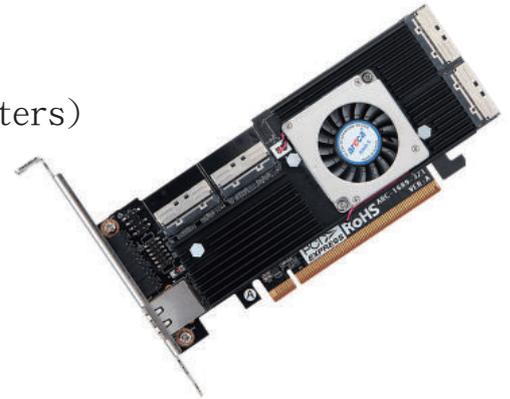


ARC-1689-321

(PCIe 5.0 x16 Fastest and Reliable NVMe H/W RAID Adapters)

The ARC-1689-321 presents advanced hardware RAID technology in enhanced performance using 4x MCIO ports (dedicated PCIe Gen5 x8 per MCIO) device interface. The hardware RAID adapter is designed with a high performance RAID engine and PCIe Gen 5.0 host/device interface, and supports AIC mode or hardware RAID levels 0, 1 (Simple/Multi-Mirroring), 10, Single Disk (Single/Dual/Triple) or JBOD, allowing customers to build high-bandwidth, low-latency, scalable, cost-effective and robust performance storage for ML/AI, HPC and enterprise applications.



Highlights

- Supports up to 4x MCIO ports (PCIe Gen5 x8 per MCIO)
- Connection for up to 8x4, 16x2 and 32x1 NVMe SSD connect via direct cable or back/mid-plane
- x16 PCIe Gen5.0 host interface
- Delivers high-speed performance with speeds of 60GB/s
- True hardware RAID protection for all valuable data
- RAID levels 0, 1 (Simple/Multi Mirroring), 10, Single Disk (Single/Dual/Triple) or JBOF/AIC Mode
- SED support for hardware NVMe encryption capable drives
- Support for UEFI secure boot
- Hardware secure boot ready
- View NVMe device and slot signal integrity status
- Flexible reconfiguration downstream station port widths: x1, x2, x4, x8, and x16 via GUI (update to ARC-1289-321 firmware)
- In-box driver support for Windows, Linux, FreeBSD and more

NVMe Performance Gains for Fast Data

Based on Broadcom's 48-Channel PEX89048 switch chip that provides x16 lanes of dedicated PCIe Gen 5.0 upstream bandwidth and x4 lanes of dedicated downstream bandwidth to each device interface, ARC-1689 NVMe RAID adapter raises the standard to higher performance levels with several enhancements including a new high performance RAID engine, outstanding performance PCIe Gen 5.0 host and PCIe Gen 5.0 (NVMe) interface bus interconnection. ARC-1689 provides an extremely fast, reliable and ultra-compact solution for companies that need storage and is especially designed for accelerated computing, ML/AI and HPC applications. This RAID adapter can support up to 8 NVMe on just one PCIe adapter, increasing capacity and speed as more NVMe devices are added. The ARC-1689 supports 8x4, 16x2 or 32x1 NVMe SSD connect and combines them on a RAID adapter to maximize I/O performance for database applications and streaming digital media environments. A drawback of software RAID is the consumption of expensive compute and memory bandwidth on the host. The ARC-1689 hardware RAID relieves the RAID function burden from the host and maximize application processing performance.

Guaranteed Data Protection

In Areca's high-performance RAID solution, ARC-1689 brings PCIe NVMe to a superior performance hardware RAID at an elevated throughput, high IOPs and low latency. It supports hardware RAID levels 0, 1 (Simple/Multi-Mirroring), 10, Single Disk (Single/Dual/Triple) or JBOD. ARC-1689 hardware secure boot helps ensure that the firmware code running on ARC-1689 hardware platforms is authentic and unmodified. The "Security Function" on the firmware supports Self-Encrypting Disks (SED) for protection of data against loss or theft of SEDs. Protection is achieved through the use of encryption technology on the NVMe drives. During the adapter firmware upgrade process, it is possible for a problem to occur, resulting in corruption of the controller firmware. The ARC-1689 RAID adapter includes several innovative features, including true surprise add and removal, Downstream Port Containment and Read Tracking, which can avoid typical situations that would cause a kernel panic or blue screen event. The advanced intelligent cooling continuously adapts to environmental conditions by automatically controlling the speed of the cooling fans. This super silent design, optimizing balance between noise reduction and necessary cooling. Firmware can monitor and check the current attached NVMe device and slot signal status. User can use it to test new designs or watch over active systems to prevent problems. An error count refers to the number of bit errors detected by the physical layer transceivers within the PCIe switch. These errors can be correctable, where the system can recover without data loss or intervention, or uncorrectable, which negatively impact the interface's function and a high rate can indicate underlying signal integrity issues that may impact performance (latency, bandwidth) or system failures.

Maximum Interoperability

The ARC-1689 RAID adapter enables support for maximum interoperability using standard system UEFI secure boot and OS in-box NVMe driver. The in-box plug-and-play function allows automatic installation of the best-matched driver with no user intervention required for driver media insertion. The ARC-1689 supports in-box NVMe driver for most major operating systems, including Windows, Linux, FreeBSD, VMare and more, along with key system monitoring features such as enclosure management, SMTP and SNMP functions. ARC-1689 products and technology are based on extensive testing and validation processes, optimizing RAID adapters in field-proven compatibility with operating systems, motherboards, applications and device drivers.

