



## Intel® LXT16735

12.5Gbps 1:1 Clock and Data Recovery Device

## Intel® LXT16736

12.5Gbps 1:1 Re-timer Device

**Intel® optical components are modular building blocks that enable networking and communications equipment manufacturers to create standards-based products with shorter time-to-market and reduced development costs. Developers can use these silicon components to build optical network solutions to meet a variety of high-bandwidth requirements in SDH/SONET, Optical Transport Network, and Ethernet networks.**

### Product Highlights

- Intel® LXT16735 12.5Gbps 1:1 Clock and Data Recovery Device
  - Integrated Clock and Data Recovery with optional high-speed clock output and loss of signal
  - Integrated Limiting Amplifier
  - Automatic sampling point adjustment
- Intel® LXT16736 12.5Gbps 1:1 Re-Timer Device
  - Integrated clock generator
  - Dual-loop architecture
  - Re-timer
- Intel® LXT16735/36 devices
  - Scalable bit rate: 12Gbps–13Gbps
  - Combined power dissipation: 0.8–1.0W
  - 42-ball (5 x 6 mm) PBGA package

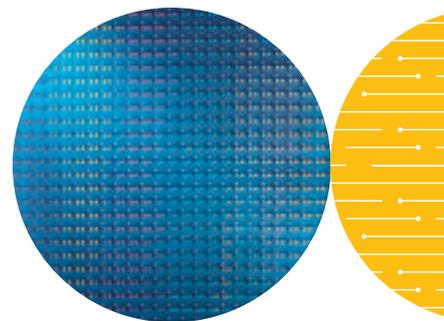


System manufacturers need standards-based building blocks and tools that enable them to meet stringent cost and power requirements, without compromising on performance. In addition, component vendors have begun to offer low-power CMOS solutions with serial interfaces to Layer 2 devices such as framers and FEC devices that do not provide high-end jitter performance.

### Product Overview

The Intel® LXT16735 and the Intel® LXT16736 form a high-performance protocol-agnostic 12.5Gbps Clock and Data Recovery and Re-timer chipset for use in optical line cards for SDH STM 64/SONET OC-192 ultra long-haul SONET applications, Optical Transport Network (OTN) systems with up to 30 percent Forward Error Correction (FEC), submarine systems, and optical test equipment.

Intel in  
Communications



**Product Overview** (continued)

The Intel® LXT16735/36 chipset provides a unique solution for improving performance in discrete implementations. These devices can be inserted directly on the transmission line in conjunction with non-SONET conformance 12.5Gbps framers, Layer 2 and serializer/deserializer (SerDes) devices.

The Intel LXT16735/36 chipset is manufactured using a BiCMOS technology that offers the performance, stability, and reliability required for optical communication systems.

The devices are operated from a single 3.3V power supply, and the chipset has a low power dissipation of 0.8–1.0W.

The devices allow operation at any line rate between 12 and 13Gbps. This provides for a flexible discrete solution with reduced design and production costs. Loop filter components are the only external devices required.

