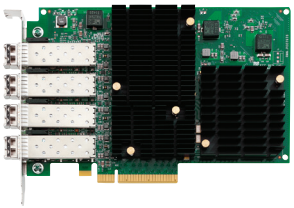
EMULEX
An Avago Technologies Company

DATA SHEET

LightPulse® LPe16004 Gen 5 Fibre Channel HBAs

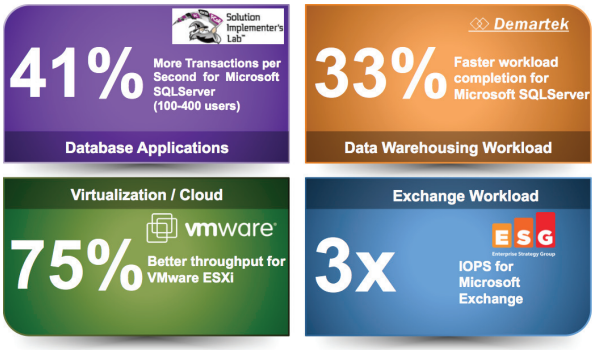


The PCI Express (PCIe) 3.0 LPe16004 quad-port Gen 5 Fibre Channel (16GFC) Host Bus Adapter (HBA) delivers up to 2.4 million I/O operations per second (IOPS)—twice the IOPS of other Gen 5 FC HBAs, making it ideal for slot constrained servers and environments that need to maximize FC connectivity performance. It provides maximum IOPS for solid state disks (SSDs) and new multi-core processor servers.

The LPe16004 HBA cuts response times by more than half and delivers 4x more IOPS per watt compared to 8GFC HBAs, making it the clear choice for the most demanding virtualized, cloud and mission critical deployments. Its advanced management functionality can shave days off installing and managing adapters.

The LightPulse® LPe16004 features the Emulex bullet-proof driver-stack, backward compatibility to 4GFC and 8GFC HBAs and rock-solid reliability with a heritage that spans back to the first generation of Fibre Channel to today's Gen 5 Fibre Channel HBAs. LightPulse is trusted by data centers the world-over, with more than 15 million HBA ports shipped and installed to date.

LightPulse Gen 5 accelerates application performance vs. 8GFC



Performance based on the Gen 5 FC dual-port LPe16000-series vs. the LPe12000-series HBA.

Key benefits

- Maximum performance—up to 2.4 million IOPS per adapter to support larger server virtualization deployments and scalable cloud initiatives, as well as performance to match new multi-core processors, SSDs and faster PCIe 3.0 server host bus architectures
- Ability to meet SLAs and ensure Quality of Service for prioritized traffic with ExpressLane™
- Simplified and time-saving diagnostics of storage network connectivity by using ClearLink supported Brocade Switches and LightPulse HBAs
- Provides FC connectivity for slot constrained server environments
- Delivers quad-channel connectivity for 16GFC target applications
- Improves IT staff productivity through simplified deployment and management
- Reduces the number of cards, cables and PCIe slots required
- Exceptional performance per watt and price/performance ratios
- Integrates seamlessly into existing SANs
- Allows application of SAN best practices, tools and processes with virtual server deployments
- Assures data availability and data integrity
- Provides highest FC performance within the PCIe power specification

EMULEX Gen 5 Fibre Channel

LightPulse® LPe16004

Proven design, architecture and interface

The LightPulse highly integrated multi-core processor design maximizes host performance and efficiency. Advanced error-checking features ensure the integrity of block data as it traverses the storage area network (SAN). LightPulse's firmware-based architecture enables feature and performance upgrades without costly hardware changes.

The unique 4th Generation Service Level Interface (SLI™) allows use of a common driver across all models of Emulex HBAs on a given operating system (OS) platform. Installation and management facilities are designed to minimize server reboots and further simplify deployment.

