

ServeRAID M5110 and M5110e SAS/SATA Controllers Product Guide (withdrawn product)

The ServeRAID M5110 and M5110e SAS/SATA controllers are 6 Gb SAS/SATA internal RAID controllers. This adapter and embedded controller are part of the ServeRAID M Series family of products 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 System x3650 M4 and x3750 M4 (8722) servers. These adapters also share a common set of upgrades, simplifying inventory management.



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
Base controller		
ServeRAID M5110e SAS/SATA Controller	Onboard	Onboard
ServeRAID M5110 SAS/SATA Controller	81Y4481	A347
Cache upgrades and battery kit		
ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	81Y4484	A1J3
ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	81Y4487	A1J4
ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	81Y4559	A1WY
ServeRAID M5100 Series 2GB Flash/RAID 5 Upgrade	47C8670*	A4G6
ServeRAID M5100 Series Battery Kit	81Y4508	A22E
Features on Demand (FoD) upgrades**		
ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	81Y4544	A1X2
ServeRAID M5100 Series RAID 6 Upgrade	81Y4546	A1X3
ServeRAID M5100 Series SSD Performance Accelerator	90Y4273	A2MC
ServeRAID M5100 Series SSD Caching Enabler	90Y4318	A2MD

* Withdrawn from marketing

** One M5100 Series FoD upgrade activates the feature on all M5200 Series and M5100 Series controllers that are installed in the server. The M5100 Series Zero Cache/RAID 5 Upgrade also activates the equivalent upgrades for M1100 and M1200 Series controllers.

The ServeRAID M5110 option part number includes the following items:

- One ServeRAID M5110 adapter card
- Full-height (3U) bracket
- Low-profile (2U) bracket
- Documentation package

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

- Cache module
- Documentation package

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

- Battery
- Two battery cables (0.5 m and 0.95 m)
- Documentation package

ServeRAID M5100 Series 512MB, 1GB, and 2GB Flash Upgrade option part numbers include the following items:

- Cache module
- Flash power module
- Two power module cables
- Documentation package

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 authorization letter
- Feature Activation Instructions

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

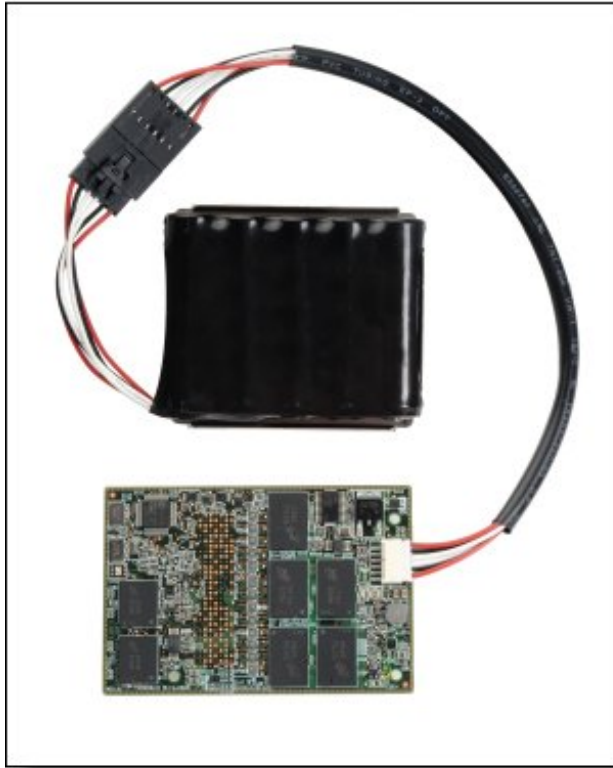


Figure 2. Flash-backed cache module, power module, and power cable

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.

Note: RAID 10, 50 and 60 drive groups do not support Online Capacity Expansion and Online RAID Level Migration. RAID 0, 1, 5, and 6 drive groups do not support Online Capacity Expansion and Online RAID Level Migration if two or more virtual drives are defined on a single drive group.

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).
This is a Features on Demand upgrade and only one upgrade is needed per server; all M5200 and M5100 series adapters installed in the server will have this upgrade enabled automatically.

- 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, 81Y4559, or 47C8670.

