

Product Brief

SAS5132W

24Gb/s SAS/PCIe 5.0 NVMe RAID-On-Chip

Applications

- Flash-based storage for extreme RAID performance
- SAS and NVMe SSDs
- High-density, high-connectivity solutions

Key Features

- High performance IOP
- 2x increase in Random Read and 5x Random Write RAID performance over previous generation
- Dual-core Arm A15 at 1600 GHz
 - 32-KB L1 I/D caches
 - 2-MB shared L2 cache
 - 24-MB on-chip memory
- 32 PHY SAS/PCIe interface: 24, 12, 6Gb/s SAS and PCIe 5 NVMe rates of 32.0/16.0/8.0/5.0/ 2.5 GT/s rates
- XOR hardware engine for RAID 5/6/50/60
- Full datapath hardware acceleration for all RAID levels. RAID features:
 - MegaRAID™ support with activation key
 - RAID levels 0, 1, 5, 6, 10, 50, and 60
- Backup at power fail using Open NAND Flash Interface (ONFI): Supports bad block management
- Advanced Security
 - Support for CNSA 2.0 PQC hardware secure boot
 - SPDM attestation
- Supports both SAS rates of 22.5, 12, and 6 GB/s, and PCIe Gen 5.0 rates of 32.0, 16.0, 8.0, 5.0, and 2.5 GT/s
 - Spread-spectrum clocking (SSC) for EMI reduction
 - Supports SSP, SMP, and STP protocols
 - Supports narrow and wide ports
 - T-10 EEDP

High-Port Count PCIe 5.0 x16, 32-Port 24Gb/s SAS/NVMe RAID-on Chip (ROC) Equips RAID Controllers with Extreme Performance

Broadcom® Storage

Broadcom enables high performance storage connectivity, and flexible system designs to support any combination of NVMe and SAS devices. Broadcom offers the industry's broadest portfolio of storage solutions, now supporting PCIe Gen 5.0 24Gb/s SAS and NVMe. 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 SAS5132W is the ninth generation of SAS ROC based on the industry-leading Fusion-MPT™ architecture. This PCIe Gen 5.0 x16, 32-port 24Gb/s ROC delivers a 2x increase in Random Reads and a 5x increase in Random Write RAID performance over previous generations, and it enables the seamless operation of SAS or NVMe storage devices from any system design. The SAS5132W ROC features a fully integrated RAID cache, allowing significantly more read/write bandwidth into and out of the memory, increasing RAID performance, and delivering extremely low and deterministic write latency over the entire performance range of the controller.

The SAS5132W host interface supports 16 PCI Express (PCIe) lanes and complies with the PCIe 5.0 specification, offering up to 14 million IOPs and maximizing both the IOPs and bandwidth of a full x16 PCIe Gen 5 interface up to 58 GB/s. The SAS5132W has also added significant hardware support to increase the rebuild performance on drive failure. With this support, applications will have very little performance change in this scenario. The SAS5132W also incorporates an embedded XOR DMA engine for RAID acceleration, T10 end-to-end data protection (EEDP) for early detection of recovery from data corruption, and a DataBolt bandwidth optimizer allows users to take advantage of 24Gb/s SAS speeds while utilizing existing 12Gb/s SAS drives when connected through Broadcom® 24 GB/s SAS expanders and backplanes. The SAS5132W also has improved security features incorporating CNSA 2.0 Post Quantum Crypto (PQC) hardware secure boot, stronger signing algorithms, and attestation. The attestation support is through the Security Protocol and Data Model (SPDM) Specification.

The introduction of PCIe devices executing NVMe command sets to the existing SAS infrastructure makes industry standard hot-pluggable drive bays even more versatile. The 32-port ROC device interface provides SAS data transfer rates of 22.5, 12, and 6Gb/s per lane, or PCIe data transfer rates of up to PCIe 5.0 data rate runs up to 32 GT/s, and it is backward compatible to 16.0/8.0/5.0/2.5 GT/s rates. The device automatically negotiates between the speeds and protocols.

Key Features (cont.)

- T-10 optical support
- SAS 2.1 power management
- Supports DataBolt bandwidth aggregation technology
- Separate REFCLK independent SSC
- PCIe application layer supports NVMe
- Supports up to 16 PCIe devices behind a supported switch
- PCIe 5.0 host interface
 - Supports x16, x8, x4, x2, and x1 PCIe lanes at a transfer rate up to 32.0 GT/s per lane, full duplex
 - Lane and polarity reversal
 - Supports ECRC and AER
 - PCIe hot-plug support
 - Variable PCIe bandwidth negotiation
- Supports SFF-TA-1005, Universal Backplane Management (UBM)
- Advanced power management support
 - Slumber and Partial power mode support for SAS devices
 - Programmable SAS link power down
 - Variable PCIe bandwidth negotiation
- External memory interface support
 - SPI-based Flash ROM
- Communication interfaces
 - I²C and I³C interfaces for enclosure management services
 - UART interface for debug
- SFF-8485 compliant, SGPIO
- Extensive OS support
- JTAG support
- Package: 31 mm x 42.5 mm
- PEA
 - Embedded hardware for capturing trace information from both host and device PCIe links
 - Use for capturing PCIe trace information based on a trigger
 - Software tools library is available to setup and control PEA

Overview (cont.)

The SAS5132W ROC has a fully-integrated RAID cache, and so unlike previous RAID controller designs, it does not require an onboard DDR for the RAID cache. The ROC supports hardware acceleration engines for RAID 5 and RAID 6 parity calculations, and features a high performance dual-core Arm A15, 16-GHz processor. Broadcom offers a full featured RAID implementation. MegaRAID hardware RAID (0, 1, 5, 6, 10, 50, and 60) is ideal for high performance and high availability applications. The ROC can support up to 240 SAS devices. It supports up to 32 direct attached SAS or NVMe devices and complies with the SAS4 and PCIe 5.0 specifications, PCIe dynamic power allocation, end-to-end cyclic redundancy check (ECRC), and Advanced Error Reporting (AER) with compatible devices.

With the heightened performance benefits that the integrated RAID cache delivers, the SAS5132W is focused on support for SSDs. Compared to the previous Broadcom SAS4100 series, which support both SSDs and HDDs, the SAS5100 family is ideal for SSD-based storage applications that require low and deterministic write latency and improves overall performance output. RAID-based applications for HDD should continue to use our SAS41xx family of ROCs.

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.

A new feature for the SAS5132W includes a PCIe Embedded Analyzer (PEA) function. All PCIe links on the host and on the device have embedded hardware that can be programmed to capture PCIe information for debugging. There is a rich set of trigger, trace, and filter capabilities that are setup through function calls using a software tools library. Customers will find this feature invaluable for both design and debug, and when deployed.

Ordering Information

Part Number	Description
SR15-0B00-04	ROC (24Gb/s SAS; PCIe Gen 5), 32 port, x16 PCIe Host, Hard Secure