ operating temperature
- CMOS implementation
- Available in die form

LXT17001 Laser Driver

- Supply voltages
 - 3.3V output stage
 - 2.5V input stage
- Drive current capability
 - Bias current > (35mA)
 - Modulation current > 35mA
- Low-power consumption < 545mW at maximum output
- Low signal overshoot and undershoot < 10%

Benefits

- Reduced heat generation, enabling implementations within small form factor optical modules
- Low jitter and open eye pattern at 10Gbps data rates
- Suitable for “carrier class” telecommunication applications
- Low-cost manufacturing
- Small implementation footprint and reduced parasitic inductance and capacitance
- Compatible with preliminary 10GbE XGP and XENPAK module specifications
- Sufficient for biasing and driving most commercial grade Vertical Cavity Surface Emitting Laser
- Reduced heat generation, enabling implementations within small form factor modules
- Low jitter and open eye pattern at 10Gbps data rates

Features (continued)

Benefits (continued)

LXT14002 Transimpedance Amplifier (TIA)

- High transimpedance gain $Z_T > 500\Omega$ single ended
- 1.8V supply voltages
- Low-power consumption < 140mW
- Tolerant to photodiode capacitance of 0.15pF

- Good receiver dynamic range
- Compatible with preliminary 10GbE XGP and XENPAC module specifications
- Reduced heat generation, enabling implementations within small form factor modules
- Broadband operations with commercial grade photodiodes
- High signal to noise ratio

- Low input referred noise current

LXT13002 Limiting Amplifier (LIA)

- High gain bandwidth product
- Adjustable LOS threshold
- Sensitivity to low input voltage < 10mV differential
- 1.8V supply voltages
- Low-power consumption < 324mW
- Low total Root Mean Square (RMS) jitter
Typical < 3ps
- 0.500mV output voltage swing

- 10Gbps operation
- Adjustable range LOS gives user flexibility to choose what input signal level will trigger the LOS output
- High dynamic range at the receiver input
- Compatible with preliminary 10GbE XGP and XENPAC module specifications
- Reduced heat generation, enabling implementations within small form factor modules
- Low system jitter at 10Gbps data rates
- Able to interface with Current Mode Logic (CML)

Intel in Communications

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