- MegaRAID flash cache protection

MegaRAID 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, flash cache protection technology transfers the contents of the DRAM cache to NAND flash using power from the flash power module. After the power is restored to the RAID controller, flash cache protection 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). This is a Features on Demand upgrade and only one upgrade is needed per server; all M5100 and M5200 series adapters installed in the server will have this upgrade enabled automatically.

- MegaRAID CacheCade SSD caching for traditional hard drives

MegaRAID CacheCade 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.

CacheCade is a Features on Demand upgrade and only one upgrade is needed per server; all M5100 and M5200 series adapters installed in the server will have this upgrade enabled automatically.

Note: Not all SSDs support the CacheCade feature. For details, refer to the following web page: <https://support.lenovo.com/us/en/documents/MIGR-5094754>

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, 1 GB, or 2 GB with flash backup (MegaRAID flash cache protection 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
- 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
- Support for Integrated MegaRAID (iMR) mode (no cache memory upgrades installed) or MegaRAID (MR) mode (requires 512 MB, 1 GB, or 2 GB cache memory upgrade)
 - iMR mode (no cache memory upgrades installed) supports:
 - RAID 0, 1, and 10, and, optionally, 5 and 50
 - Fixed stripe unit size of 64 KB
 - Self-encrypting drives with optional Zero Cache/RAID 5 FoD upgrade
 - Both RAID and JBOD (pass-thru mode with system drives) configurations
 - Up to 16 drives are supported in a RAID configuration.
 - Up to 63 drives are supported in a JBOD configuration. (JBOD drives can be used as bootable drives.)
 - MR mode (512 MB, 1 GB, or 2 GB cache memory upgrade required) supports:
 - RAID 0, 1, 10, 5, and 50 and, optionally, 6 and 60 (Non-RAID is not supported.)
 - Configurable stripe unit size from 64 KB up to 1 MB
 - Self-encrypting drives
 - Optional SSD performance features (FastPath and CacheCade)
- 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	2 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	No
ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	81Y4484	HW	Yes	Yes	Yes	No	No	No
ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	81Y4487	HW	Yes	Yes	Yes	No	No	Yes
ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	81Y4559	HW	Yes	Yes	No	Yes	No	Yes
ServeRAID M5100 Series 2GB Flash/RAID 5 Upgrade	47C8670	HW	Yes	Yes	No	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	2 GB Flash/RAID 5
Secondary feature upgrades		Part number		81Y4544	81Y4484	81Y4487	81Y4559	47C8670
		Upgrade type		FoD	HW	HW	HW	HW
Feature	Option description	Part number	Type					
Battery-backed cache	Battery Kit	81Y4508	HW	No support	Required	No support	No support	No support
RAID 6, 60	RAID 6 Upgrade	81Y4546	FoD	No support	Required	Required	Required	Required
FastPath	SSD Performance Accelerator	90Y4273	FoD	No support	Required	Required	Required	Required
CacheCade	SSD Caching Enabler	90Y4318	FoD	No support	Required	Required	Required	Required

Server support

The following tables list the servers that support the M5110 and M5110e.

Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Table 4. Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Part number	Description	x3250 M6 (3943)	x3250 M6 (3633)	x3550 M5 (8869)	x3650 M5 (8871)	x3850 X6/x3950 X6 (6241, E7 v4)	nx360 M5 (5465, E5-2600 v4)	sd350 (5493)
Onboard	ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	N	N
81Y4481	ServeRAID M5110 SAS/SATA Controller	N	N	N	N	N	N	N
81Y4544	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	N	N	N	N	N	N	N
81Y4484	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	N	N	N	N	N	N	N
81Y4487	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	N	N	N	N	N	N	N
81Y4559	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	N	N	N	N	N	N	N
47C8670	ServeRAID M5100 Series 2GB Flash/RAID 5 Upgrade	N	N	N	N	N	N	N
81Y4508	ServeRAID M5100 Series Battery Kit	N	N	N	N	N	N	N
81Y4546	ServeRAID M5100 Series RAID 6 Upgrade	N	N	N	N	N	N	N
90Y4273	ServeRAID M5100 Series SSD Performance Key	N	N	N	N	N	N	N
90Y4318	ServeRAID M5100 Series SSD Caching Enabler	N	N	N	N	N	N	N

