Aries PCI Express® and Compute Express Link™ Low-Latency Smart Retimer Portfolio

1 Benefits and Features

- Compatible with PCI Express® Gen-5/4/3/2/1 and Compute Express Link™
- 32 GT/s, 16 GT/s, 8 GT/s, 5 GT/s, and 2.5 GT/s Data Rates with Automatic Link Equalization
- Low-Latency Mode Enables Cache-Coherent Links
- Up to 16 Lanes with Flexible Link Bifurcation Including 1x16, 2x8, 4x4, 8x2, and Others
- Extends Reach by >36 dB at 32 GT/s, >28 dB at 16 GT/s, Enabling Low-Cost PCB Materials and Connectors
- Receiver and Transmitter Performance Exceeds PCIe® Base Specification Requirements
- No System Software Required
- BGA Package Footprint Optimized for Board Routing
- Integrated AC-Coupling Capacitors Reduce Solution Size and Improves Signal Integrity Performance (PT4161L, PT5161L, PT5081L)
- Supports SRIS, SRNS, and Common Clock Systems
- Supports Hot Plug and Hot Un-Plug
- Supports Lane Margining at the Receiver for Both Timing and Voltage
- Supports Slave Loopback
- Supports Systems with Lane Reversal and Implements Automatic Polarity Correction
- HCSL Reference Clock Output Eliminates Clock Buffers to Drive Downstream PCIe Components
- Advanced In-Band and Out-of-Band Diagnostics for Fleet Management, Large-Scale Server Deployments
- Full-Featured C and Python SDKs for Rapid Integration of Advanced Diagnostics Features
- Device Configuration through SMBus or EEPROM
- IEEE 1149.6 AC-JTAG Boundary Scan
- Full Portfolio of Pin- and Register-Compatible Retimers Enables Easy Performance Scaling Between CXL and PCIe Gen-4 and Gen-5

2 Applications

- Server and High-Performance PC Motherboards
- PCIe Riser and Add-in Cards
- NVMe JBOFs, GPU/Deep-Learning Accelerators

Product Family Information – x16, x8

Part #	CXL/PCIe	Lanes	Body Size (Nom)
PT5161LR	PCIe 5.0	16	8.9 mm x 22.8 mm
PT5161LX	CXL / PCIe 5.0	16	8.9 mm x 22.8 mm
PT4161LR	PCIe 4.0	16	8.9 mm x 22.8 mm
PT5081LR	PCIe 5.0	8	8.5 mm x 13.4 mm
PT5081LX	CXL / PCIe 5.0	8	8.5 mm x 13.4 mm
PT4080LR	PCIe 4.0	8	8.5 mm x 13.4 mm

3 Descriptions

The Aries PCI Express® (PCIe®) and Compute Express Link™ (CXL™) Smart Retimer is a protocol-aware low-latency Retimer designed to integrate seamlessly between a Root Complex and End Point(s) extending the reach by >36 dB at 32 GT/s, >28dB at 16 GT/s. Compliant to all PCIe Gen-5/4/3/2/1 rates and Retimer functional requirements, the Aries Smart Retimer enables more system topologies and lower total solution cost while minimizing implementation overhead and Bill of Materials (BoM).

The innovative protocol-non-disruptive low-latency architecture of Aries Smart Retimer significantly reduces latency through the Retimer while being transparent to system software and participating in Link Equalization with the Root Complex and End Point(s) to optimize Link performance. The Aries Smart Retimer can autonomously adapt its latency to maximize performance during normal operational Link state (L0) while maintaining protocol interoperation.

To support a wide variety of End Points and port configurations, the Aries x16 Smart Retimer can bifurcate to one x16 Link, two x8 Links, four x4 Links, eight x2 Links, and more; the Aries x8 Smart Retimer can bifurcate to one x8 Link, two x4 Links, four x2 Links, and more. Each Link operates independently, and per-Link diagnostics information such as Link state history and electrical margin are accessible through in-band (Receiver margining) and out-of-band (SMBus) methods.

The Aries Smart Retimer uses a standard PCIe 100-MHz HCSL input clock and provides a 100-MHz HCSL output clock to drive other Retimer devices or PCIe components in the system.

The pinout is based on the Intel Retimer Supplemental Specification and uses a Flip-Chip CSP package. The pinout allows for separate single-layer routing for all high-speed transmit and receive signals. Compact design, minimal supporting circuitry, and integrated AC-coupling capacitors greatly reduces overall solution size, making the Aries Smart Retimer ideal for space-restricted applications like system boards and riser cards.

Typical Application Block Diagram