

# MegaRAID® 9400 Series Tri-Mode Storage Adapters

## 12Gb/s SAS/SATA/NVMe Tri-Mode PCIe RAID Controllers

### Industry's First Hardware RAID adapter with Tri-Mode SerDes Technology

Broadcom enables high performance storage connectivity and flexible system designs that support any combination of NVMe, SAS and SATA devices with the industry's first hardware RAID adapter with Tri-Mode SerDes. The MegaRAID 9400 series of adapters expands on the industry-leading family of 12Gb/s storage adapters from Broadcom with 8 and 16 port internal, external and combination Tri-Mode port options.

### Applications

- High-port count SAS/SATA/NVMe controllers for direct attached high connectivity applications
- Tri-Mode connectivity enabling maximum data center flexibility
- Flexible solutions for cloud computing
- External storage requiring high connectivity SAS/SATA interface for host or drive side connect

### Key Features

- Tri-Mode Storage Interface Ports
  - SFF-8680 Bay
    - x1 SAS
    - x1 SATA
    - x2 SAS (Multi Link)
    - Two x1 SAS (Dual port using MPIO)
  - SFF-8639 (U.2) Bay
    - x2\*, x4 NVMe
- Supports 12, 6, and 3Gb/s SAS and 6, 3Gb/s SATA data transfer rates

### NVMe Performance Gains for Storage

The MegaRAID Tri-Mode storage adapters bring NVMe performance benefits to the storage tier by providing connectivity and data protection that MegaRAID technology has offered for over 20 years for SAS/SATA interfaces. Based on the dual-core SAS3516 or SAS3508 RAID on Chip (ROC) and 72-bit DDR4-2133 SDRAM, these controllers provide bandwidth and IOPS performance increases compared to the previous generation and are ideal for high-end servers utilizing internal storage or connecting to large-scale external storage enclosures.

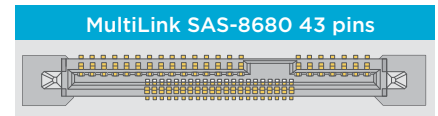
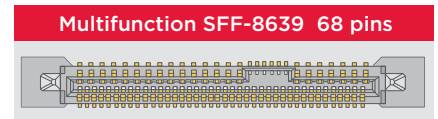
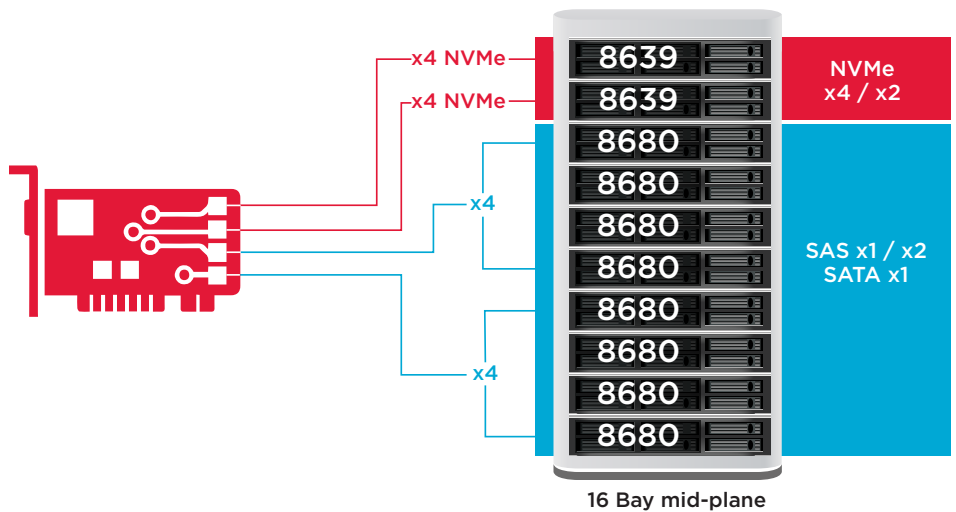


### Key Features (Cont.)

- Up to 8 storage interface PCIe links. Each link supporting x4 or x2\* link widths up to 8.0 GT/s (PCIe Gen3) per lane
- SFF-9402 Compliant, Connector Pin-out
- SFF-8485 Compliant, SGPIO
- RAID levels 0, 1, 5, 6, 10, 50 and 60
- CacheVault flash back-up at power fail
  - Supports bad block management
- PCIe 3.1 Host Interface
  - Supports x8, x4, x2, x1 PCIe lanes at a transfer rate up to 8.0 GT/s per lane, full duplex
  - Lane and polarity reversal
  - Variable PCIe bandwidth negotiation

### Endless design flexibility using Tri-Mode Controllers

Broadcom’s Tri-Mode SerDes Technology enables operation of NVMe, SAS, or SATA storage devices in a single drive bay. A single controller can operate in all three modes concurrently servicing NVMe, SAS, or SATA drives. The controller negotiates between the speeds and protocols to seamlessly work with any of the three types of storage devices. Tri-Mode support provides a non-disruptive way to evolve existing data center infrastructure. By upgrading to a Tri-Mode controller, users can expand beyond SAS/SATA and use NVMe without major changes to other system configurations.



