

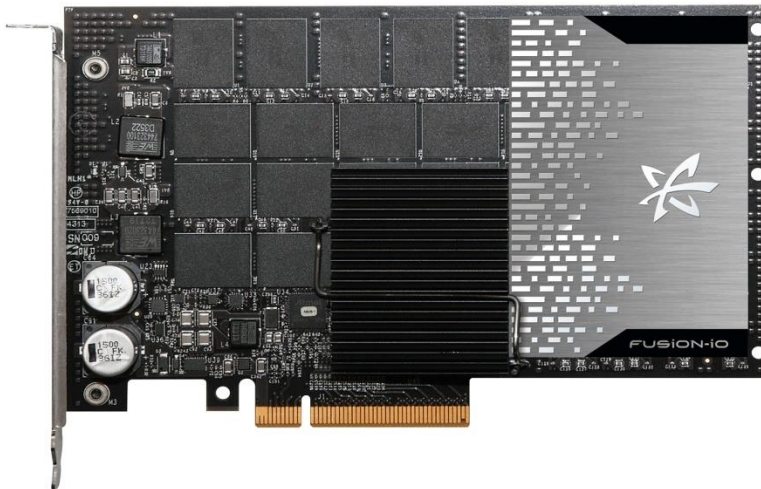
# Fusion ioMemory3 PCIe Flash Adapters for Cisco UCS C-Series Rack Servers and B-Series Blade Servers

## Product Overview

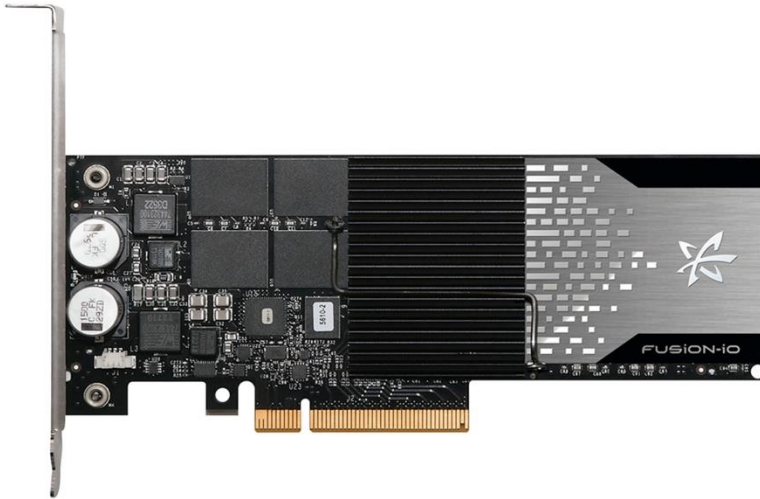
The Cisco Unified Computing System™ (Cisco UCS®) is a next-generation data center platform that unites computing, networking, storage, and virtualization resources in a cohesive system designed to reduce total cost of ownership (TCO) and increase business agility.

Using ultra-low-latency Fusion ioMemory connected directly to the PCI Express (PCIe) bus, the Fusion-io Atomic Series adapters built for Cisco UCS servers decouple storage performance from capacity through the integration of a powerful memory tier uniquely designed to accelerate application delivery (Figures 1, and 2).

**Figure 1.** Cisco UCS 5200-GB Fusion ioMemory3 Adapter for Cisco UCS C-Series Rack Servers



**Figure 2.** Cisco UCS 1000-GB Fusion ioMemory3 Adapter for Cisco UCS C-Series Rack Servers



## Overview

Fusion ioMemory3:

- Delivers significant improvements in application performance by reducing latency in enterprise applications with a persistent, reliable, high-performance and high-capacity storage tier
- Provides Small Computer System Interface (SCSI) and block storage that integrates transparently with Cisco UCS servers to immediately improve performance and relieve I/O bottlenecks
- Offers from 1 to approximately 30 terabytes (TB) of capacity in a single 2-socket server and up to approximately 55 TB in a 4-socket server
- Offers powerful manageability features, including inventory, service profiles mapping, and firmware updates for one or many Cisco UCS PCIe flash-memory devices with Cisco UCS Manager, and the capability to track flash-memory endurance
- Significantly reduces complexity in customer environments compared to the products of most competing solution vendors, which require manual command-line interface (CLI) processes per PCIe card

## Fusion ioMemory3 Solutions for Cisco UCS

### Main Benefits

- **Dramatically reduced TCO:** PCIe flash memory can be used to eliminate the need for SAN or network-attached storage (NAS) infrastructure or to augment existing array infrastructure. With significant performance improvements in both cases, Cisco customers can reduce the amount of physical infrastructure they need to deploy, increase the number of virtual machines that they can place on a single physical server, and further improve overall system efficiency. These improvements provide savings in capital expenditures (CapEx) and operating expenses (OpEx), including reduced application licensing fees and savings related to space, cooling, and energy use.

- Improved enterprise reliability through self-healing features, wear management, and predictive monitoring:** Cisco UCS adapters for Fusion ioMemory PX600 and SX350 include powerful features to eliminate concerns about reliability, such as NAND flash-memory failures and excessive wear. The intelligent, self-healing Fusion-io Adaptive Flashback feature provides complete chip-level fault tolerance, allowing the Cisco UCS adapters for the Fusion-io Atomic Series to recover from a single- or multiple-chip failure without interrupting business continuity.

## Product Specifications

Tables 1, 2, and 3 provide specifications for the Cisco UCS platform's Fusion ioMemory3 PCIe solution.

**Table 1.** Cisco UCS C-Series and Fusion ioMemory PX600 NAND, Capacity, and Endurance Specifications

Cisco UCS C-Series and Fusion ioMemory PX600 Specifications	1000 GB	1300 GB	2600 GB	5200 GB
NAND type	Multilevel cell (MLC)	MLC	MLC	MLC
Usable capacity (GB)	1000	1300	2600	5200
User-addressable sectors	244,140,625	317,382,813	634,765,625	1,269,531,250
Sector size (bytes)	4096			
Mean time between failure (MTBF; hours)	More than 2 million			
Warranty (wears)	3			
Physical drive write operations per day	7			
Endurance rating: Total petabytes (PB) written	12	16	32	64

**Table 2.** Cisco UCS C-Series and Fusion ioMemory SX350 NAND, Capacity, and Endurance Specifications

Cisco UCS C-Series and Fusion ioMemory SX350 Specifications	1300 GB	1600 GB	3200 GB	6400 GB
NAND type	MLC	MLC	MLC	MLC
Usable capacity (GB)	1250	1600	3200	6400
User-addressable sectors	305,175,781	390,625,000	781,250,000	1,562,500,000
Sector size (bytes)	4096			
MTBF (hours)	More than 2 million			
Warranty (years)	3			
Physical drive write operations per day	2			
Endurance rating: Total PB written	4	5.5	11	22

**Table 3.** Cisco UCS B-Series and Fusion ioMemory SX350 and PX600 NAND, Capacity, and Endurance Specifications

Cisco UCS B-Series and Fusion ioMemory SX300 and PX600 Specifications	1300 GB		1600 GB
	Fusion ioMemory PX600		Fusion ioMemory SX300
NAND type	MLC		MLC
Usable capacity (GB)	1300		1600
User-addressable sectors	317,382,813		390,625,000
Sector size (bytes)	4096		
MTBF (hours)	More than 2 million		
Warranty (years)	3		
Physical drive write operations per day	7		2
Endurance rating: Total PB written	16		5.5

## Operating System and Cisco UCS Manager Support

### Operating System Support

To meet the needs of the majority of our customers, the Cisco UCS solution supports a broad set of operating systems. For the most up-to-date list, please visit the [Cisco UCS hardware and software interoperability matrices](#).

