BROADCOM®

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 ports of internal, external, and combination Tri-Mode port options.

NVMe Performance Gains for Storage

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 using internal storage or connecting to large-scale external storage enclosures.
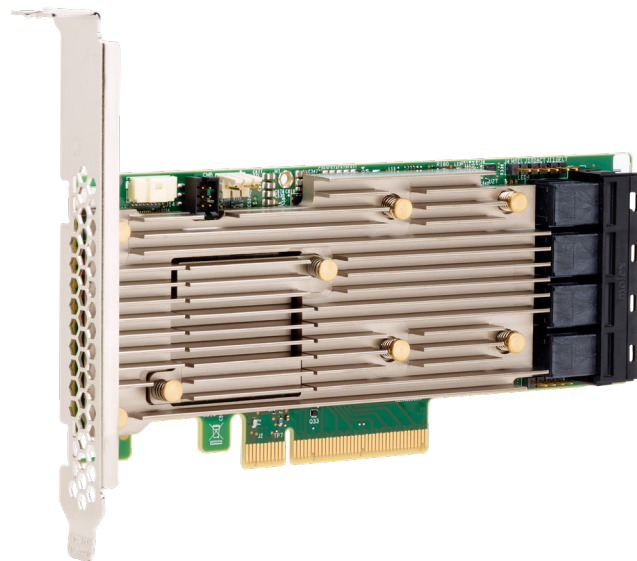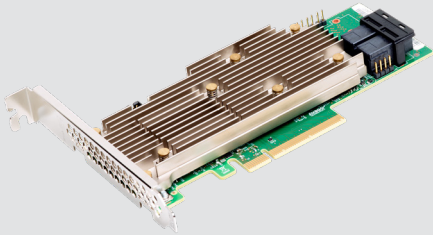
Applications

- 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
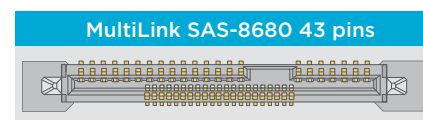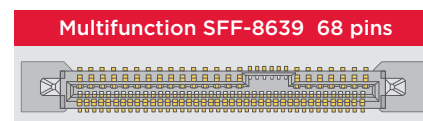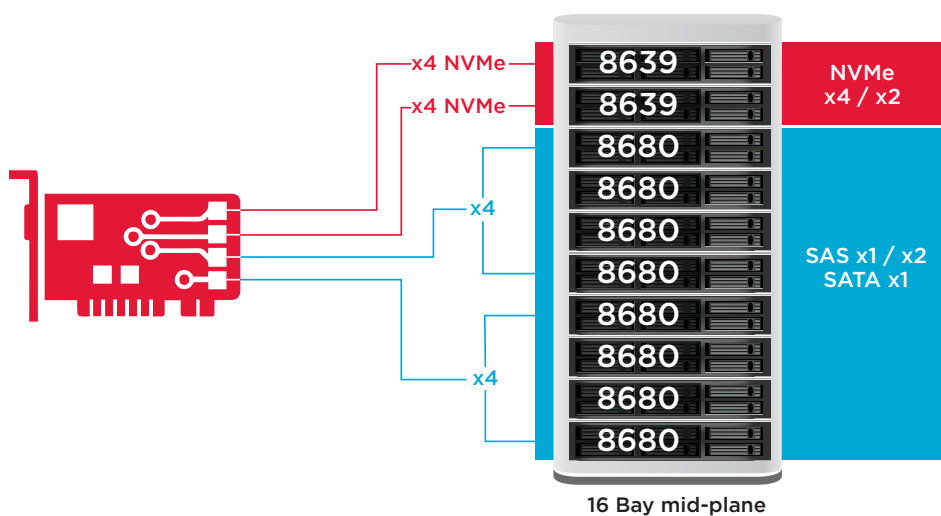- Supports 12, 6, and 3 Gb/s SAS and 6 and 3 Gb/s SATA data transfer rates

Key Features (cont.)

- Up to 8 storage interface PCIe links. Each link supports x4 or x2* link widths up to 8.0 GT/s (PCIe 3.0) 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, and 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

*Not applicable to 9440-8i.

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.

x4 NVMe
x4 NVMe
x4
x4

8639
8639
8680
8680
8680
8680
8680
8680
8680
8680

NVMe x4 / x2

SAS x1 / x2
SATA x1

16 Bay mid-plane

Multifunction SFF-8639 68 pins

MultiLink SAS-8680 43 pins

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)			
Maximum PCIe (NVMe) Direct-Attach Devices	Four x4, Eight x2	Two x4, Four x2	Two x4, Four x2 (internal only)	Two x4, Two x2 (direct-attached only)
Maximum Devices Per Controller*	SAS/SATA: 240 NVMe: 24	SAS/SATA: 240 NVMe: 24	SAS/SATA: 240 NVMe: 24	SAS/SATA: 63 NVMe: 2
Cache Memory	4 GB 2133 MHz DDR4 SDRAM	2 GB 2133 MHz DDR4 SDRAM	4 GB 2133 MHz 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	• RAID levels 0, 1, 5, and 6*
	• RAID spans 10, 50, and 60*
	• JBOD Mode*
	• Online Capacity Expansion (OCE)
	• Online RAID Level Migration (RLM)
	• Auto resume after loss of system power during array rebuild or reconstruction (RLM)
	• Single controller multipathing
	• Load balancing
	• Configurable stripe size up to 1 MB (64 KB only for 9440-8i)
	• 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
			• 64 virtual drive support (32 for 9440)
			• 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)
			• DataBolt bandwidth optimizer technology support for compatible expander-based enclosures
			• Shield state drive diagnostic technology	

Physical Dimensions	6.127 in. × 2.712 in. (155.65 mm × 68.90 mm)	6.127 in. × 2.712 in. (155.65 mm × 68.90 mm)	6.600 in. × 2.712 in. (167.65 mm × 68.90 mm)	6.127 in. × 2.712 in. (155.65 mm × 68.90 mm)
Typical Power	17.02W	14.16W	17.71W	10.05W
Airflow	250 LFM at 55°C	250 LFM at 55°C	250 LFM at 55°C	200 LFM at 55°C
Operating Conditions	Operating: 0°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, 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.			
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

*Not applicable to the 9440-8i adapter