Intuitive RAID Management

Similar to Areca RAID adapter, the ARC-1689-321 switch adapter is supplied with fully validated and supported firmware and standards based in-band and out of band manageability features. McBIOS RAID is a BIOS based utility used to simplify configurations and manage RAID adapter via firmware built-in EFI Shell (UEFI OS) at M/B BIOS boot-up screen. Without deploying an agent, users can still configure, deploy, update and monitor the ARC-1689 via the GUI or through the CLI utility. Customers can launch the firmware browser based McRAID GUI through ArcHttp proxy server and the on-board Lan port. Additionally, Areca ArcSAP storage manager allows the user to scan multiple RAID units in the network and perform GUI management operations across multiple RAID units.

Adapter Architecture

- PEX89048 Gen5 Switch/High-Performance RAID Engine
- PCIe Gen5 x16 lane host interface
- Connection for up to 8x4, 16x2 and 32x1 NVMe SSD connect via direct cable or back/mid-plane
- Support 4x MCIO (PCIe Gen5 x8 per MCIO)
- Drive interface at each MCIO - PCIe Gen5 at 32GT/per lane
- Hardware secure boot
- Multi-adapter support for large storage requirements
- Delivers 64GB/s bandwidth & sustained transfer speeds up to 60GB/s
- Support SFF-9402 compliant connector pin-out
- Support for UEFI secure boot
- NVRAM for RAID event & transaction log
- Redundant flash image for controller availability
- Support backplanes based on the SFF-TA-1005 specification (UBM) and VPP

Monitors/Notification

- System status indication through LED status and alarm buzzer
- SMTP support for email notification
- Bracket LED for each NVMe activity/fault status
- SNMP support for remote manager
- Support for multiple backplanes, including VPP and UBM

RAID Management

- Field-upgradeable firmware in flash ROM
- UEFI OS to launch McBIOS RAID setup utility
- Web browser-based McRAID storage manager via Windows, Linux, FreeBSD and macOS
- Support command-line interface (CLI)
- Single Admin Portal (ArcSAP) storage manager
- API library for developers to configure RAID adapters with their own utility
- Support Out-of-Band management via Lan port

RAID Features

- RAID levels 0, 1(Simple/Multi Mirroring), 10, Single Disk (Single/Dual/Triple) or JBOD/AIC Mode
- Multiple RAID selections
- Online Array roaming
- Online RAID level/stripe size migration
- Online Capacity expansion/RAID level migration simultaneously
- Instant availability and background initialization
- Support global and dedicated hot spare
- NVMe-RAID TRIM support for Host
- Support NVMe S.M.A.R.T command
- NVMe automatic monitor clone (AMC) and NVMe disk clone
- SED support for hardware NVMe encryption capable drives
- Support slot link control capabilities, link status and error count monitoring for signal integrity
- Flexible reconfiguration downstream station port widths: x1, x2, x4, x8, and x16 using GUI interface (update to ARC-1289-32I firmware package)

Operating System

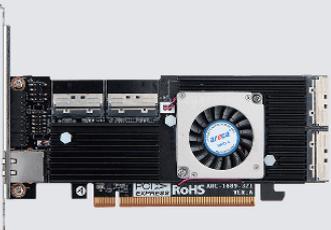
OS Native NVMe Driver Support

- Windows 11/10 / Server 2025/2022/2019/2016
 - Linux (kernel 3.10 or later)
 - FreeBSD
 - macOS (one zoned Namespace and W/O in band management)
- Note: macOS (Areca legacy driver for multi-volumess and in band management)

Note: NVMe Driver only supports Message Signaled Interrupts, MSI and MSI-X
For more information & latest supported OS listing visit www.areca.com.tw

Environmental Specifications

Operating Voltage	12V
Temperature	Operating: 0°C to 55°C Storage: -20°C to 80°C
Humidity	Operating: 10-85%, relative humidity Non-operating: 5-90%, relative humidity
Compliance Certification	CE, FCC, RoHS, REACHE

Model Name	ARC-1689-32I H/W RAID Adapter	ARC-1689-32I Switch Adapter
PCIe Switch	PEX89048 48 Lanes Gen5 Switch /High-Performance RAID Engine	
Host Interface	PCIe Gen5 x16 Lanes	
Form Factor	LP-MD2 : 64.41(H) x 167.65(L) mm	
Device Connector	4x MCIO (PCIe 5.0 x8 per MCIO) Connector	
Max NVMe Devices Support	Up to 8x4, 16x2 and 32x1 NVMe SSD connection via direct cable or back/mid-plane	
RAID Level	0, 1(Simple/Multi Mirroring), 10, Single Disk(Single/Dual/Triple)	N/A (W/O RAID function on GUI)
Device Interface	PCIe Gen 5 x4 (NVMe)	
Management Port	In-Band: PCIe/Out-of_Band:Lan Port	
Device Driver	In-Box(Native) NVMe driver	
Software Package	Same as ARC-1886 Tri-Mode RAID Adapter	
Power Consumption	Worst Case: 23.7 Watts Typical: 18 Watts	
Products View		



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1F., No.9, Alley 2, Lane 35, Ji-Hu Rd., 114Taipei, Taiwan, R.O.C.
TEL: 886-2-87974060 FAX: 886-2-87975970 <http://www.areca.com.tw>
Technical Support: support@areca.com.tw Sales Information: sales@areca.com.tw