BROADCOM®

Product Brief

MegaRAID™ 9500 PCIe Gen 4.0 Tri-Mode Storage Adapters

12Gb/s SAS/SATA/PCIe (NVMe) Tri-Mode RAID Controller

Overview

Data center, cloud, and high-performance computing environments not only require large amounts of storage capacity, but must also provide the data protection, flexibility, and performance that today's applications and end users demand. The MegaRAID™ 9500 Series of 12Gb/s SAS/SATA/PCIe (NVMe) Gen 4.0 Tri-Mode Storage Adapters, with 16 and 8 ports, address these needs by delivering more performance and offering RAID data protection for a range of high-end server storage applications.

Based on the Broadcom SAS3916 and SAS3908 eight-lane host PCIe to SAS/SATA/PCIe RAID on Chip (RoC) controller, the 9500 series MegaRAID adapters are the first RAID adapters to offer both PCIe Gen 4.0 host and PCIe Gen 4.0 storage interfaces. PCIe Gen 4.0 enables these adapters for high bandwidth by delivering twice the bandwidth and 75% more IOPs.

Applications

- High-port direct-attached connectivity applications
- Enterprise databases
- Analytics applications
- Medical imaging
- Media applications
- Flexible solutions for cloud computing

Tri-Mode SerDes Technology

The Broadcom Tri-Mode SerDes technology enables operation of NVMe, SAS, or SATA storage devices in a single drive bay. A single adapter can operate in all three modes concurrently servicing NVMe, SAS, or SATA drives. The adapter negotiates between speeds and protocols to seamlessly work with any of the three types of storage devices. Tri-Mode support provides a nondisruptive way to evolve existing data center infrastructure. By upgrading to a Tri-Mode adapter, users can expand beyond SAS/SATA and use NVMe without major changes to other system configurations. The 9500 series adapters are compatible with existing PCI Express SFF-8639 Module (U.2) backplanes, allowing users to boost performance for today's ever increasing bandwidth requirements.
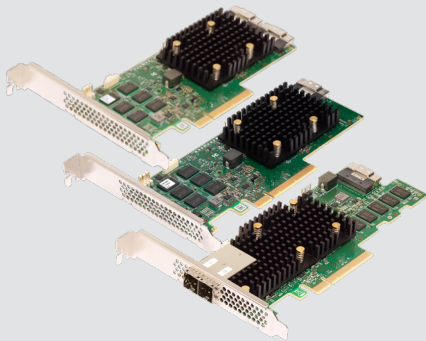
Key Features

- Tri-Mode Storage Interface
  - 12Gb/s SAS
  - 6Gb/s SATA
  - Gen 4.0 PCIe (NVMe)
- Hardware Secure Boot
- Universal Backplane Management (UBM) ready
- RAID levels 0, 00, 1, 5, 6, 10, 50, and 60
  - 13,700 MB/s (RAID 256K Seq Rd)
  - 3M IOPs (4K RAID RR)
  - 240K RAID 5 IOPs (4K RW)
- MegaRAID SafeStore™ Software for SED Key Management
- CacheVault™ flash backup
- x8 PCIe Gen 4.0 Host Interface
  - Supports x8, x4, x2, x1 PCIe lanes at a transfer rate up to 16.0GT/s per lane, full duplex
  - Lane and polarity reversal
- SFF-9402 Compliant Connector Pinout
- Up to 240 SAS/SATA devices
- Up to 32 NVMe devices
- Form Factor Friendly Cable Exit