## Cisco UCS Manager Integration Features

### Cisco UCS C-Series Rack Servers

Starting with Cisco UCS Manager Release 2.2.1, Cisco UCS PCIe flash-memory cards for the Cisco UCS C-Series are discovered and inventoried, and they can be added to firmware upgrade policies as well as upgraded individually. Customers can add flash memory to firmware upgrade policies within Cisco UCS Manager so that each card is automatically upgraded along with policies that upgrade RAID, BIOS, and I/O adapters. When multiple cards are installed in more than one server, this capability provides significant OpEx savings compared to approaches that apply new firmware to one card at a time across multiple servers.

### Cisco UCS B-Series Blade Servers

Starting with Cisco UCS Manager Release 2.1.1, Cisco UCS PCIe mezzanine flash-memory cards are automatically discovered and inventoried. With Release 2.2.1, mezzanine cards can be added to firmware policies in the same way as for Cisco UCS C-Series servers, described in the preceding section.

With Cisco UCS Manager Release 2.2.2 and later, life-left statistics are automatically polled and displayed in the user interface. The data is kept on the card, so if a server is rebooted or otherwise modified, Cisco UCS Manager always polls the card to collect the latest NAND life-left data. Cards can also be repurposed for new servers because they keep the information about their life left. When a card is inserted into a new server, Cisco UCS Manager presents the existing life left for the PCIe flash-memory device: a very useful feature for higher-endurance PCIe flash-memory products, which can outlive a server when they are under a read-intensive workload.

## Performance Specifications

Tables 4, 5, and 6 present performance specifications for the Cisco UCS platform's Fusion ioMemory PCIe solution.

**Table 4.** Cisco UCS C-Series and Fusion ioMemory PX600 Performance Specifications

Fusion ioMemory PX600 Specifications	1000 GB	1300 GB	2600 GB	5200 GB
Read bandwidth (GBps)	2.7	2.7	2.7	2.7
Write bandwidth (GBps)	1.5	1.7	2.2	2.1
Random read operations at 4-KB block size (IOPS)	196,000	235,000	330,000	276,000
Random write operations at 4-KB block size (IOPS)	320,000	370,000	375,000	375,000
Read latency (microseconds)	92			
Write latency (microseconds)	15			

For detailed performance, environmental, and dimension specifications, please see the Fusion ioMemory PX600 specification sheet: <http://www.fusionio.com/data-sheets/iomemory-px600-atomic-series>.

**Table 5.** Cisco UCS C-Series and Fusion ioMemory SX350 Performance Specifications

Fusion ioMemory SX350 Specifications	1300 GB	1600 GB	3200 GB	6400 GB
Read bandwidth (GBps)	2.7	2.7	2.7	2.7
Write bandwidth (GBps)	1.5	1.7	2.2	2.1
Random read operations at 4-KB block size (IOPS)	196,000	235,000	350,000	285,000
Random write operations at 4-KB block size (IOPS)	330,000	375,000	385,000	385,000
Read latency (microseconds)	92			
Write latency (microseconds)	15			

For detailed performance, environmental, and dimension specifications, please see the Fusion ioMemory SX350 specification sheet: <http://www.fusionio.com/data-sheets/iomemory-SX350-atomic-series>.

For performance-tuning best practices, see the Fusion ioMemory VSL Peak Performance Guide (the latest version): [https://support.fusionio.com/load/-media-/2fk40u/docsConfluence/iomemory\\_VSL\\_Peak\\_Performance\\_Guide\\_2013-08-20.pdf](https://support.fusionio.com/load/-media-/2fk40u/docsConfluence/iomemory_VSL_Peak_Performance_Guide_2013-08-20.pdf).

