Switchtec PSX PCIe Gen3 Storage Switch Family

PM8546, PM8545, PM8544, PM8543, PM8542, and PM8541

The Switchtec PSX PCIe Gen3 Storage Switch family comprises programmable and high-reliability PCIe Base Specification 3.1-compliant switches supporting up to 96 lanes, 48 ports, 24 virtual switch partitions, 48 Non-Transparent Bridges (NTBs), and hot- and surprise-plug controllers for each port. The switch family also features advanced error containment, comprehensive diagnostics and debug capabilities, a wide breadth of I/O interfaces, and an integrated MIPS processor. PSX switches utilize a system-on-chip architecture that optionally enables customer-differentiated solutions through firmware customization and enhancements.

Applications for the PSX family include PCIe SSD enclosures, flash arrays, multi-host architectures, high-density servers, blade servers, pooled storage/compute, and applications that require customized, high-reliability PCIe switching.

Features

High-Performance Non-Blocking Switches

- Up to 174 GB/s switching capacity
- 96-lane, 80-lane, 64-lane, 48-lane, 32-lane, and 24-lane variants
- Ports bifurcate from x2 to x16 lanes
- Up to 48 NTBs assignable to any port
- Logical Non-Transparent (NT) interconnect allows for larger topologies
- Supports 1+1 and N+1 failover mechanisms
- NT address translation using direct windows and multiple sub-windows per BAR
- Supports multicast groups per port

Error Containment

- Advanced Error Reporting (AER) on all ports
- Downstream Port Containment (DPC) on all downstream ports
- Poisoned TLP blocking
- Completion Timeout Synthesis (CTS) to prevent an error state in an upstream host due to incomplete non-posted transactions
- Upstream Error Containment (UEC), a programmable feature protecting errors from propagating upstream
- Hot- and surprise-plug controllers per port
- GPIOs configurable for different cable/connector standards

PCIe Interfaces

- Passive, managed, and optical cables
- SFF-8644, SFF-8643, SFF-8639, OCuLink, and other connectors

Diagnostics and Debug

- Transaction Layer Packet (TLP) generator for testing and debugging of links and error handling
- Built-in PCIe analyzer with flexible triggering
- Real-time eye capture
- Any-to-any port mirroring for debug purposes

Highlights

- High-reliability PCIe: robust error containment, hot- and surprise-plug controllers per port, end-to-end data integrity protection, ECC protection on RAMs, high-quality, low-power SERDES
- PSX Software Development Kit (SDK): enables customer-differentiated solutions in areas such as error containment and surprise-plug
- Integrated enclosure management processor and I/O interfaces, SDK, and a turn-key enclosure management solution
- Comprehensive diagnostics and debugging: PCIe generator and analyzer, per-port performance and error counters, multiple loopback modes, and real-time eye capture
- Significant power, cost, and board space savings with support for:
  - Up to 48 ports, 48 NTBs, and 24 virtual switch partitions
  - Flexible x2, x4, x8 and x16 port bifurcation with no restrictions on configuring ports as either upstream or downstream, or on mapping ports to NTBs

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Diagnostics and Debug (Continued)

- External loopback at PHY and TLP layers
- Errors, statistics, performance, and TLP latency counters

Peripheral I/O Interfaces

- Up to 11 Two-Wire Interfaces (TWIs) with SMBus support
- Up to 4 SFF-8485-compliant SGPIO ports
- Up to 106 parallel GPIO pins
- 10/100 Ethernet MAC port (MII/RMII) (PSX 96x/80x/64xG3)
- 16-bit local bus interface with ECC protection
- Up to 4 UARTs
- JTAG and EJTAG interface

High-speed I/O

- PCIe Gen3 8 GT/s
- Supports PCIe-compliant link training and manual PHY configuration

Chiplink Diagnostic Tools

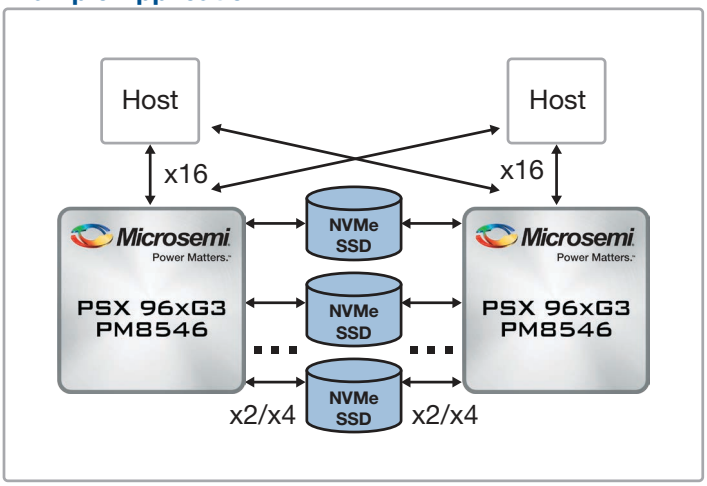
- Extensive debug, diagnostics, configuration, and analysis tools with an intuitive GUI
- Access to configuration data, management capabilities, and signal integrity analysis tools (such as real-time eye capture)
- Connects to device over in-band PCIe or sideband signals (UART and EJTAG)

Evaluation Kits

The evaluation kits are used to evaluate and test device functionality, measure signal integrity, and customize and develop PSX firmware. The following kits are available:

- PM5461-KIT—PSX/PFX 96/80/64xG3, 1-Slot, 16 HD Evaluation Kit (PMC-2151996)
- PM5462-KIT—PSX/PFX 48/32/24xG3, 3-Slot Evaluation Kit (PMC-2151645)

Example Application



Ordering Information

Product	Lanes	Ports/ NTBs	Partitions	Hot-plug Controllers	Package	Ordering No.
PSX 96xG3 PCIe Storage Switch	96	48	24	48	37.5 mm x 37.5 mm	PM8546B-FEI
PSX 80xG3 PCIe Storage Switch	80	40	20	40	37.5 mm x 37.5 mm	PM8545B-FEI
PSX 64xG3 PCIe Storage Switch	64	32	16	32	37.5 mm x 37.5 mm	PM8544B-FEI
PSX 48xG3 PCIe Storage Switch	48	24	12	24	27.0 mm x 27.0 mm	PM8543B-F3EI
PSX 32xG3 PCIe Storage Switch	32	16	8	16	27.0 mm x 27.0 mm	PM8542B-F3EI
PSX 24xG3 PCIe Storage Switch	24	12	6	12	27.0 mm x 27.0 mm	PM8541B-F3EI

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