Note: Not all features are applicable to the 9540. See the support matrix for details.
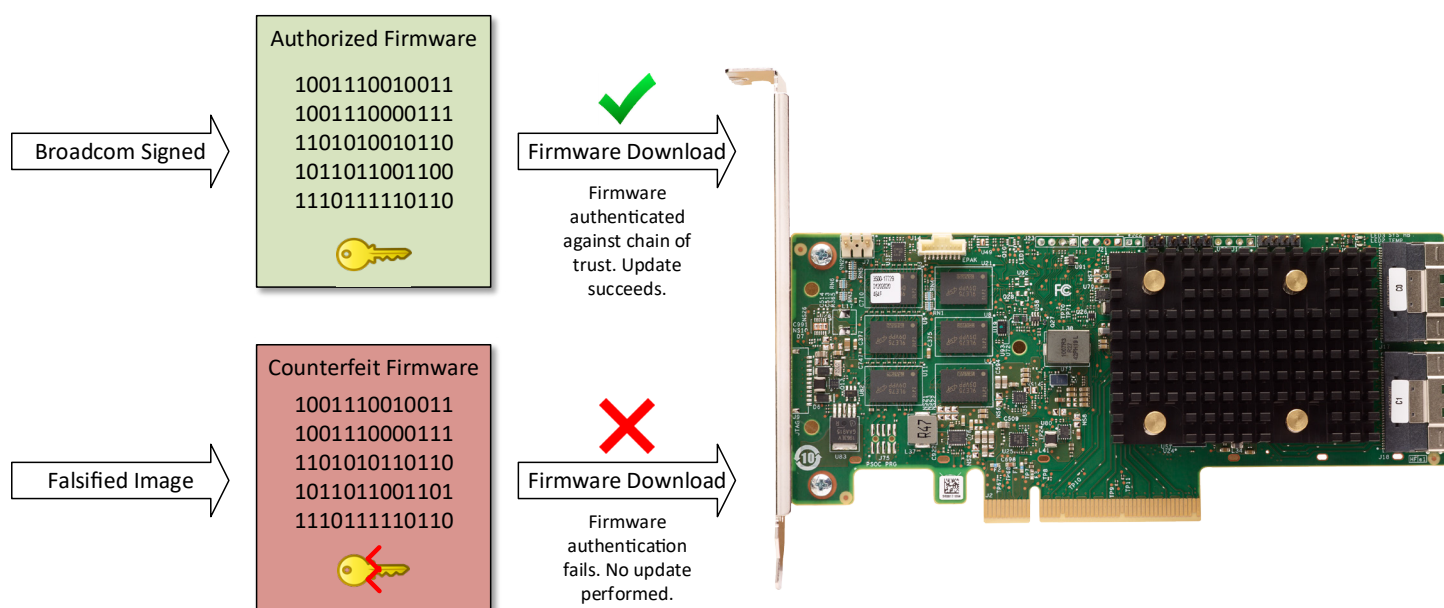
As next-generation systems expand the adoption of Tri-Mode SerDes technology through implementation of the SFF-TA-1001 and SFF-TA-1005 standards, the 9500 series adapters allow users to get the most performance and flexibility. The SFF-TA-1001 specification commonly known as U.3 defines a common bay type and connector for SAS (x1, x2, x4), SATA, and NVMe (x1, x2, x4) devices. The creation of the U.3 standard gives unprecedented flexibility to system OEMs and data centers that want to support the latest storage technologies at the lowest cost and system complexity. With a single 9500 series adapter, system implementers can take full advantage of SAS, SATA, and x1, x2, and x4 NVMe drives in a U.3 based backplane.

Control and management of multiprotocol (SAS/SATA/NVMe) backplanes has been loosely defined in previous generations of products. Recognizing this, Broadcom worked with key industry members to introduce Universal Backplane Management (UBM) or SFF-TA-1005. UBM builds upon current management frameworks to provide a comprehensive approach to managing SAS, SATA, and NVMe. The 9500 series adapters are UBM ready, and customers can immediately integrate these adapters into their U.3 backplanes utilizing UBM.

Hardware Secure Boot

The onboard controller incorporates advanced security through hardware secure boot. The hardware secure boot feature permits only authenticated firmware to execute on the adapter. The controller's Internal Boot ROM establishes an initial Root of Trust (RoT). Hardware secure boot authenticates and builds a Chain of Trust (CoT) with succeeding firmware images using the RoT, meaning only authorized firmware is executed on the adapter. Broadcom provides the signed firmware images, making the use of hardware secure boot transparent to customers, while providing confidence in the security of the solution.

Simple Secure Boot

Authorized Firmware
1001110010011
1001110000111
1101010010110
1011011001100
1110111110110

Broadcom Signed

Firmware Download
Firmware authenticated against chain of trust. Update succeeds.

Counterfeit Firmware
1001110010011
1001110000111
1101010110110
1011011001101
1110111110110

Falsified Image

Firmware Download
Firmware authentication fails. No update performed.

