Field-Proven, Interoperable, and Standards-Compliant Portfolio

Microsemi
Power Matters.™

SWITCHTEC™
PFX PCIe®
FANOUT SWITCH

Microsemi
Power Matters.™

SWITCHTEC™
PSX PCIe®
STORAGE SWITCH

PCIe Fanout and Storage Switch Solutions

PCIe Signal Integrity and Timing Solutions

FPGA and SoC PCIe Interface Solutions

Microsemi®
Power Matters.™

PCI Express Solutions

PCI Express (PCIe) is a widely deployed bus interconnect interface that is mainly used in server platforms, and increasingly used as a storage interconnect solution with the addition of NVMe storage devices into the PCIe ecosystem. PCIe currently supports up to 8 GT/s of throughput per PCIe lane, with a roadmap up to 16 GT/s. Typical storage implementations utilize ×2, ×4, ×8, and ×16 lane width interconnect configurations from the host root complex directly, or through PCIe switches, to endpoint PCIe storage devices.

Microsemi is a leader in PCIe, having introduced multiple industry firsts, including:

- PCIe Gen3 SAS/SATA RAID Controller
- PCIe (NVMe) storage switches (Switchtec™), with the industry's leading port count and signal integrity, and the industry's lowest power consumption (up to 60% more power efficient than other solutions)
- PCIe Gen3 NVMe Flash Controller (Flashtec™), followed by a second-generation introduction of the industry's fastest PCIe Gen3 NVMe SSD controllers
- PCIe Gen3 Redriver with EQNOX™ Adaptive Equalization
- Flash-based FPGAs and SoCs used in CPLD functions with integrated PCIe endpoint implementations

Microsemi offers a flexible product portfolio to intelligently design your PCIe network for data center, communications, defense, and industrial applications. Our industry-leading PCIe solutions include storage and fanout switches, NVMe controllers, NVRAM drives, redrivers, and timing solutions, and flash-based FPGAs and SoCs.
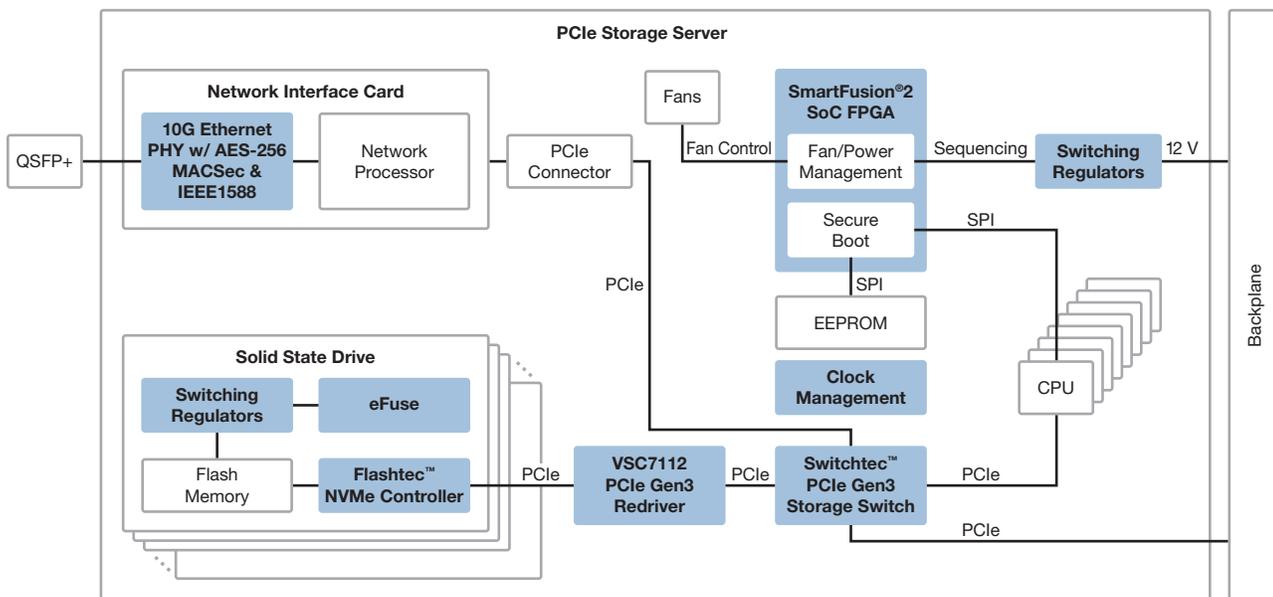
PCI Express Solutions

