

Flashtec® NVMe® 4016

Performance 16-Channel Gen 5 PCIe® Flash Controller



Summary

The Flashtec® fourth generation NVMe controller family enables the world's leading enterprises and data centers to realize the highest performance PCIe Gen-5 SSDs utilizing next-generation NAND technologies. Combining world-class capacity, security and flexibility, the Flashtec controller family is the reliable choice. The Flashtec NVMe 4016 controllers support the standard NVM Express (NVMe) host interface and are optimized for high-performance random read/write operations, performing all Flash management operations on-chip and consuming negligible host processing and memory resources.

Flexibility

The flexible and programmable platform gives developers total control for optimization supporting NVMe, Cloud and Zoned Namespace (ZNS) capable SSD's. End users deploy these PCIe-SSD-based systems in their data centers for Cloud computing and business-critical applications, such as online transaction processing, financial data processing, database mining and other applications that are sensitive to latency and performance.

Cloud Optimizations

The advanced virtualization with large scale physical and virtual functions per port, coupled with the new Credit Engine for dynamic allocation of resources enables optimal on-demand cloud services. High performance CPU cores, hardware off-load engines, and innovative new Machine Learning technology enables differentiated solutions for the Cloud and Data Center Storage Market segments.

Error Correction

Flashtec's advanced ECC engine provides superior endurance and increases the overall reliability of today's SSD technologies and NAND geometries. The advanced Flashtec LDPC correction technology utilizes both hard and soft decode techniques, to extend the memory life with exceptionally strong Error Correction capabilities for QLC NAND and future technologies.

Reliability and Security

Flashtec controller family provides end-to-end data integrity and reliability features for enterprise-class solutions through a combination of exceptionally strong ECC and RAID. For Cloud, the fully secure infrastructure includes secure boot, double signing authentication and integrity and data encryption (IDE).

TCO

Flashtec family is optimized for power savings, utilizing a combination of architectural and semiconductor design techniques. Emphasis is given to absolute power consumption and to advanced power management features, including automatic idling of processor cores and autonomous power reduction capabilities. The Flashtec family leverages the Enterprise NVM Express dynamic power management interface, enabling solutions to meet power and performance objectives through firmware to meet overall total cost of ownership goals.

Features

- Advanced Credit Management technology offers stringent Quality of Service (QoS)
- Advanced virtualization with multiple functions support
- Flashtec NVMe 4016 Controller can achieve greater than 3 million random read IOPS on 4 KB operations
- The Flashtec NVMe 4016 controller bandwidth is optimized for PCIe Gen 5 and will achieve 14+ GB/s bandwidth
- PCIe Gen-5 x8, x4, or dual independent PCIe Gen-5 x4, x2 (active, active/standby) host interfaces, compliant with PCIe 5.0
- Enables high capacity SSDs up to 200+ TB, in multiple form factors including: E1, E3, U.2 and U.3
- SLC, MLC, Enterprise MLC, TLC and QLC Flash with Toggle and ONFI interface supporting up to 2400 MT/s
- 16 independent programmable Flash channels
- Supports 2 ranks of DDR4-3200
- Power Loss Protection (PLP) capable
- Industry leading security and encryption, including PCIe lane encryption
- Data integrity and reliability:
 - Strong LDPC Flash ECC
 - Flash channel RAID
 - End-to-end data protection
- Innovative new Machine Learning (ML) technology

Benefits

- Power-optimized high-performance PCIe Flash controllers for enterprise and data center workloads
- Advanced ECC and LDPC enabling current and future architectures of next generation Flash NAND technologies
- Machine Learning engine providing a platform for innovation in SSD management with machine learning technology
- Programmable architecture enables SSD developers to optimize product differentiation through firmware customization
- Supports a wide range of applications from the industry's highest performance SSDs to the industry's highest capacity SSD solutions
- Zoned Namespace (ZNS) capable
- Enables a number of form factors, including E3, U.2, U.3 and PCIe add-in cards
- Supports industry-leading security features such as Single Chip Hardware Root of Trust and FIPS 140-3 Level 2 compliance

Microchip provides NVMe hardware and software solutions to enterprise and data center customers, enabling world-leading performance, capacity, security and flexibility.

Solid-state drives promise to greatly enhance enterprise and data center storage performance with faster random access to data and faster transfer rates. PCI Express-based SSDs, together with the NVM Express host control, alleviate the interface bottleneck. Microchip's family of NVMe-compliant PCIe enterprise Flash controllers dramatically boost the number of random I/O operations per second that a system can process, while concurrently reducing latency and power.

Ordering Information

Part Number	Description	Package
PM8667A-F3EIP	×8 PCIe® Gen 5 prototype	25 mm × 25 mm

Flashtec Architecture Diagram

