

ServeRAID M5110 and M5110e SAS/SATA Controllers for IBM System x

IBM Redbooks Product Guide

The ServeRAID M5110 and M5110e SAS/SATA controllers for IBM® System x® are part of the IBM ServeRAID M Series family that offers a complete server storage solution consisting of RAID controllers, cache/flash modules, energy packs, and software feature upgrades in an ultra-flexible offerings structure. These products are optimized to deliver the performance that is demanded by the ever-growing I/O requirements of today's enterprises. While M5110 comes as a small form factor PCIe adapter, M5110e comes integrated with the IBM System x3650 M4 server. They also share a common set of upgrades, simplifying inventory management.

Figure 1 shows the ServeRAID M5110 Controller with optional cache installed.



Figure 1. ServeRAID M5110 SAS/SATA Controller (with optional cache installed)

Did you know

The ServeRAID M5110 and M5110e SAS/SATA controllers are optimized for high-performance, internal data storage with integration of the dual-core chip architecture, DDR3 1333 MHz cache memory, and PCIe 3.0 host interface. A portfolio of building blocks allows clients to design around a bottom-up approach and caters to a wide array of storage requirements. Upgrade features, such as support for RAID 6/60, performance optimization, and caching with SSDs, no longer require a hardware key. They are implemented through Features-on-Demand (FoD) software licenses.

Part number information

Table 1 provides the ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
ServeRAID M5110e SAS/SATA Controller for IBM System x	Onboard	Onboard
ServeRAID M5110 SAS/SATA Controller for IBM System x	81Y4481	A347
ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade for IBM System x	81Y4544	A1X2
ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade for IBM System x	81Y4484	A1J3
ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade for IBM System x	81Y4487	A1J4
ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade for IBM System x	81Y4559	A1WY
ServeRAID M5100 Series Battery Kit for IBM System x	81Y4508	A22E
ServeRAID M5100 Series RAID 6 Upgrade for IBM System x	81Y4546	A1X3
ServeRAID M5100 Series SSD Performance Accelerator for IBM System x	90Y4273	A2MC
ServeRAID M5100 Series SSD Caching Enabler for IBM System x	90Y4318	A2MD

The ServeRAID M5110 option part number includes the following items:

- One ServeRAID M5110 adapter card
- Full-height (3U) bracket
- Low-profile (2U) bracket
- Warranty Flyer
- ServeRAID M Documentation CD
- Important Notices Flyer

The ServeRAID M5100 Series 512MB Cache Upgrade option part number includes the following items:

- Cache module
- Important Notices Flyer
- Warranty Flyer
- ServeRAID M Documentation CD

The ServeRAID M5100 Series Battery Kit option part number includes the following items:

- Battery
- Two battery cables (0.5 m and 0.95 m)
- Important Notices Flyer
- Lithium Battery Handling Statement
- Warranty Flyer
- ServeRAID M Documentation CD

ServeRAID M5100 Series 512MB and 1GB Flash Upgrade option part numbers include the following items:

- Cache module
- Flash power module
- Two power module cable
- Important Notices Flyer
- Warranty Flyer
- ServeRAID M Documentation CD

ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade, RAID 6 Upgrade, SSD Performance Accelerator, and SSD Caching Enabler option part numbers include the following items:

- M5100 Series upgrade activation key
- Feature Activation Instructions

Figure 2 shows the flash-backed cache module, power module, and power cable.

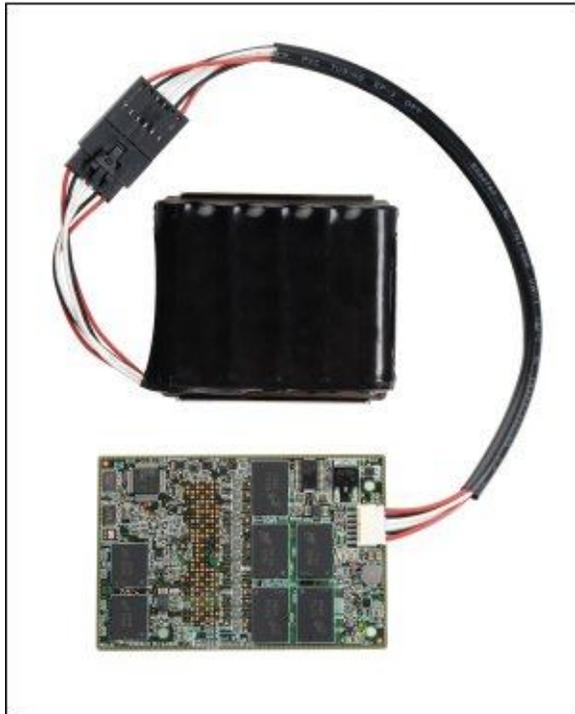


Figure 2. Flash-backed cache module, power module, and power cable

Features

The ServeRAID M5110 and M5110e SAS/SATA controllers have the following standard features:

- Auto-resume on array rebuild or array reconstruction after the loss of system power
Auto-resume uses non-volatile RAM (NVRAM) to save the rebuild progress during a host reboot or power failure to automatically resume from the last checkpoint. Auto-resume ensures that data integrity is maintained throughout the process. The card supports a number of features that are able to be implemented without rebooting the server. Applications, such as email and web server, benefit from avoiding downtime during the transition.
- Online Capacity Expansion
Online Capacity Expansion (OCE) allows the capacity of a virtual disk to be expanded by adding new physical disks or making use of unused space on existing disks, without requiring a reboot.
- Online RAID Level Migration
Online RAID Level Migration, which is also known as logical drive migration, provides the ability to migrate a virtual disk from any RAID level to any other RAID level without requiring a reboot. System availability and application functionality remain unaffected.
- Fast initialization for quick array setup
Fast initialization quickly writes zeros to the first and last sectors of the virtual drive. This feature allows you to immediately start writing data to the virtual drive while the initialization is running in the background.
- Consistency check for background data integrity
Consistency check verifies that all stripes in a virtual disk with a redundant RAID level are consistent. The consistency check will mirror data when an inconsistent stripe is detected for a RAID 1 and recreate the parity from the peer disks in the case of a RAID 5 or RAID 6. Consistency checks can be scheduled to take place periodically.
- Extensive online configuration options and advanced monitoring and event notification
Management tools provide convenience for the configuration of logical volumes and alerting when errors have occurred or are about to occur.
- Patrol read for media scanning and repairing
Patrol read is a background sentry service designed to pro-actively discover and correct media defects (bad sectors) that arise normally as a disk drive ages. The service issues a series of verify commands, and if a bad block is discovered, the card's firmware uses RAID algorithms to recreate the missing data and remap the sector to a good sector. The task is interruptible based on controller activity and host operations. The firmware also provides an interface where the patrol read task can be initiated, set up for continuous operation, and terminated from a management application. Patrol read can be activated by a manual command or automatically.
- Global and dedicated hot spare with revertible hot spare support
A hot spare rebuilds data from all virtual disks within the disk group in which it is configured. ServeRAID provides the ability to define a physical disk as a hot spare to replace a failed drive. Hot spares can be configured as either global or dedicated. A global hot spare allows any physical drive to be designated as a hot spare. A dedicated hot spare allows the user to assign a hot spare drive to a particular array of the same drive type.

- Single controller multipathing (failover) I/O load balancing
The ServeRAID's firmware detects and uses multiple paths from the controllers to the SAS drives that are in enclosures. With redundant paths to the same port of a device, if one path fails, another path can be used to communicate between the controller and the drive. Using multiple paths with load balancing, instead of a single path, can increase reliability through redundancy.
- WebBIOS configuration utility for pre-boot array configuration and management
WebBIOS is a utility that is built into the ServeRAID controller that allows you to configure drive groups and logical drives before installing or booting the operating system.
- MegaRAID Storage Manager management software
MegaRAID Storage Manager is an easy-to-use advanced RAID management application that is used across the entire family of ServeRAID M controllers. It allows you to configure, monitor, and maintain drive groups, virtual drives, and advanced features with an intuitive GUI, reducing administrative efforts and simplifying troubleshooting.

The following features are optional and require the respective upgrade to be purchased:

- Support for RAID levels 6 and 60 with M5100 Series RAID 6 Upgrade (81Y4546)
- MegaRAID SafeStore support for self-encrypting drive (SED) services
MegaRAID SafeStore encryption services offer instant secure erase and local key management for self-encrypting drives. This technology represents a significant step forward in securing data on a disk drive from any unauthorized access or modification resulting from theft, loss, or repurposing of drives. Instant secure erase permanently removes data when repurposing or decommissioning SEDs. SafeStore local key management provides the necessary management and protection of SEDs using a simple pass phrase, security key identifier, and security key file that can be set and applied to all SEDs assigned to a ServeRAID adapter. This feature removes the complexity of managing each SED's unique encryption key, and it essentially relieves the administrator of most of the daily tasks of securing data. The SafeStore is part of any RAID 5 upgrade that is available: 81Y4544, 81Y4484, 81Y4487, or 81Y4559.
- MegaRAID CacheVault flash cache protection
MegaRAID CacheVault flash cache protection uses NAND flash memory powered by a supercapacitor to protect data stored in the controller cache. This module eliminates the need for a lithium-ion battery commonly used to protect DRAM cache memory on PCI RAID controllers. To avoid the possibility of data loss or corruption during a power or server failure, CacheVault technology transfers the contents of the DRAM cache to NAND flash (CacheVault flash module (CVFM)) using power from the CacheVault power module (CVPM). After the power is restored to the RAID controller, CacheVault technology transfers the contents of the NAND flash back to the DRAM, which will eventually be flushed to disk.
- MegaRAID FastPath SSD performance acceleration
MegaRAID FastPath software provides high-performance I/O acceleration for SSD-based virtual drives by exploiting an extremely low latency I/O path to increase the maximum I/O per second (IOPS) capability of the controller. This feature boosts the performance of applications with a highly random data storage access pattern, such as transactional databases. The feature is activated by enabling M5100 Series Performance Accelerator (90Y4273).

- MegaRAID CacheCade Pro 2.0 SSD caching for traditional hard drives

MegaRAID CacheCade Pro 2.0 read/write software is designed to accelerate the performance of hard disk drive (HDD) arrays with only an incremental investment in solid-state drive (SSD) technology. The software enables SSDs to be configured as a dedicated pool of controller cache to help maximize the I/O performance for transaction-intensive applications, such as databases and web serving. CacheCade software tracks data storage access patterns and identifies the most frequently accessed data. The hot data is then automatically stored on the solid-state storage devices that are assigned as a dedicated cache pool on a ServeRAID controller with the M5100 Series SSD Caching feature (90Y4318) enabled.

Technical specifications

The ServeRAID M5110 and M5110e SAS/SATA controllers have the following specifications:

- PCI Low Profile, Half-length - MD2 form factor (M5110) or onboard chip (M5110e)
- Eight internal 6 Gbps SAS/SATA ports
- Two internal Mini-SAS connectors (SFF-8087)
- 6 Gbps throughput per port
- 800 MHz dual-core IBM PowerPC® processor with LSI SAS2208 6 Gbps RAID on Chip (ROC) controller
- PCI Express 3.0 x8 host interface
- Support for RAID levels 0, 1, 10 standard; support for RAID 5, 50 and 6, 60 with optional upgrades
- Optional onboard data cache (DDR3 running at 1333 MHz) with the choice of:
 - 512 MB with optional battery backup
 - 512 MB or 1 GB with flash backup (MegaRAID CacheVault technology)
- Support for SAS and SATA HDDs and SSDs
- Support for intermixing SAS and SATA HDDs and SSDs; mixing different types of drives in the same array (drive group) not recommended
- Connections to up to 32 internal drives, depending on the server model
- Optional support for self-encrypting drives (SEDs) with MegaRAID SafeStore
- Optional support for SSD performance acceleration with MegaRAID FastPath and SSD caching with MegaRAID CacheCade Pro 2.0
- Support for up to 64 virtual drives, up to 128 drive groups, up to 16 virtual drives per one drive group, and up to 32 physical drives per one drive group
- Support for logical unit number (LUN) sizes up to 64 TB
- Configurable stripe size up to 1 MB
- Compliant with Disk Data Format (DDF) configuration on disk (COD)
- S.M.A.R.T. support
- MegaRAID Storage Manager management software

Feature upgrade matrix

The ServeRAID M5110 and M5110e provide support for RAID 0, 1, and 10 as standard capabilities. Additional functional upgrades optionally are available to expand the standard capabilities. Some upgrades do not depend on other upgrades and can be applied to "out-of-the-box" controllers (we call them primary upgrades). Certain upgrades cannot be applied to "out-of-the-box" controllers and require that other upgrades are enabled before applying these upgrades (we call them secondary upgrades). There are two types of available upgrades: hardware (HW) and Feature on Demand (FoD). Hardware upgrades contain physical parts (for example, cache module or battery). FoD upgrades are software licenses. The following table lists the available primary upgrades, their capabilities, and types.