Microsemi Advantages

Switchtec™ PCIe Switches

- Options from 24 to 96 lanes

- Industry's most flexible port bifurcation from ×2 to ×16 lanes per port

- Highest port and non-transparent bridge (NTB) density, with up to 48 ports and 48 NTBs

- Highest switch partition density

- Industry's first integrated programmable processor

- Industry's first integrated enclosure management solution

Flashtec™ NVMe Controllers

- World's first and fastest enterprise PCIe NVMe controller, with up to 850K IOPS and up to 8 TB

- Software-defined flash: flexible, programmable architecture optimized for cost, performance, and endurance

- Enterprise class reliability, availability, and serviceability with NVMe management features and industry's only dual-port

Flashtec NVRAM Drives

- Non-volatile DRAM with over 10 million IOPS, sub-microsecond latency

- Industry-standard interfaces that are application-friendly for ease of integration

- Zero-maintenance green backup

- Unlimited endurance NVRAM

- Small form factor for high-density rack solutions

Signal Integrity

- PCIe Gen 3.0 solutions supporting ×1 to ×8 lanes

- Adaptive EQ and de-emphasis with up to 30 dB loss compensation

- BOM integration and smaller package sizes save board cost and area

- Low-power modes scale with speed and drive strength

- High ease of use
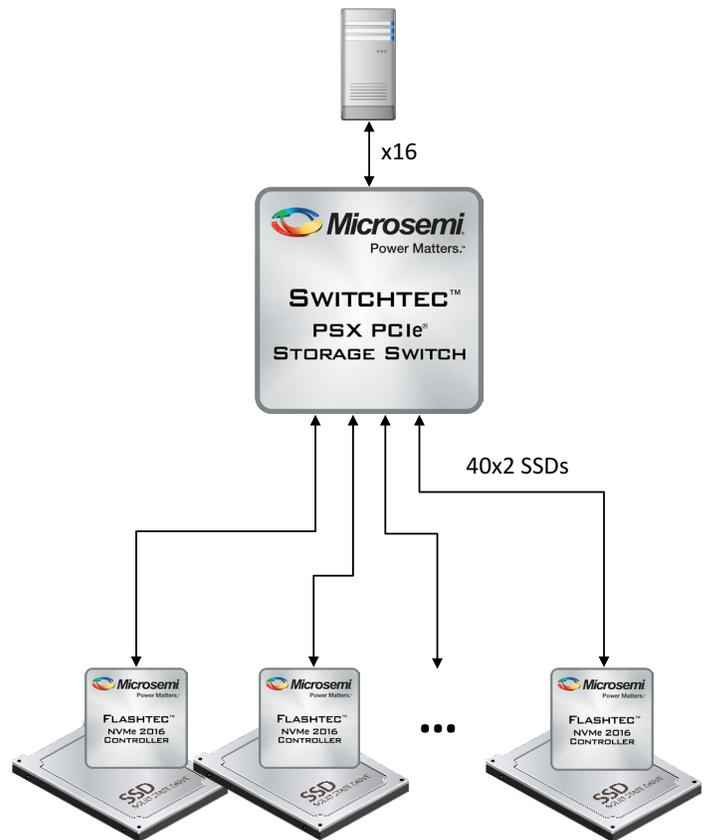
Timing Solutions

- End-to-end offering including synthesis, rate conversion, attenuation, and distribution

- Ultra-low jitter (160 fs) synthesizers and jitter attenuators

- Ultra-low additive jitter cost efficient buffers

- Application specific with custom configuration— MiClockDesigner™

- Validated with the Agilent Time Domain PCI-SIG Compliance Software Suite

PCIe Fanout and Storage Switches

PFX PCIe Fanout Switches

Microsemi Switchtec™ PFX Fanout PCIe Switches provide the industry's highest-density, lowest-power PCIe switch for data center, communications, defense, and industrial applications. With simple hardware configuration and advanced diagnostics and debug capabilities, the PFX enables PCIe solutions for a wide variety of systems, from just a bunch of flash (JBOF) to general purpose applications requiring low-power and high-reliability PCIe switching.