Support for System x and dense servers with Intel Xeon v3 processors

Table 5. Support for servers with Intel Xeon v3 processors

Part number	Description	x3100 M5 (5457)	x3250 M5 (5458)	x3500 M5 (5464)	x3550 M5 (5463)	x3650 M5 (5462)	x3850 X6/x3950 X6 (6241, E7 v3)	nx360 M5 (5465)
Onboard	ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	N	N
81Y4481	ServeRAID M5110 SAS/SATA Controller	Y	Y	N	N	N	N	N
81Y4544	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	Y	Y	N	N	N	N	N
81Y4484	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	Y	Y	N	N	N	N	N
81Y4487	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	Y	Y	N	N	N	N	N
81Y4559	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	Y	Y	N	N	N	N	N
47C8670	ServeRAID M5100 Series 2GB Flash/RAID 5 Upgrade	N	N	N	N	N	N	N
81Y4508	ServeRAID M5100 Series Battery Kit	Y	Y	N	N	N	N	N
81Y4546	ServeRAID M5100 Series RAID 6 Upgrade	Y	Y	N	N	N	N	N
90Y4273	ServeRAID M5100 Series SSD Performance Key	Y	Y	N	N	N	N	N
90Y4318	ServeRAID M5100 Series SSD Caching Enabler	Y	Y	N	N	N	N	N

Support for servers with Intel Xeon v2 processors

Table 6. Support for servers with Intel Xeon v2 processors

Part number	Description	x3300 M4 (7382)	x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3750 M4 (8753)	x3850 X6/x3950 X6 (6241, E7 v2)
Onboard	ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	N	N	N
81Y4481	ServeRAID M5110 SAS/SATA Controller	Y	Y	Y	Y	Y	Y	N	N
81Y4544	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	Y	Y	Y	Y	Y	Y	N	N
81Y4484	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	Y	Y	Y	Y	Y	Y	N	N
81Y4487	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	Y	Y	Y	Y	Y	Y	N	N
81Y4559	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	Y	Y	Y	Y	Y	Y	N	N
47C8670	ServeRAID M5100 Series 2GB Flash/RAID 5 Upgrade	Y	Y	Y	Y	Y	Y	N	N
81Y4508	ServeRAID M5100 Series Battery Kit	Y	Y	Y	Y	Y	Y	N	N
81Y4546	ServeRAID M5100 Series RAID 6 Upgrade	Y	Y	Y	Y	Y	Y	N	N
90Y4273	ServeRAID M5100 Series SSD Performance Key	Y	Y	Y	Y	Y	Y	N	N
90Y4318	ServeRAID M5100 Series SSD Caching Enabler	Y	Y	Y	Y	Y	Y	N	N

Drive support

The ServeRAID M5110 and M5110e SAS/SATA Controllers support the drives that are supported in the servers listed in the following tables. 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.

- Table 7: [1.8-inch SSDs](#)
- Table 8: [2.5-inch hot-swap 6 Gb SAS/SATA HDDs](#)
- Table 9: [2.5-inch hot-swap 6 Gb SAS/SATA SSDs](#)
- Table 10: [3.5-inch hot-swap 6 Gb SAS/SATA HDDs](#)
- Table 11: [3.5-inch hot-swap 6 Gb SAS/SATA SSDs](#)
- Table 12: [3.5-inch simple-swap 6 Gb SAS/SATA HDDs](#)

Table 7. 1.8-inch SSDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
1.8-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)								
00AJ335	120GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	Y	N	N	N
00AJ340	240GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	Y	N	N	N
00AJ345	480GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	Y	N	N	N
00AJ350	800GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	Y	N	N	N

Table 8. 2.5-inch hot-swap 6 Gb SAS/SATA HDDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
2.5-inch hot-swap HDDs - 6 Gb SAS 10K								
90Y8877	300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	Y	Y	N	Y	N	Y	Y
90Y8872	600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	Y	Y	N	Y	N	Y	Y
81Y9650	900GB 10K 6Gbps SAS 2.5" SFF HS HDD	Y	Y	N	Y	N	Y	Y
00AD075	1.2TB 10K 6Gbps SAS 2.5" G2HS HDD	Y	Y	N	Y	N	Y	N
00NA441	1.8TB 10K 6Gbps SAS 2.5" G2HS 512e HDD	N	Y	N	Y	N	N	Y
2.5-inch hot-swap HDDs - 6 Gb SAS 15K								
81Y9670	300GB 15K 6Gbps SAS 2.5" G2HS HDD	Y	Y	N	Y	N	Y	Y
00AJ300	600GB 15K 6Gbps SAS 2.5" G2HS HDD	Y	Y	N	Y	N	N	Y
2.5-inch hot-swap HDDs - 6 Gb NL SAS								
90Y8953	500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	Y	Y	N	Y	N	Y	Y
81Y9690	1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	Y	Y	N	Y	N	Y	Y
2.5-inch hot-swap HDDs - 6 Gb NL SATA								
81Y9726	500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	Y	Y	N	Y	N	Y	Y
81Y9730	1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	Y	Y	N	Y	N	Y	Y
2.5-inch hot-swap SED HDDs - 6 Gb SAS 10K								
90Y8913	300GB 10K 6Gbps SAS 2.5" SFF G2HS SED	Y	Y	N	Y	N	N	N
90Y8908	600GB 10K 6Gbps SAS 2.5" SFF G2HS SED	N	Y	N	Y	N	Y	Y