**Table 6.** Cisco UCS B-Series and Fusion ioMemory SX300 and PX600 Performance Specifications

Fusion ioMemory SX350 and PX600 Specifications	1300 GB	1600 GB
	Fusion ioMemory PX600	Fusion ioMemory SX300
Read bandwidth (GBps)	2.7	2.7
Write bandwidth (GBps)	1.7	1.7
Random read operations at 4-KB block size (IOPS)	235,000	235,000
Random write operations at 4-KB block size (IOPS)	370,000	375,000
Read latency (microseconds)	92	
Write latency (microseconds)	15	

## Supported Cisco UCS Servers

Tables 7, 8, and 9 list the Cisco UCS servers that support the Cisco UCS platform’s Fusion ioMemory PCIe solution.

**Table 7.** Supported Cisco UCS C-Series Servers: Fusion ioMemory SX350

	1300	1600	3200 GB	6400 GB
Cisco UCS C220 M4 Rack Server	Up to 2	Up to 2	Up to 2	Up to 1
Cisco UCS C240 M4 Rack Server	Up to 5	Up to 4	Up to 4	Up to 5
Cisco UCS C460 M4 Rack Server	Up to 9			
Adapter size	Half height, half length	Half height, half length	Half height, half length	Full height, half length
Part number	UCSC-F-S13002	UCSC-F-S16002	UCSC-F-S32002	UCSC-F-S64002

**Table 8.** Supported Cisco UCS C-Series Servers: Fusion ioMemory PX600

	1000 GB	1300 GB	2600 GB	5200 GB
Cisco UCS C220 M3 Rack Server	Up to 2			Up to 1
Cisco UCS C240 M3 Rack Server	Up to 5			Up to 4
Part number	UCSC-F-FIO-1000MP	UCSC-F-FIO-1300MP	UCSC-F-FIO-2600MP	UCSC-F-FIO-5200MP

	1000 GB	1300 GB	2600 GB	5200 GB
Cisco UCS C220 M4 Rack Server	Up to 2			Up to 1
Cisco UCS C240 M4 Rack Server	Up to 5	Up to 4		Up to 5
Cisco UCS C460 M4 Rack Server	Up to 9			
Adapter size	Half height, half length			Full height, half length
Part number	UCSC-F-FIO-1000PS	UCSC-F-FIO-1300PS	UCSC-F-FIO-2600PS	UCSC-F-FIO-5200PS

Please see individual server specification sheets or the Cisco Commerce Workspace for information about the current capacities supported and available PCIe slots because this information may change. Note that the supported number of cards shown in the table assumes that at least one PCIe slot is being used for server I/O or management. In some cases, a modular LAN on motherboard (mLOM) slot can be used instead, allowing the use of an additional PCIe flash-memory device.

**Table 9.** Supported Cisco UCS B-Series Servers: Fusion ioMemory SX300 and PX600

	1300 GB	1600 GB
	Fusion ioMemory PX600	Fusion ioMemory SX300
Cisco UCS B22 M3 Blade Server	Up to 1	
Cisco UCS B200 M3 Blade Server	Up to 1	
Cisco UCS B420 M3 Blade Server	Up to 2	
Cisco UCS B200 M4 Blade Server	Up to 1	
Cisco UCS B260 M4 Blade Server	Up to 2	
Cisco UCS B460 M4 Blade Server	Up to 4	
Part number	UCSB-F-FIO-1300MP	UCSB-F-FIO-1600MS

## Cisco Capital

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### For More Information

The following Cisco UCS reference architectures use PCIe storage for application acceleration:

- Oracle Database
  - [Oracle Database on Cisco UCS C-Series with Fusion ioMemory](#)
  - [Boost Database Performance with the Cisco UCS Storage Accelerator](#)
- Microsoft SQL Server
  - [Microsoft SQL Server 2012 with Always On Using Cisco UCS C-Series Servers and Fusion ioMemory](#)
- Virtual desktop infrastructure (VDI)
  - [Cisco UCS Storage Accelerator Solution: Optimize Your Desktop Virtualization Infrastructure](#)
- SAP
  - [SAP IQ Reference Guide for World Record TPC-H Benchmark](#)



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