Product	Lanes	Description	Package Type
PM8531 PFX 24xG3	24	PFX 24xG3, 24-Lane PCIe Gen3 Fanout Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8532 PFX 32xG3	32	PFX 32xG3, 32-Lane PCIe Gen3 Fanout Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8533 PFX 48xG3	48	PFX 48xG3, 48-Lane PCIe Gen3 Fanout Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8534 PFX 64xG3	64	PFX 64xG3, 64-Lane PCIe Gen3 Fanout Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8535 PFX 80xG3	80	PFX 80xG3, 80-Lane PCIe Gen3 Fanout Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8536 PFX 96xG3	96	PFX 96xG3, 96-Lane PCIe Gen3 Fanout Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch

PFX-L Fanout-Lite PCIe Switches

Microsemi Switchtec PFX-L Fanout-Lite PCIe Switches support up to 96 lanes, 24 ports, x4/x8/x16 port bifurcation, two non-transparent bridges (NTBs), hot-plug controllers, advanced diagnostics and debug, end-to-end data integrity, SRIS, and low power. The PFX-L switches maintain footprint compatibility with the PFX switch family.

Product	Lanes	Description	Package Type
PM8561 PFX-L 24xG3	24	PFX-L 24xG3, 24-Lane Fanout-Lite PCIe Gen3 Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8562 PFX-L 32xG3	32	PFX-L 32xG3, 32-Lane Fanout-Lite PCIe Gen3 Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8563 PFX-L 48xG3	48	PFX-L 48xG3, 48-Lane Fanout-Lite PCIe Gen3 Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8564 PFX-L 64xG3	64	PFX-L 64xG3, 64-Lane Fanout-Lite PCIe Gen3 Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8565 PFX-L 80xG3	80	PFX-L 80xG3, 80-Lane Fanout-Lite PCIe Gen3 Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8566 PFX-L 96xG3	96	PFX-L 96xG3, 96-Lane Fanout-Lite PCIe Gen3 Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch

PSX PCIe Storage Switches

Microsemi Switchtec PSX PCIe Storage Switches are engineered to scale PCIe flash in high-performance, robust storage systems providing the industry's highest-density, lowest-power, high-reliability switch, and is also the first programmable PCIe switch with an integrated processor.

Product	Lanes	Description	Package Type
PM8541 PSX 24xG3	24	PSX 24xG3, 24-Lane PCIe Gen3 Storage Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8542 PSX 32xG3	32	PSX 32xG3, 32-Lane PCIe Gen3 Storage Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8543 PSX 48xG3	48	PSX 48xG3, 48-Lane PCIe Gen3 Storage Switch	650-pin, 27 mm × 27 mm FCBGA package, 1 mm ball pitch
PM8544 PSX 64xG3	64	PSX 64xG3, 64-Lane PCIe Gen3 Storage Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8545 PSX 80xG3	80	PSX 80xG3, 80-Lane PCIe Gen3 Storage Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch
PM8546 PSX 96xG3	96	PSX 96xG3, 96-Lane PCIe Gen3 Storage Switch	1311-pin, 37.5 mm × 37.5 mm FCBGA package, 1 mm ball pitch

PCIe Signal Integrity and Timing Solutions

PCIe Signal Integrity

Improve weak or degraded signals with Microsemi's PCIe signal integrity solutions. With industry-exclusive EQNOX™ adaptive equalization, Microsemi's PCIe redrivers and crosspoint switches deliver excellent performance in a compact footprint with flexible lane configurations for Gen1/2/3 applications, including pass-through buffer, non-blocking matrix switching, replication of inputs to multiple outputs, and multiplexing.

