

# Switchtec™ PSX PCIe® Gen3 Storage Switch Family

PM8546, PM8545, PM8544, PM8543, PM8542 and PM8541

## Summary

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

## Diagnostics and Debug

- 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

## 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 |

## High-Speed I/O

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

## Chiplink Diagnostic Tools

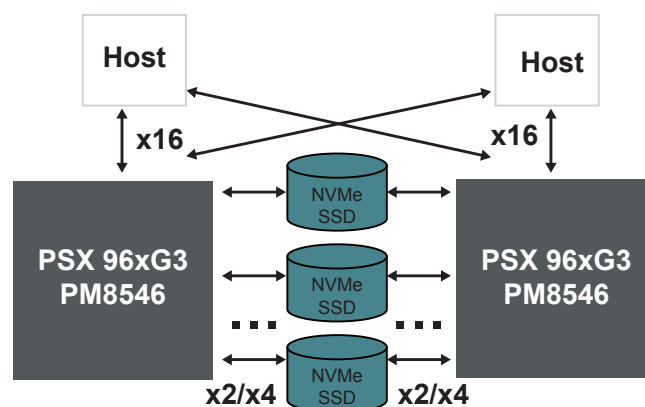
- Extensive debug, diagnostics, configuration and analysis tools with an intuitive GUI
- Access to configuration data, management capabilities, and signal integrity analysis tools (such as real-time eye capture)
- Connects to device over in-band PCIe or sideband signals (UART and EJTAG)

## Evaluation Kits

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

- PM5461-KIT - PSX/PFX/PFX-I/PFX-L 96/80/64xG3 PCIe Switch HD Evaluation Kit (PMC-2151996)

## Example Application



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