Table 2. ServeRAID M5110 and M5110e primary upgrades and their features

Feature			RAID 5, 50	SED	512 MB DDR3 cache	1 GB DDR3 cache	Flash-backed cache
Option description	Part number	Type					
ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	81Y4544	FoD	Yes	Yes	No	No	No
ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	81Y4484	HW	Yes	Yes	Yes	No	No
ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	81Y4487	HW	Yes	Yes	Yes	No	Yes
ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	81Y4559	HW	Yes	Yes	No	Yes	Yes

The following table shows the secondary upgrades, their capabilities, types, and dependencies. The primary feature upgrades, on which the secondary upgrades depend, are listed in their respective columns. "Required" means that the primary upgrade listed in the column must be enabled before enabling the secondary feature listed in that particular row.

Table 3. ServeRAID M5110 and M5110e secondary upgrades, their features, and dependencies

Primary feature upgrades		Option description	Zero Cache/RAID 5	512 MB Cache/RAID 5	512 MB Flash/RAID 5	1 GB Flash/RAID 5	
Secondary feature upgrades		Part number	81Y4544	81Y4484	81Y4487	81Y4559	
		Upgrade type	FoD	HW	HW	HW	
Feature	Option description	Part number	Type				
Battery-backed cache	Battery Kit	81Y4508	HW	No support	Required	No support	No support
RAID 6, 60	RAID 6 Upgrade	81Y4546	FoD	No support	Required	Required	Required
FastPath	SSD Performance Accelerator	90Y4273	FoD	No support	Required	Required	Required
CacheCade Pro 2.0	SSD Caching Enabler	90Y4318	FoD	No support	Required	Required	Required

Supported servers

The ServeRAID M5110 and M5110e controllers are supported on the IBM System x servers that are listed in the following table.

Table 4. Supported System x servers

Product description	x3100 M4 (2582)	x3200 M3 (7327, 7328)	x3250 M3 (4251, 4252)	x3250 M4 (2583)	x3400 M3 (7378, 7379)	x3500 M3 (7380)	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M3 (7944)	x3550 M4 (7914)	x3620 M3 (7376)	x3630 M3 (7377)	x3630 M4 (7158)	x3650 M3 (7945)	x3650 M4 (7915)	x3690 X5 (7147)	x3750 M4 (8722)	x3755 M3 (7164)	x3850 X5 (7143)	dx360 M3 (6391)	dx360 M4 (7912)
ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N
ServeRAID M5110 SAS/SATA Controller	N	N	N	N	N	N	Y	Y	N	Y	N	N	Y	N	N	N	Y	N	N	N	N

* Onboard controller

See IBM ServerProven® for the latest information about the System x servers that support each adapter:
<http://ibm.com/servers/eserver/serverproven/compat/us/>

Supported operating systems

The ServeRAID M5110 and M5110e SAS/SATA Controllers support the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE Linux Enterprise Server 10 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- VMware vSphere 5

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml>

Supported drives

The ServeRAID M5110 and M5110e SAS/SATA controllers support the drives that are supported in the servers listed in Table 2. The maximum number of drives that can be connected to the RAID controller is limited by the maximum number of internal drive bays for a supported server.

Supported 2.5" simple-swap hard disk drives and the servers with which they are supported are listed in the following table.

Table 5. Supported 2.5" simple-swap hard disk drives

Product description	Part number	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3750 M4 (8722)
2.5" SAS SS HDDs							
IBM 146GB 15K 6Gbps SAS 2.5" SFF G2SS HDD	90Y8935	N	N	N	N	N	N
IBM 146GB 15K 6Gbps SAS 2.5" SFF SS HDD	49Y1996	N	N	N	N	N	N
IBM 300GB 10K 6Gbps SAS 2.5" SFF G2SS HDD	90Y8895	N	N	N	N	N	N
IBM 300GB 10K 6Gbps SAS 2.5" SFF SS HDD	49Y1991	N	N	N	N	N	N
IBM 600GB 10K 6Gbps SAS 2.5" SFF G2SS HDD	90Y8890	N	N	N	N	N	N
IBM 600GB 10K 6Gbps SAS 2.5" SFF SS HDD	49Y2027	N	N	N	N	N	N
2.5" NL SATA SS HDDs							
IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF SS HDD	81Y9734	N	N	N	N	N	N
IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF SS HDD	81Y9738	N	N	N	N	N	N
IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF SS HDD	81Y9742	N	N	N	N	N	N

Supported 2.5" hot-swap hard disk drives and the servers with which they are supported are listed in the following table.

