12 Gbps SAS Expander Family

68/48-Port (31 mm × 31 mm Package) and
36/24-Port (27 mm × 27 mm and 25 mm × 25 mm)

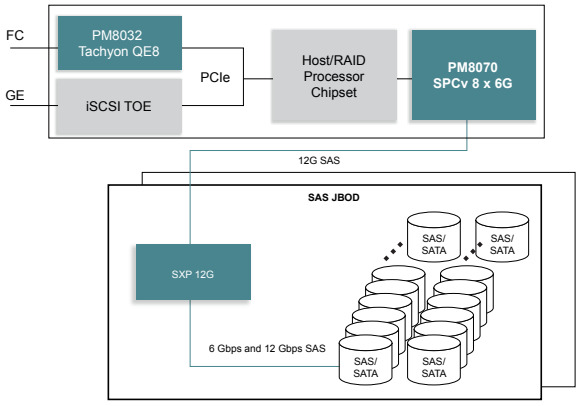
Summary

Microchip offers a complete family of 12G SAS expanders. They are available in 68 and 48 ports in a 31 mm × 31 mm FCBGA package, and in 36 and 24 ports in a 27 mm × 27 mm or 25 mm × 25 mm package. All 12G SAS expanders feature SAS-3 T10 zoning, self-configuration, table-to-table routing and an integrated MIPS processor for SES and enclosure management support. The 31 mm and 27 mm packages also feature an Ethernet port, which is not included in the 25 mm package. Applications for the SXP 12G include SAS/SATA JBODs and RBODs, high-density SAS HBAs, blade server disk interconnects and HDD/SSD expansion for enterprise servers.

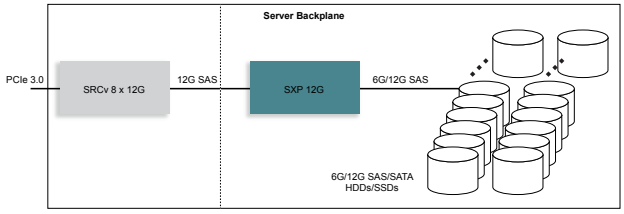
Benefits

- Implements SAS-3 T10 zoning for secure storage
- Ultra-low switching latency for improved system performance
- SAS and SATA edge-buffering preserves your investment by improving performance with existing 3G and 6G drives
- Table-to-table routing removes need for keyed connectors

12G JBOD Application Diagram



12G Server Storage Application Diagram



Highlights

- 12G SAS signaling support for up to 10 m mini-SAS HD passive copper cable
- High port count device (68 ports) for SAS switch use-cases
- Optical SAS support
- Early Power Off Warning (EPOW) support
- SAS and SATA edge-buffering support
- Ultra-low switching latency to improve system performance
- Quad SPI or parallel Flash support; optional inline ECC on the parallel Flash
- T10 zoning support (up to 256 zones)
- Port mirroring for system debug
- Integrated MIPS processor for enclosure management
- Firmware compatible with 3 Gbps and 6 Gbps SAS expanders and stand-alone enclosure management controllers
- Integrated Ethernet port (not included in 25 mm package) for seamless interface to management entity
- Local bus data integrity protection (not included with 25 mm × 25 mm package)
- Real-time eye capture with enhanced BER eye mask and estimation
- Non-disruptive zero down time firmware update support
- Position-independent firmware image support to simplify firmware image management/download
- Compatible enclosure management firmware architecture with SXP 3G/6G products
- Real-time clock (1 µS counter up to 35+ years)
- Integrated MIPS processor for enclosure management with an enhanced processor subsystem (MIPS 34Kc)
- Backward-compatibility with 6G/3G SXP devices

High-Speed I/O

- SAS-3 (12 Gbps, 6 Gbps, 3 Gbps, 1.5 Gbps) and SATA-3 (6 Gbps, 3 Gbps, 1.5 Gbps) operation
- Support for up to 4K SAS addresses
- Automated Decision Feedback Equalizer (DFE) per SAS-3
- Programmable continuous time linear equalizer for SATA-3
- Supports Spread-Spectrum Clocking (SSC) per SAS/SATA-3
- Per-PHY configurable transmit and receive SSC
- Per-PHY programmable transmit amplitude and emphasis
- Integrated resistive termination
- SAS 3.0-compliant back-channel training (SAS3 speed negotiation)

Peripheral Interfaces

- 4 UART interfaces for system monitoring and debugging
- 4 SGPIO interfaces (or additional TWI per SFF-8448)
- Up to 81 GPIO pins (31 mm and 27 mm packages), or 62 GPIO pins (25 mm package)
- Eight dedicated two-wire interfaces (up to twelve total) for device configuration and control of external interfaces
- 16-bit local bus interface for connecting to NOR flash and SRAM (absent in PM8044 and PM8043)
- SPI, DSPI and QSPI interface
- 10/100 Ethernet MAC port (absent in PM8044 and PM8043)
- JTAG and EJTAG interface

Statistics and Performance Monitoring

- Per-port error counters for comprehensive diagnostic capability
- Programmable PMON counters and interrupt generation
- Per-link PRBS and CJPAT pattern generators and loop-backs for link-integrity diagnostics
- Real-time clock

Physical

- 68/48-port: 1408-pin, 31 mm × 31 mm FCBGA package, 0.8 mm ball pitch
- 36/24-port: 1073-pin, 27 mm × 27 mm FCBGA package, 0.8 mm ball pitch
- 36/24-port: 896-pin, 25 mm × 25 mm FCBGA package, 0.8 mm ball pitch

Firmware Development Kit

- Zoning configuration interface
- SAM4/SPC4/SES3-compatible SES target with enclosure management application reference design
- SAS-3-compatible protocol stack in virtual SAS/SMP port
- SSP/STP Initiator API supports communication with SSP/STP targets over SAS links
- SMP routing management including topology discovery
- Firmware download over multiple in-band and out-of-band interfaces
- Expander diagnostics API
- Disk spin-up control and disk qualification API
- Peripheral drivers for TWI, UART, SGPIO and Ethernet interfaces
- TCP/IP enables management of the SXP 12G through remote network (31 mm and 27 mm packages only)
- Error detection, logging and reporting
- Wake up system through Ethernet or SAS port (32 mm and 27 mm packages only)

Chiplink Diagnostic Utility

- Supports advanced features for validation, characterization and debugging of Microchip expanders
- Includes full SAS tool suite and a macro interface for user-authored animation scripts

Third Party Support

- Green Hills MULTI development environment and EJTAG debugger

Ordering Information

Order Number*	Ports	Package
PM8057B-FEI**	68	31 mm × 31 mm
PM8056B-FEI	68	31 mm × 31 mm
PM8055B-FEI	48	31 mm × 31 mm
PM8054B-F3EI	36	27 mm × 27 mm
PM8053B-F3EI	24	27 mm × 27 mm
PM8044B-F3EI	36	25 mm × 25 mm
PM8043B-F3EI	24	25 mm × 25 mm

*B: Revision; F, F3: package descriptor; E: Pb-free; I: industrial temperature.

** PM8057 is dedicated for Microchip's SmartSwitch S300 turnkey managed SAS switch.

For More Information

https://www.microsemi.com/product-directory/sas-expanders/4037-12g-sas-expanders

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