

# 9400 Series Tri-Mode Storage HBAs

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

### Industry's First HBA 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 HBA with Tri-Mode SerDes. The Tri-Mode HBAs expand Broadcom's industry leading family of 12Gb/s SAS HBAs with 8 and 16 port internal, external and combination Tri-Mode port options.

### NVMe Performance Gains for Storage

The Tri-Mode Storage HBAs bring NVMe performance benefits to the storage tier by providing connectivity and data protection that HBAs have offered for over 20 years for SAS/SATA interfaces. Based on the single-core SAS3516, SAS3416 or SAS3408 Tri-Mode Storage I/O controllers (IOC), these HBAs provide bandwidth and IOPS performance increase compared to the previous generation and are ideal for high-end servers utilizing internal storage or connecting to large-scale external storage enclosures.

### Endless design flexibility using Tri-Mode Controllers

Broadcom Tri-Mode SerDes Technology enables the 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 HBA, users can expand beyond SAS/SATA and use NVMe without major changes to other system configurations.



### Applications

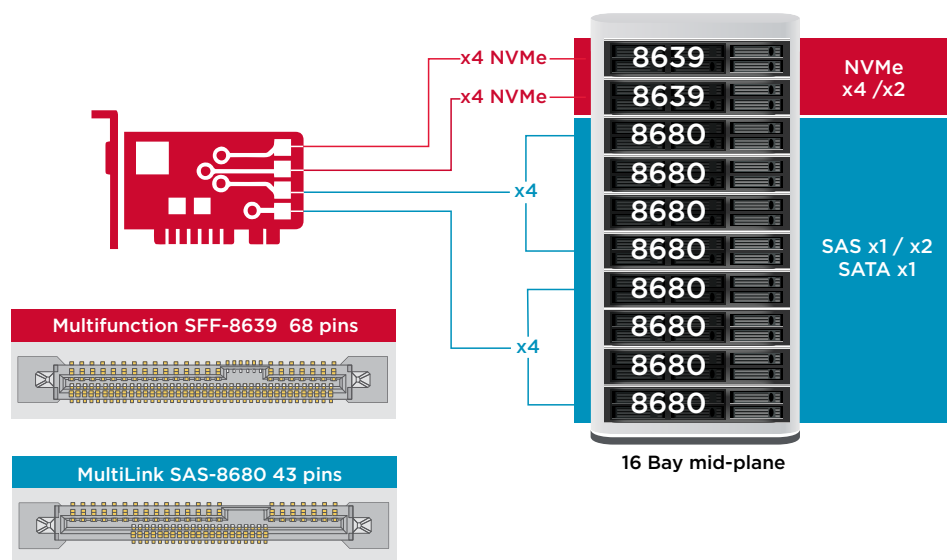
- High-port count SAS/SATA/NVMe adapters for direct attached high connectivity applications
- Tri-Mode connectivity enabling maximum data center flexibility
- Flexible solutions for cloud computing
- External storage requiring high connectivity SAS/SATA interface for host or drive side connect

### 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
- 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

## Key Features (con't)

- SFF-9402 Compliant, Connector Pin-out
- SFF-8485 Compliant, SGPIO
- 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



## 9400 Series Tri-Mode Storage HBAs

|                                | 9400-16i                                                                                                                                                                                                                                            | 9400-8i                                | 9400-16e                                      | 9400-8e                                       | 9400-8i8e                                                           |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|
| Ports                          | 16 internal                                                                                                                                                                                                                                         | 8 internal                             | 16 external                                   | 8 external                                    | 8 internal/8 external                                               |
| Connectors                     | Four (x4) SFF-8643                                                                                                                                                                                                                                  | Two (x4) SFF-8643                      | Four (x4) SFF-8644                            | Two (x4) SFF-8644                             | Two (x4) SFF-8643;<br>Two (x4) SFF-8644                             |
| Storage Interface Support      | SAS, SATA, NVMe (PCIe)                                                                                                                                                                                                                              |                                        |                                               |                                               |                                                                     |
| Max NVMe Direct Attach Devices | Four x4, Eight x2*                                                                                                                                                                                                                                  | Two x4, Four x2*                       | N/A                                           | N/A                                           | Two x4, Four x2* (internal only)                                    |
| Max Devices Per Controller     | SAS/SATA: 1024<br>NVMe: 24*                                                                                                                                                                                                                         | SAS/SATA: 1024<br>NVMe: 24*            | SAS/SATA:1024                                 | SAS/SATA:1024                                 | SAS/SATA: 1024<br>NVMe: 24* (internal only)                         |
| I/O Processor / SAS Controller | SAS3416                                                                                                                                                                                                                                             | SAS3408                                | SAS3416                                       | SAS3408                                       | SAS3516                                                             |
| Host Bus Type                  | PCIe 3.1 x8                                                                                                                                                                                                                                         | PCIe 3.1 x8                            | PCIe 3.1 x8                                   | PCIe 3.1 x8                                   | PCIe 3.1 x8                                                         |
| Typical Power                  | 11.95W                                                                                                                                                                                                                                              | 10.05W                                 | 11.18W                                        | 9.48W                                         | 12.39W                                                              |
| 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" (167.65 mm x 68.90 mm)        | 6.600" x 2.712" (167.65 mm x 68.90 mm)        | 6.600" x 2.712" (167.65 mm x 68.90 mm)                              |
| Cable Support                  | Passive Copper                                                                                                                                                                                                                                      | Passive Copper                         | Passive Copper, Active Copper, Active Optical | Passive Copper, Active Copper, Active Optical | Passive Copper, Active Copper (external), Active Optical (external) |
| Operating Conditions           | Operating: 10°C to 55°C, 20 to 80% non-condensing    Airflow: 200 LFM    Storage: -45°C to 105°C, 5 to 95% non-condensing                                                                                                                           |                                        |                                               |                                               |                                                                     |
| MTBF (Calculated)              | >4,500,000 hours at 40°C                                                                                                                                                                                                                            |                                        |                                               |                                               |                                                                     |
| Operating Voltage              | +12V +/-8%; 3.3V +/-9%                                                                                                                                                                                                                              |                                        |                                               |                                               |                                                                     |
| Hardware Warranty              | 3 years; with advanced replacement option                                                                                                                                                                                                           |                                        |                                               |                                               |                                                                     |
| 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, Linux, VMware.    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                    | 05-50008-00                                                                                                                                                                                                                                         | 05-50008-01                            | 05-50013-00                                   | 05-50013-01                                   | 05-50031-02                                                         |

\*x2 and 24 max NVMe drive support available at a later release