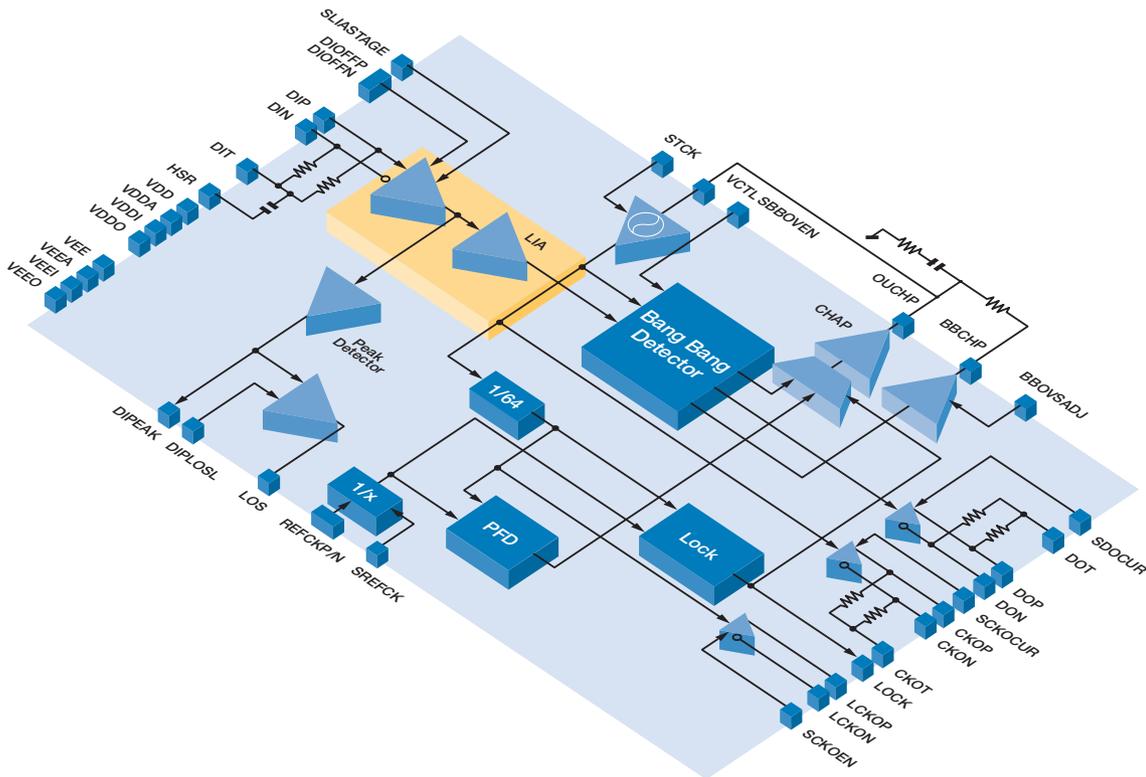
**Intel® LXT16735 12.5Gbps 1:1 Clock and Data Recovery Device**

The Intel® LXT16735 device features an integrated Limiting Amplifier (LIA) with state-of-the-art input sensitivity (better than  $2 \times 2.5\text{mVpp}$  @ BER  $10^{-10}$ ), a Clock and Data Recovery (CDR) unit, and a loss of signal/loss of lock circuitry.

The CDR recovers clock and data, sampling the signal to determine the optimum bit period and coping with dispersions in the fiber that can cause the eye to shrink or deteriorate. The CDR in the Intel LXT16735 device chip automatically detects the optimum sampling point.

A CDR can be applied in discrete line cards for the following performance improvements:

- State-of-the-art input sensitivity—by minimizing the noise coupling between the DeMUX and CDR.
- Extended reach—by recovering, re-amplifying, and re-timing the data signal. Typical optical receiver pill with PIN/TIA/LIA has a typical reach <10 inch on traditional FR-4 Printed Circuit Boards.
- Providing automatic phase adjustment and a manual decision threshold for an optimized sampling point, which will reduce Bit Error Rate to improve signal integrity and extend reach on FR-4 and fiber, compared to an equalizer-only solution.
- Complete regeneration of the 12.5Gbps signal in optical-electrical-optical applications.