## MegaRAID 9400 Series

	9460-16i	9460-8i	9480-8i8e	9440-8i
Ports	16 internal	8 internal	8 internal/8 external	8 internal
Connectors	Four (x4) SFF-8643	Two (x4) SFF-8643	Two (x4) SFF-8643, Two (x4) SFF-8644	Two SFF-8643
Storage Interface Support	SAS, SATA, PCIe (NVMe)			
Max PCIe (NVMe) Direct Attach Devices	Four x4, Eight x2*	Two x4, Four x2*	Two x4, Four x2 (internal only)	Two x4, Four x2*
Max Devices Per Controller*	SAS/SATA: 255 NVMe: 24*	SAS/SATA: 255 NVMe: 24*	SAS/SATA: 255 NVMe: 24*	SAS/SATA: 63 NVMe: 24*
Cache Memory	4 GB 2133MHz DDR4 SDRAM	2 GB 2133MHz DDR4 SDRAM	4 GB 2133MHz DDR4 SDRAM	N/A
I/O Processor / SAS Controller	SAS3516	SAS3508	SAS3516	SAS3408
Host Bus Type	PCIe 3.1 x8	PCIe 3.1 x8	PCIe 3.1 x8	PCIe 3.1 x8
Cache Protection	CacheVault CVPM05	CacheVault CVPM05	CacheVault CVPM05	N/A
Key RAID Data Protection Features	<ul style="list-style-type: none"> <li>• RAID levels 0, 1, 5, and 6***</li> <li>• RAID spans 10, 50, and 60***</li> <li>• SDS Personality with EPD** and JBOD</li> <li>• Online Capacity Expansion (OCE)</li> <li>• Online RAID Level Migration (RLM)</li> <li>• Auto resume after loss of system power during array rebuild or reconstruction (RLM)</li> <li>• Single controller Multipathing</li> <li>• Load Balancing</li> <li>• Configurable stripe size up to 1MB</li> <li>• Fast initialization for quick array setup</li> <li>• Check Consistency for background data integrity</li> <li>• SSD Support with SSD Guard™ technology</li> <li>• Patrol read for media scanning and repairing</li> </ul>		<ul style="list-style-type: none"> <li>• 64 virtual drive support (32 for 9440)</li> <li>• DDF compliant Configuration on Disk (COD)</li> <li>• S.M.A.R.T support</li> <li>• Global and dedicated Hot Spare with Revertible Hot Spare support               <ul style="list-style-type: none"> <li>-Automatic rebuild</li> <li>-Enclosure affinity</li> <li>-Emergency SATA hot spare for SAS arrays</li> </ul> </li> <li>• Enclosure management               <ul style="list-style-type: none"> <li>-SES (inband)</li> <li>-SGPIO (sideband)</li> </ul> </li> <li>• DataBolt bandwidth optimizer technology support for compatible expander-based enclosures</li> <li>• Shield state drive diagnostic technology</li> </ul>	
Physical Dimensions	6.127" x 2.712" (155.65 mm x 68.90 mm)	6.127" x 2.712" (155.65 mm x 68.90 mm)	6.600" x 2.712" ( 167.65mm x 68.90mm)	6.127" x 2.712" (155.65 mm x 68.90 mm)
Typical Power	17.02W	14.16W	17.71W	10.05W
Airflow	250LFM @ 55°C	250LFM @ 55°C	250LFM @ 55°C	200LFM @ 55°C
Operating Conditions	Operating: 10°C to 55°C 20 to 80% non-condensing		Storage: -45°C to 105°C 5 to 95% non-condensing	
MTBF (Calculated)	>3,000,000 hours at 40°C			
Operating Voltage	+12V +/-8%; 3.3V +/-9%			
Hardware Warranty	3 years; with advanced replacement option			
Management Software	LSI Storage Authority (LSA) StorCLI (command-line interface), HII (UEFI Human Interface Infrastructure)			
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			
OS Support	Microsoft Windows. Contact Oracle support for Oracle Solaris driver or software support. See <a href="http://www.broadcom.com/support/download-search">www.broadcom.com/support/download-search</a> for details on versions.			

## Ordering Information

Single Pack	05-50011-00	05-50011-02	05-50031-00	05-50008-02
CVPM05	05-50039-00	05-50039-00	05-50039-00	N/A

\*Feature available at a later release

\*\*See MegaRAID Software Users Guide and MegaRAID and HBA Tri-Mode Storage Adapters User Guide for more information on supported drive profiles.

\*\*\*Not applicable to the 9440-8i adapter

Visit the Broadcom Server Storage website at: [broadcom.com/server-storage](http://broadcom.com/server-storage)

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