Product	Ports	Max Rate	Part Type	Receiver Type	Max Link Width
VSC3340-01	40 × 40	6.5G	Crosspoint switch	CTLE	PCIe 2.0 × 16
VSC3316	16 × 16	11.5G	Crosspoint switch	CTLE	PCIe 3.0 × 8
VSC3308	8 × 8	11.5G	Crosspoint switch	CTLE	PCIe 3.0 × 4
VSC7112	4, Dual 2 × 2	8.5G	Redriver with mux/demux	Adaptive CTLE	PCIe 3.0 × 2

Clock Synthesis

The miClockSynth™ family of high-performance, any-rate multiplier and frequency synthesizer devices simplifies board design by generating ultra-low jitter clock signals from a single crystal or crystal oscillator while generating additional independent frequency families.

Product	Frequency Families	Outputs	Inputs	Jitter Performance RMS	Package (mm)
MAX245xx	2	Up to 10 diff/20SE 1 Hz–750 MHz	10 MHz–750 MHz	180 fs	10 × 10 BGA
ZL30225x	1	Up to 3 diff/6SE 1 Hz–1035 MHz	10 M–1250 MHz	160 fs	5 × 5 QFN
ZL30224x	2	Up to 6 diff/12SE 1 Hz–1035 MHz	10 M–1250 MHz	160 fs	5 × 10 LGA
ZL30226x	4	Up to 10 diff/20SE 1 Hz–1035 MHz	10 M–1250 MHz	170 fs	8 × 8 QFN

Clock Fanout Buffers

Microsemi's high-performance buffers complement clock synthesis devices by providing additional fanout capability and minimal jitter combined with the industry's best power supply noise rejection performance. This preserves signal integrity by adding ultra-low jitter and filtering noise from power supplies, resulting in better performance while simplifying engineering board design efforts.

Product	Input	Outputs	Output Frequency	Additive Jitter RMS	Package (mm)
ZL40xxx	1, 2, and XO, any signal type	2, 4, 6, 8 LVPECL or LVDS	750 MHz	<100 fs (as low as 39 fs)	3 × 3 and 5 × 5 QFN
ZL4024x, ZL4023x	2 inputs, XTAL, XO, any signal type	4, 5, 10 LVPECL, LVDS, HCSL, or LVCMOS	1.6 GHz	<50 fs (as low as 25 fs)	5 × 5 QFN
ZL30224x	3 inputs, XTAL, XO, any signal type	3, 6, or 10 any native signal diff or SE configurable by output	1 GHz	<170 fs	8 × 8 QFN

FPGA and SoC PCIe Interface Solutions

SmartFusion2 and IGLOO2

Microsemi offers implementation of PCIe protocol using the high-speed serial interface (SERDESIF) available in the SmartFusion2 or IGLOO2 device families. SmartFusion2 and IGLOO2 have a fully integrated PCIe endpoint implementation that complies with PCIe Base Specification revisions 2.0 and 1.1.

The SmartFusion2 and IGLOO2 transceivers provide full support for PCI Express Gen 2.0, including:

- Gen1/Gen2 rates at ×1, ×2, and ×4 links
- Endpoint topology
- Single-function/single-VC
- Receiver and transmit buffers support error correction and coding (ECC)
- Fabric interface options of AXI3 master/slave or AHB32 master/slave
- Address translation window support between PCIe and local device address space

The following SERDESIF PCIe endpoint blocks are available in SmartFusion2 and IGLOO2:

	M2S/M2GL 005	M2S/M2GL 010	M2S/M2GL 025	M2S/M2GL 050	M2S/M2GL 060	M2S/M2GL 090	M2S/M2GL 150
PCIe Endpoint	0	1	1		Up to 2		Up to 4

Why Choose Microsemi for PCIe?

Microsemi keenly recognizes the importance of interoperability to address the design requirements of your PCIe network. Microsemi is actively involved with the advancement of PCIe standards, and ensures that all of our PCIe interfaced products properly conform to these standards. Microsemi also regularly participates in PCI-SIG compliance workshop events, proving interoperability of our Flashtec™, Switchtec™, Tachyon®, and Adaptec® products. A list of our PCI Express 3.0-compliant products can be found on the PCI-SIG Integrators List.

Microsemi's turnkey PCIe reference designs and field-proven interoperable solutions portfolio will streamline your design time, accelerating your time to market with differentiated products. Contact your local Microsemi sales office today to find the right PCIe technologies and products for your design needs.

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

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