Table 6. Supported 2.5" hot-swap hard disk drives

Product description	Part number	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3750 M4 (8722)
2.5" SAS HS HDDs							
IBM 73GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0672*	N	N	N	N	N	N
IBM 146GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0632*	N	N	N	N	N	N
IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8926	Y	N	Y	N	Y	Y
IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS SED	90Y8944	Y	N	Y	N	Y	Y
IBM 146GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0677	N	N	N	N	N	N
IBM 146GB 15K 6Gbps SAS 2.5" SFF Slim-HS SED	44W2294	N	N	N	N	N	N
IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8877	Y	N	Y	N	Y	Y
IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS SED	90Y8913	Y	N	Y	N	Y	Y
IBM 300GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0637	N	N	N	N	N	N
IBM 300GB 10K 6Gbps SAS 2.5" SFF Slim-HS SED	44W2264	N	N	N	N	N	N
IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	81Y9670	Y	N	Y	N	Y	Y
IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8872	Y	N	Y	N	Y	Y
IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	49Y2003	N	N	N	N	N	N
IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD	81Y9650	Y	N	Y	N	Y	Y
2.5" NL SAS HS HDDs							
IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	90Y8953	Y	N	Y	N	Y	Y
IBM 500GB 7200 6Gbps NL SAS 2.5" SFF Slim-HS HDD	42D0707	N	N	N	N	N	N
IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	81Y9690	Y	Y	Y	N	Y	Y
2.5" NL SATA HS HDDs							
IBM 160GB 7200 NL SATA 2.5" SFF Slim-HS HDD	42D0747*	N	N	N	N	N	N
IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9722	N	Y	Y	N	Y	Y
IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9726	N	Y	Y	N	Y	Y
IBM 500GB 7200 NL SATA 2.5" SFF Slim-HS HDD	42D0752*	N	N	N	N	N	N
IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9730	Y	Y	Y	N	Y	Y

* Withdrawn, not available for ordering.

Supported 3.5" hot-swap hard disk drives and the servers with which they are supported are listed in the following table.

Table 7. Supported 3.5" hot-swap hard disk drives

Product description	Part number	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3750 M4 (8722)
3.5" SAS HS HDDs							
IBM 300GB 15K 6Gbps SAS 3.5" G2HS HDD	49Y6092	Y	Y	Y	Y	Y	N
IBM 450GB 15K 6Gbps SAS 3.5" G2HS HDD	49Y6097	Y	Y	Y	Y	Y	N
IBM 600GB 15K 6Gbps SAS 3.5" G2HS HDD	49Y6102	Y	Y	Y	Y	Y	N
IBM 300GB 15K 6Gbps SAS 3.5" Hot-Swap HDD	44W2234	N	N	N	N	N	N
IBM 450GB 15K 6Gbps SAS 3.5" Hot-Swap HDD	44W2239	N	N	N	N	N	N
IBM 600GB 15K 6Gbps SAS 3.5" Hot-Swap HDD	44W2244	N	N	N	N	N	N
3.5" NL SAS HS HDDs							
IBM 1TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	90Y8567	Y	Y	Y	Y	Y	N
IBM 1TB 7.2K 6Gbps NL SAS 3.5" HS HDD	42D0777	N	N	N	N	N	N
IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	90Y8572	Y	N	Y	N	Y	N
IBM 2TB 7.2K 6Gbps NL SAS 3.5" HS HDD	42D0767	N	N	N	N	N	N
IBM 3TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	90Y8577	Y	Y	Y	Y	Y	N
IBM 3TB 7.2K 6Gbps NL SAS 3.5" HS HDD	81Y9758	N	N	N	N	N	N
3.5" NL SATA HS HDDs							
IBM 250GB 7.2K SATA 3.5" Hot-Swap HDD	43W7754	N	N	N	N	N	N
250GB 3.5" Hot-Swap SATA II HDD	39M4526*	N	N	N	N	N	N
500GB 3.5" Hot-Swap SATA II HDD	39M4530	N	N	N	N	N	N
IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	81Y9786	Y	Y	Y	Y	Y	N
IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	81Y9790	Y	Y	Y	Y	Y	N
IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	81Y9794	Y	Y	Y	Y	Y	N
IBM 2TB 7200 NL SATA 3.5" HS HDD	42D0782	N	N	N	N	N	N
IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	81Y9798	Y	Y	Y	Y	Y	N
IBM 3TB 7.2K 6Gbps NL SATA 3.5" HS HDD	81Y9774	N	N	N	N	N	N

* Withdrawn, not available for ordering.