**Intel® LXT16735 Device Block Diagram**

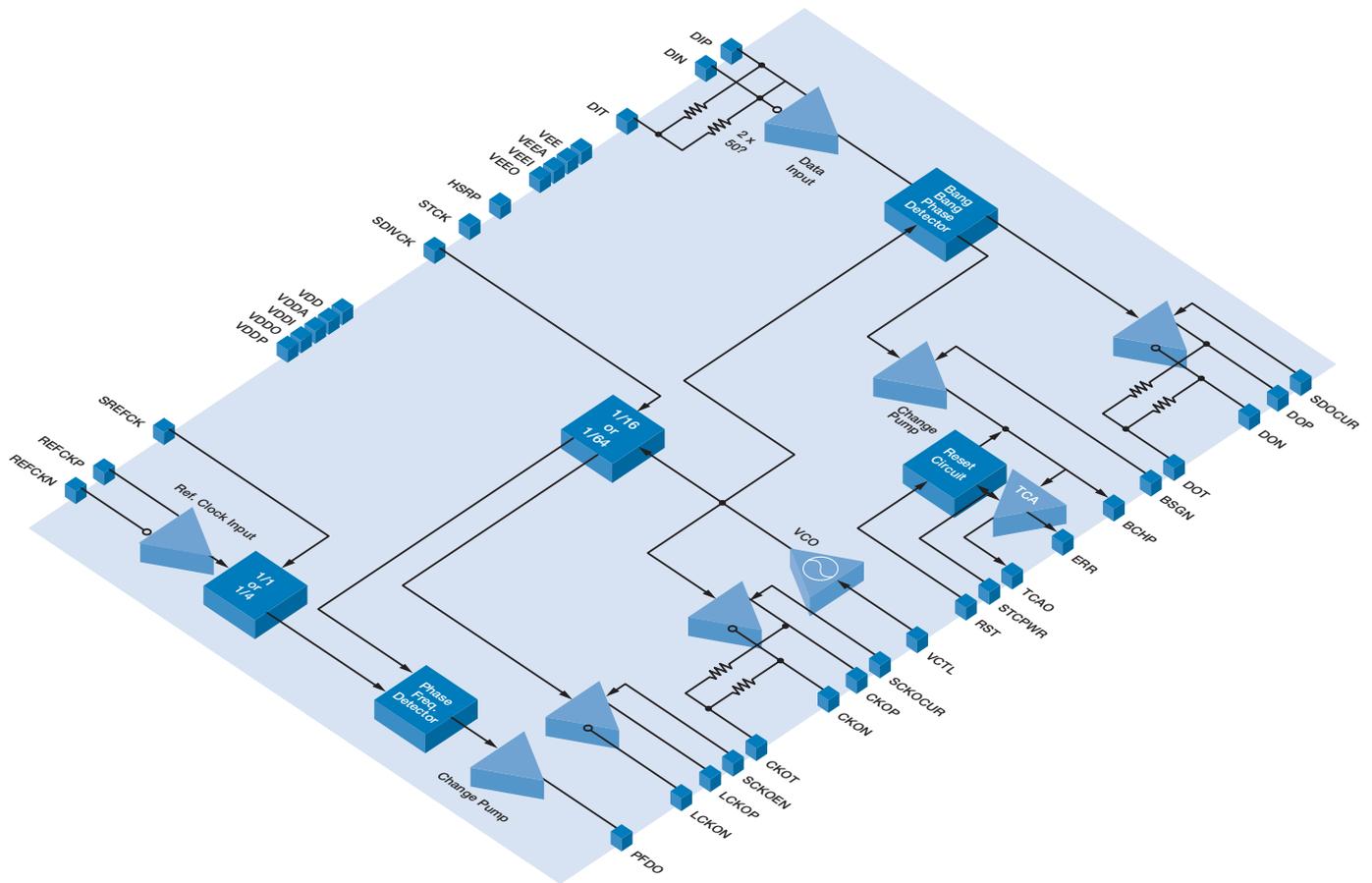
## Intel® LXT16736 12.5 Gbps 1:1 Re-Timer Device

The Intel® LXT16736 chip features a Clock Generator and Phase Locked Loop (PLL) circuits with a patent-pending dual-loop filter design. The Intel LXT6736 chip can be used for jitter clean-up/pattern-jitter clean-up, thus improving system performance of devices and exceeding Telcordia/ITU-T jitter recommendations.

This chip enables a very simple data interface for optical transmission, with very relaxed requirements to the data input signal. The chip recovers a transmission clock from the high-speed data and uses this clock for re-timing of the signal.

The re-timer can be applied in discrete line cards to enable the following performance improvements:

- Exceeding SONET jitter requirements, when non-SONET-compliant 12.5Gbps I/Os are used
- Jitter clean-up (down to single-digit Hertz) and pattern jitter regeneration without the use of an external VCXO, enabling cost optimized solutions
- Providing a backplane re-timer and eye-opener.



