BROADCOM®

Product Brief

SAS3908 Tri-Mode ROC

High-Port Count PCIe 4.0 x8, 8-port SAS/SATA/NVMe ROC featuring Tri-Mode SerDes Technology

Up to 2x IOPS Performance Benefits and Devices Supported than Previous Generations

Key Features

- High-performance I/O Processor
- Dual-core Arm A15 at 1600 MHz
  - 32 KB L1 I/D Caches
  - 1 MB shared L2 Cache
  - 6 MB On-Chip Memory
- Exclusive-OR hardware engine for RAID 5
- RAID 6 hardware acceleration
- RAID features:
  - MegaRAID® support with activation key
  - RAID levels 0, 1, 5, 6, 10, 50, and 60
- Hardware Secure Boot
- DRAM back-up at power fail using ONFI (Open NAND Flash Interface)
  - Supports bad block management
- PCIe 4.0 Host Interface
  - Supports x8, x4, x2, x1 PCIe lanes at a transfer rate up to 16.0 GT/s per lane, full duplex
  - Lane and polarity reversal
  - Supports End-to-End CRC (ECRC) and Advanced Error Reporting (AER)
  - PCIe hot plug support
  - Variable PCIe bandwidth negotiation
- Tri-Mode (PCIe4/SAS3/SATA) PCI device port configurations:
  - Supports 12, 6, and 3 Gb/s SAS and 6 and 3 Gb/s SATA data transfer rates
  - Spread spectrum clocking
  - Supports SSP, SMP, STP, and SATA protocols
  - Supports narrow and wide ports

Broadcom® Storage

Broadcom enables high-performance storage connectivity and flexible system designs that support various combinations of SAS, SATA, and NVMe devices. Broadcom offers the industry's broadest portfolio of storage solutions, backed by decades of experience and trusted by the world's leading server and storage suppliers. Broadcom provides the building blocks for storage solutions that help customers understand, prioritize, store, and protect critical data.

Overview

The SAS3908 is the seventh generation of Serial Attached SCSI (SAS) RAID-on-Chip (ROCs) based on the industry-leading Fusion-MPT™ (Message Passing Technology) architecture. This Gen 4.0 PCIe x8, 8-port ROC, which delivers enhanced performance and power reductions over previous generations, features Tri-Mode SerDes Technology that enables a seamless operation of SAS, SATA, and NVMe storage devices from any system design.

The SAS3908 host interface supports 8 PCI Express (PCIe) lanes and complies with the PCIe 4.0 specification, offering a maximum of 3 million IOPS (JBOD mode) and 3.0 million IOPS in RAID (random reads).

The 8-port Tri-Mode ROC device interface provides SAS data transfer rates of 12, 6, and 3 Gb/s per lane, SATA data transfer rates of 6 and 3 Gb/s, or PCIe data transfer rates of 16.0, 8.0, 5.0, and 2.5 GT/s. The device automatically negotiates between the speeds and protocols. The SCSI Protection Information for early detection of and recovery from data corruption, and Spread Spectrum Clocking (SSC) for EMI reduction are supported. Additional features include SAS 2.1 power management and DataBolt Technology allowing users to take advantage of 12 Gb/s speeds while utilizing existing SAS and SATA 6 Gb/s drives and backplanes.

Key Features (cont.)

- T-10 End-to-End Data Protection (EEDP)
- T-10 Optical Support
- SAS 2.1 power management
- Supports up to 2,000 SAS/SATA devices
- Supports DataBolt bandwidth aggregation technology
- Separate Refclk Independent SSC (SRIS)
- PCIe application layer supports NVMe
- Up to 32 NVMe devices supported (switch required)

- Advanced Power Management support
  - Slumber and Partial power mode support for SAS and SATA devices
  - Programmable SAS link power down
  - Variable PCIe bandwidth negotiation
- External memory interface support
  - SPI based Flash ROM
- Communication Interfaces
  - I^2C interfaces for enclosure management services
  - UART and Ethernet interface for debug
- SFF-8485 Compliant, SGPIO
- JTAG support
- Package (estimated): 27 mm

Applications

- Direct-attached SAS/SATA/NVMe ROC solutions for server and storage applications
- SAS/SATA/PCIe RAID host bus adapter
- Cost effective, single-chip solution for entry-level RAID storage systems supporting up to 8 direct-attach drives
- SAS Target Mode support for external storage applications
- Utilize NVMe-attached SSDs with confidence of industry-leading device management and error recovery

The SAS3908 ROC integrates a 72-bit, DDR4-2666 DRAM interface and supports hardware acceleration engines for RAID 5 and RAID 6 parity calculations. The ROC supports a high-performance dual-core Arm A15 processor resulting in a cost-effective ROC ideal for entry and mid-range servers. Broadcom offers a full featured RAID implementation. MegaRAID hardware RAID (0, 1, 5, 6, 10, 50, 60) is ideal for high-performance and high-availability applications. The ROC can support up to 2,000 SAS or SATA devices and 6,000 outstanding I/Os. It supports up to 8 direct attached NVMe devices and complies with PCIe 4.0 specifications, PCIe Dynamic Power allocation (DPA), ECRC, and AER with compatible devices. The ROC also supports NVMe over PCIe devices.

The Hardware Secure Boot feature, which permits only authenticated firmware to execute, requires the controller to boot from an Internal Boot ROM (IBR) to establish the initial root of trust. Hardware Secure Boot authenticates and builds a chain of trust with succeeding software using this root of trust.

Broadcom provides a complete suite of industry standard operating system drivers and supports Virtual Operating Systems with device emulation and para-virtualization.

Fusion-MPT Architecture Overview

Fusion-MPT architecture marks the next generation of I/O architecture designed to deliver the highest performance available today while reducing time to market, integration, and certification time. Fusion-MPT devices are high performance, cost-effective protocol controllers that represent the newest system-level integration technology in intelligent I/O processors from Broadcom.

Specifications

Attribute	3908
PCIe Host Links	x8, Gen 4.0
SAS Port Configurations (Lanes)	x1/2/4/8 (8) 12 Gb/s
PCIe Port Configurations (Lanes)	x1/2/4/8 (8) 16 Gb/s
Hardware RAID Levels	5, 6
PI/DIF	Yes
VD Block Size	512, 4k
DataBolt Support	Yes
Maximum RAID IOPS (4k RR)	3M
Maximum RAID 5 IOPS (4k RW)	240k
Power (WC/TYP)	13.2W/9.8W
Process	16 nm
Package Type/Size	FPBGA (27 mm × 27 mm)

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For more product information: broadcom.com/products/storage/

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