Supported 3.5" simple-swap hard disk drives and the servers with which they are supported are listed in the following table.

Table 8. Supported 3.5" simple-swap hard disk drives

Product description	Part number	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3750 M4 (8722)
3.5" NL SATA SS HDDs							
250GB 3.5" Simple-Swap SATA II HDD	39M4508*	N	N	N	N	N	N
IBM 250GB 7.2K SATA 3.5" Simple-Swap HDD	43W7750	N	N	N	N	N	N
500GB 3.5" Simple-Swap SATA II HDD	39M4514	N	N	N	N	N	N
IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	81Y9802	Y	Y	Y	Y	Y	N
IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	81Y9806	Y	Y	Y	Y	Y	N
IBM 1TB 7.2K SATA 3.5" Simple-Swap HDD	43W7622	N	N	N	N	N	N
IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	81Y9810	Y	Y	Y	Y	Y	N
IBM 2TB 7200 NL SATA 3.5" SS HDD	42D0787	N	N	N	N	N	N
IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	81Y9814	Y	Y	Y	Y	Y	N
IBM 3TB 7.2K 6Gbps NL SATA 3.5" SS HDD	81Y9778	N	N	N	N	N	N

* Withdrawn, not available for ordering.

Supported solid-state drives (SSDs) and the servers with which they are supported are listed in the following table.

Table 9. Supported solid-state drives

Product description	Part number	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3750 M4 (8722)
SATA HS SSDs							
IBM 50GB SATA 2.5" SFF Slim-HS High IOPS SSD	43W7714	N	N	N	N	N	N
IBM 50GB SATA 1.8" MLC SSD	43W7726	N	N	N	N	N	Y
IBM 200GB SATA 2.5" MLC HS SSD	43W7718	N	N	N	N	N	Y
IBM 200GB SATA 1.8" MLC SSD	43W7746	N	N	N	N	N	Y
IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8648	Y	N	Y	N	Y	Y
IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8643	Y	N	Y	N	Y	Y
SATA SS SSDs							
IBM 50GB SATA 1.8" NHS SSD	43W7734*	N	N	N	N	N	N
IBM 200GB SATA 2.5" MLC SS SSD	43W7742	N	N	N	N	N	N
IBM 128GB SATA 2.5" MLC SS Enterprise Value SSD	90Y8668	N	N	N	N	N	N
IBM 256GB SATA 2.5" MLC SS Enterprise Value SSD	90Y8663	N	N	N	N	N	N

* Withdrawn, not available for ordering.

Physical specifications

The ServeRAID M5110 SAS/SATA Controller has the following physical specifications:

Dimensions (approximate):

- Height: 15 mm (0.6 in.)
- Width: 69 mm (2.7 in.)
- Depth: 168 mm (6.6 in.)
- Weight: 77 g (0.2 lb)

Shipping dimensions (approximate):

- Height: 51 mm (2.0 in.)
- Width: 143.0 mm (5.6 in.)
- Depth: 238 mm (9.4 in.)
- Weight: 222 g (0.5 lb)

Operating environment

The ServeRAID M5110 SAS/SATA Controller is supported in the following environment:

- Temperature:
 - 10 to 35 degrees C (50 to 95 F) at 0 to 914 m (0 to 3,000 ft)
 - 10 to 32 degrees C (50 to 90 F) at 914 to 2,133 m (3,000 to 7,000 ft)
- Relative humidity: 20% to 80% (noncondensing)
- Maximum altitude: 2,133 m (7,000 ft)

Warranty

There is a 1-year limited warranty. When installed on a System x server, the adapter assumes your system's base warranty and any IBM ServicePac® upgrade.

Agency approvals

The adapter conforms to the following standards:

- EN55022
- EN55024
- EN60950 / CE
- EN 61000-3-2
- EN 61000-3-3
- IEC 950 CB Scheme
- FCC Part 15 Class A, and Class B
- UL 1950
- CSA C22.2 950-95
- VCCI
- NZ AS3548 / C-tick
- RRL for MIC (KCC)
- BSMI
- UL 94-/V

Related publications

For more information, see the following documents:

- IBM US Announcement Letter:
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-048>
- System x RAID products home page:
http://www.ibm.com/systems/storage/product/systemx/scsi_raid.html
- IBM ServeRAID software matrix:
<http://www.ibm.com/support/docview.wss?uid=psg1SERV-RAID>
- IBM System x Configuration and Options Guide:
<http://www.ibm.com/support/docview.wss?uid=psg1SCOD-3ZVQ5W>

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