Powerful management software for maximum data center efficiency

The OneCommand® Manager enterprise class management application features a multiprotocol, cross-platform architecture that provides centralized management of all adapters provided by Emulex. This enables IT administrators to manage network connectivity with one tool for maximum efficiency. OneCommand Manager also features:

- **OneCommand® Manager plug-in for VMware vCenter Server**—enables comprehensive control of Fibre Channel HBAs and network (Fibre Channel over Ethernet [FCoE], iSCSI and TCP/IP NIC) connectivity solutions provided by Emulex from VMware's vCenter Server management console. The OneCommand Manager plug-in for VMware vCenter Server supports both the new VMware vSphere 5.1 Web Client and the VMware vCenter Server desktop client with an identical feature set regardless of the client.



Key features

- PCI Express (PCIe) 3.0 bus increases interconnect performance bandwidth by 2x compared to PCIe 2.0; the new encoding scheme reduces overhead by 20% resulting in more efficient data transfers and power efficiency
- vScale™ performance and scalability—multi-core ASIC engine with eight cores supports 255 virtual functions (VFs), 1024 Message Signaled Interrupts eXtended (MSI-X) and 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters
- 2x management functionality, and takes half the time to manage with OneCommand® Manager
- GreenState™ power efficiency—reduces data center power consumption and associated operational expenditures (OPEX) by delivering up to 4x better IOPS performance/watt
- BlockGuard® data integrity offload— high performance T10 Protection Information (T10 PI) end-to-end data integrity protects against silent data corruption with no performance degradation
- vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs
- Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications
- Support for MSI-X, improves host utilization and enhances application performance
- Support for Gen 5 Fibre Channel (16GFC), 8GFC and 4GFC devices
- Comprehensive virtualization capabilities with support for N_Port ID Virtualization (NPIV) and Windows virtual HBAs
- Secure management with role-based administration integrated with Light Directory Access Protocol (LDAP) and Active Directory (AD) services
- Common driver model, allows a single driver to support all LightPulse HBAs on a given OS

Standards

General specifications

- The LPe16004 series is powered by two XE201 converged fabric controllers and consists of an eight-lane (x8) PCIe 3.0 bus (backward compatibility to PCIe 2.0 supported). The XE201 controller is capable of Fibre Channel, and for certain adapters, Ethernet. Each of the XE201 controllers is capable of providing up to 1.2 million IOPS on a single-port, delivering the highest single-port IOPS performance in the industry.

Industry standards

- Current ANSI/IETF Standards: FC-PI-4; FC-PI-5; FC-FS-2 with amendment 1; FC-AL-2 with amendments 1 and 2; FC-LS-2; FC-GS-6; FC-DA; FC-SP-2; FCP-4; FC-MJS; FC-SB-4; FC-SP; SPC-4; SBC-3; SSC-3; RFC4338
- Legacy ANSI/IETF standards: FC-PH; FC-PH-2; FC-PH-3; FC-PI; FC-PI-2; FC-FS; FC-AL; FC-GS-2/3/4/5; FCP; FCP-2; FC-SB-2; FC-FLA; FC-HBA; FC-PLDA; FC-TAPE; FC-MI; SPC-3; SBC-2; SSC-2; RFC2625
- PCIe base spec 3.0
- PCIe card electromechanical spec 3.0
- Fibre Channel class 2 and 3
- PHP hot plug-hot swap

Architecture

- Quad-port 16GFC HBA
- Supports 16GFC, 8GFC and 4GFC link speeds, automatically negotiated
- Supports four FC ports at 16GFC max
- Integrated data buffer and code space memory

Comprehensive OS and hypervisor support

- Windows Server
- Linux
- Solaris
- VMware vSphere
- Windows Hyper-V
- Additional support is available from OEMs and partners

Hardware environments

- PowerPC, SPARC, x86, x64 and Intel Itanium 64-bit processor family

Optical

- Data rates: 14.025 Gb/s (1600Mb/s); 8.5 Gb/s (800Mb/s); 4.25 Gb/s (400 Mb/s) (auto-detected)
- Optics: Short wave lasers with LC type connector
- Cable: Operating at 16Gb
  - 15m at 16Gb on 62.5/125 µm OM1 MMF
  - 35m at 16Gb on 50/125 µm OM2 MMF
  - 100m at 16Gb on 50/125 µm OM3 MMF
  - 125m at 16Gb on 50/125 µm OM4 MMF