MegaRAID 9500 Series

Feature	9560-16i	9560-8i	9580-8i8e	9540-8i
Port Count	16 internal	8 internal	8 internal, 8 external	8 internal
Connectors	Two x8 SFF-8654	One x8 SFF-8654	One x8 SFF-8654 2 x4 SFF-8644	One x8 SFF-8654
Host Interface	x8 PCIe Gen 4.0	x8 PCIe Gen 4.0	x8 PCIe Gen 4.0	x8 PCIe Gen 4.0
Storage Interface	12Gb/s SAS, 6Gb/s SATA, Gen 4.0 PCIe (NVMe)	12Gb/s SAS, 6Gb/s SATA, Gen 4.0 PCIe (NVMe)	12Gb/s SAS, 6Gb/s SATA, Gen 4.0 PCIe (NVMe)	12Gb/s SAS, 6Gb/s SATA, Gen 4.0 PCIe (NVMe)
Controller (ROC/IOC)	SAS3916	SAS3908	SAS3916	SAS3808
RAID Levels	0, 00, 1, 10 5, 50, 6, 60	0, 00, 1, 10 5, 50, 6, 60	0, 00, 1, 10 5, 50, 6, 60	0, 00, 1, 10
Max Devices Per Controller	SAS/SATA: 240 NVMe: 32	SAS/SATA: 240 NVMe: 32	SAS/SATA: 240 NVMe: 32	SAS/SATA: 63 NVMe: 4
Cache Size	8 GB	4 GB	8 GB	—
Cache Protection	CacheVault, CVPM05	CacheVault, CVPM05	CacheVault, CVPM05	—

RAID Features	• JBOD Mode with R0/1/10 and JBOD for SDS environments*
	• Online Capacity Expansion (OCE)
	• Auto resume after loss of system power during array rebuild or OCE
	• Single controller multipathing
	• Load balancing
	• Configurable stripe size up to 1 MB
	• Fast initialization for quick array setup
	• Check consistency for background data integrity
	• SSD support with SSD Guard™ technology
	• Patrol read for media scanning and repairing
	• 240 virtual drive support (32 for the 9540)
	• DDF-compliant Configuration on Disk (COD)
			• S.M.A.R.T. support
			• Global and dedicated Hot Spare with Revertible Hot Spare support:
			  − Automatic rebuild
			  − Enclosure affinity
			  − Emergency SATA hot spare for SAS arrays
			• Enclosure management:
			  − SES (inband)
			  − SGPIO (sideband)
			  − Universal Backplane Management (UBM) ready
			• DataBolt bandwidth optimizer technology support for compatible expander-based enclosures
			• Shield state drive diagnostic technology
			• MegaRAID SafeStore Software for SED Key Management	

Management Utilities	• LSI Storage Authority (LSA) • StorCLI (command-line interface) • HII (UEFI Human Interface Infrastructure)			
OS Support	Microsoft Windows, VMware vSphere/ESXi, Red Hat Enterprise Linux, SuSE Linux, Ubuntu Linux, Citrix XenServer, CentOS Linux, Debian Linux, Oracle Enterprise Linux, Fedora, FreeBSD. See www.broadcom.com/support/download-search for details on versions.			
Dimensions	155.52 mm (±0.13 mm) x 68.77 mm (±0.13 mm)	155.52 mm (±0.13 mm) x 68.77 mm (±0.13 mm)	167.52 mm (±0.13 mm) x 68.77 mm (±0.13 mm)	155.52 mm (±0.13 mm) x 68.77 mm (±0.13 mm)
Operating Conditions	Operating: 0°C to 55°C, 5% to 90% non-condensing Storage: −45°C to 105°C, 5% to 95% non-condensing			
Typical Power	13.21W	9.64W	14.25W	6.0W
Operating Voltage	12V ±8%; 3.3V ±9%			
MTBF (Calculated)	>3,000,000 hours at 40°C			
Hardware Warranty	3 years			
Regulatory Certifications	USA (FCC 47 CFR part 15 Subpart B, class B); Canada (ICES -003, Class B); Taiwan (CNS 13438); Japan (VCCI V-3); Australia/New Zealand (AS/NZS CISPR 22); Korea (RRA no 2013-24 & 25); Europe (EN55022/EN55024); Safety: EN/IEC/ UL 60950; RoHS; WEEE.			

* Not applicable to the 9540.

Ordering Information	9560-16i	9560-8i	9580-8i8e	9540-8i
Single Pack	05-50077-00	05-50077-01	05-50076-00	05-50134-03
CVPM05	05-50039-00	05-50039-00	05-50039-00	—

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