Intel® LXT16736 Device Block Diagram

## System Examples

### Discrete Line Card Solution

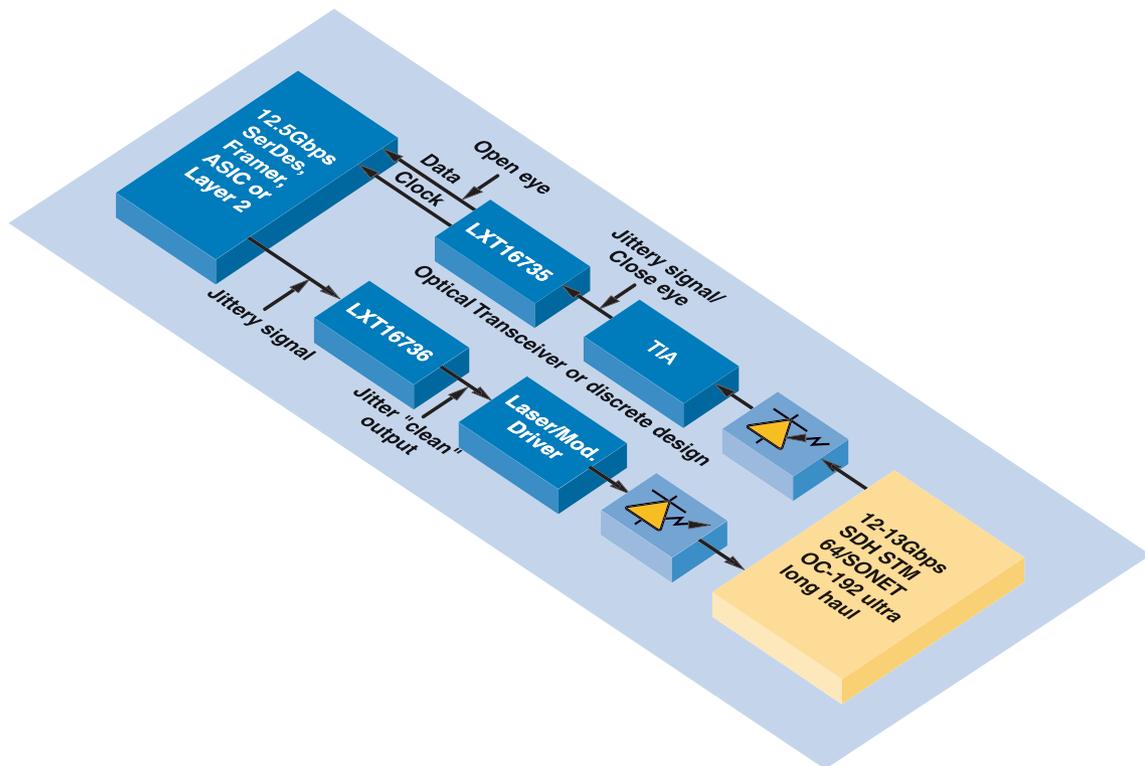
The Intel® LXT16735 12.5Gbps 1:1 Clock and data recovery device and the Intel® LXT16736 12.5Gbps 1:1 re-timer device can be used in a discrete application to improve overall system performance.

Intel® LXT16735 12.5Gbps 1:1 Clock and Data Recovery Device:

- Recovers clock and data from the signal
- Automatically samples at the center of the maximum eye width
- Improves sampling integrity and improves data distortion

Intel® LXT16736 12.5Gbps 1:1 Re-timer Device:

- Intel 12.5Gbps re-timer enables jitter clean-up/pattern-jitter clean-up
- Improves system performance of devices with 12.5Gbps I/O of non-SONET compliance
- Exceeds Telcordia/ITU-T jitter recommendations



Optical Transceiver or Discrete Design

**Product Brief** Intel® LXT16735 12.5Gbps 1:1 Clock and Data Recovery Device  
 Intel® LXT16736 12.5Gbps 1:1 Re-timer Device

## Features

## Benefits

<b>Intel® LXT16735 Device</b>	
Integrated LIA with state-of-the-art input sensitivity	Eliminates the need for an external LIA to reduce cost
Automatic sampling point adjustment	Detects optimal sampling point of the “optical eye” to improve data sampling integrity and data distortion
<b>Intel® LXT16736 Device</b>	
Integrated clock generator	No high-speed clock required for transmission of 12.5Gbps data
Dual-loop architecture	Improves system performance. Provides best in class jitter transfer and jitter generation. Enables use of low-cost non-SONET-compliant/low-performance devices with conformance to Telcordia/ITU jitter recommendations
<b>Intel® LXT16735/16736 Devices</b>	
Scalable bit rate: 12Gbps to 13Gbps	Flexible module reduces design and production costs, protocol agnostic
Combined power dissipation of 0.8-1.0W	Ideal for discrete line card solutions and optical transceivers where low total power consumption is imperative
42-ball (5 x 6 mm) PBGA package	Small physical form factor simplifies design and helps reduce board space

## Support Collateral and Tools

*The following documents are available only subject to NDA.*

Item	Description	Order Number
Data Sheet	Intel® LXT16713/LXT16735 10- and 12.5Gbps 1:1 Clock and Data Recovery	Contact your local rep
Data Sheet	Intel® LXT16714/LXT16736 10- and 12.5Gbps 1:1 Clock Multiplier Unit/Re-timer	Contact your local rep
Data Sheet	Intel® LXD90735 12.5Gbps 1:1 Clock and Data Recovery Evaluation Kit	Contact your local rep
Data Sheet	Intel® LXD90736 12.5Gbps 1:1 Clock Multiplier Unit/Re-timer Evaluation Kit	Contact your local rep

## Intel Access

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