Physical dimensions

- PCI full-height, half-length form factor card
- 111.15mm x 167.64mm (4.376" x 6.600")
- Standard bracket

Power and environmental requirements

Power supply 1.8V, 1.2V, 0.9V

- Volts: +3.3, +12
- Operating temperature: 0° to 55° C (32° to 131° F)
- Storage temperature: -40° to 70° C (-40° to 158° F)
- Relative humidity: 5% to 95% non-condensing
- 23° C wet bulb

Agency and safety approvals

North America

- FCC Class A
- UL/CSA Recognized

Europe

- CE Mark
- EU RoHS compliant
- TUV Bauart Certified

Japan

- VCCI Class A

Taiwan

- BSMI Class A

Korea

- MSIP (formally KCC/MIC) Class A

China

- China RoHS Compliant

(Please refer to the product page on www.emulex.com for further details)

Ordering Information

- LPe16004-M6
  - 4 Port 16GFC Short Wave Optical – LC SFP+

Options

Certified Spare Optic Kit for LightPulse 16GFC HBAs

- LPe16100-OPT
  - 16Gb optic kit (QTY 1 optic per kit)
  - 16GFC short wave lasers with LC-type connector SFP+ optic
  - Compatible with all LightPulse 16GFC Host Bus Adapters
  - For use as an on-site spare optic

Added Features

Performance Features

- Doubling the maximum FC link rate from 8GFC to 16GFC and enhanced virtualization capabilities, help support IT "green" initiatives.
- Frame-level multiplexing and out-of-order frame reassembly increases link efficiency and maximizes HBA performance.

Data protection features

- End-to-end data protection with hardware parity, CRC, ECC and other advanced error checking and correcting algorithms ensure data is safe from corruption.
- Enhanced silent data corruption protection provided by T10 PI with high-performance offload.

Deployment and management features

- Universal boot capability allows the appropriate boot environment to be automatically selected for any given hardware.
- Boot from SAN capability reduces system management costs and increases uptime.
- Detailed, real-time event logging and tracing enables quick diagnosis of SAN problems.
- Beaconing feature flashes the HBA LEDs, simplifying their identification within server racks.
- Environmental monitoring feature helps optimize SAN availability.

Management features

- The Emulex OneCommand Manager application enables centralized discovery, monitoring, reporting, and administration of adapters provided by Emulex on local and remote hosts. Powerful automation capabilities facilitate remote driver parameter, firmware and boot code upgrades.
- Advanced diagnostic features, such as adapter port beaconing and adapter statistics, help optimize management and network performance, while the environmental monitoring feature helps to maintain optimum host-to-fabric connections. In addition to the GUI interface, management functions can also be performed via a scriptable Command Line Interface (CLI) as well as a web browser.
- OneCommand Manager supports role-based management to facilitate administration of adapters throughout the data center without compromising security. Management privileges can be assigned based on LDAP and AD group memberships.
- Troubleshoot optics and cables before critical errors affect your system with ClearLink supported Brocade Switches and Emulex HBAs.
- Meet SLAs and QoS with ExpressLane™ application prioritization on hosts. ExpressLane is fully compatible with majority of switches offering QoS features.
- LightPulse's management instrumentation complies to open management standards, such as SMI-S and common HBA API support, which enables seamless upward integration into enterprise storage and server management solutions.

EMULEX®
An Avago Technologies Company

For product information and a complete list of distributors, please visit our website at www.emulex.com

Avago, Avago Technologies, Emulex, LightPulse, SLI, OneCommand, ExpressLane, vScale, Greenstate, vEngine and the Emulex logo are trademarks of Avago Technologies in the United States and other countries. All other brand and product names are the trademarks of their respective owners. Copyright ©2015 Avago Technologies. All rights reserved.