Table 9. 2.5-inch hot-swap 6 Gb SAS/SATA SSDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
2.5-inch hot-swap SSDs - 6 Gb SAS - Enterprise Performance (10+ DWPD)								
49Y6129	200GB SAS 2.5" MLC HS Enterprise SSD	Y	Y	N	Y	N	Y	N
49Y6134	400GB SAS 2.5" MLC HS Enterprise SSD	Y	Y	N	Y	N	Y	N
49Y6139	800GB SAS 2.5" MLC HS Enterprise SSD	Y	Y	N	Y	N	Y	N
49Y6195	1.6TB SAS 2.5" MLC HS Enterprise SSD	N	Y	N	N	N	N	N
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)								
00AJ355	120GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	Y
00AJ360	240GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	Y
00AJ365	480GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	Y
00AJ370	800GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	Y
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)								
00AJ000	S3500 120GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N
00AJ005	S3500 240GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N
00AJ010	S3500 480GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N
00AJ015	S3500 800GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N
00YC365	120GB Enterprise Entry SATA HS 2.5" SSD	N	Y	N	Y	N	N	Y
00YC370	240GB Enterprise Entry SATA HS 2.5" SSD	N	Y	N	Y	N	N	Y
00YC375	480GB Enterprise Entry SATA HS 2.5" SSD	N	Y	N	Y	N	N	Y
00YC380	960GB Enterprise Entry SATA HS 2.5" SSD	N	Y	N	Y	N	N	Y

Table 10. 3.5-inch hot-swap 6 Gb SAS/SATA HDDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
3.5-inch hot-swap HDDs - 6 Gb NL SAS								
90Y8572	2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	Y	Y	Y	Y	Y	N	N
49Y6210	4TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	N	Y	Y	N	Y	N	N
00ML213	6TB 7.2K 6Gbps NL SAS 3.5" G2HS 512e HDD	Y	Y	Y	Y	Y	Y	Y
3.5-inch hot-swap HDDs - 6 Gb NL SATA								
81Y9786	500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y	Y	Y	Y	Y	Y	Y
81Y9790	1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y	Y	Y	Y	Y	Y	Y
81Y9794	2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y	Y	Y	Y	Y	Y	Y
00FN113	2TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	Y	Y	Y	Y	Y	Y	Y
00FN173	6TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	Y	Y	Y	Y	Y	Y	Y

Table 11. 3.5-inch hot-swap 6 Gb SAS/SATA SSDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
3.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Performance (10+ DWPD)								
00YC340	Intel S3710 400GB Enterprise Performance SATA HS 3.5" SSD	N	N	N	N	N	Y	Y
00YC345	Intel S3710 800GB Enterprise Performance SATA HS 3.5" SSD	N	N	N	N	N	Y	Y
3.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)								
00AJ435	120GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	Y	N	Y	N	N
00AJ445	480GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	Y	N	N
3.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)								
00WG770	Intel S3510 120GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	Y	N
00WG775	Intel S3510 240GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	Y	N
00WG780	Intel S3510 480GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	Y	N
00YC420	960GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	Y	Y	Y

Table 12. 3.5-inch simple-swap 6 Gb SAS/SATA HDDs

Part number	Description	Xeon v2					Xeon v3	
		x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3100 M5 (5457)	x3250 M5 (5458)
3.5-inch simple-swap HDDs - 6 Gb NL SATA								
81Y9802	500GB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	Y	Y	Y	Y	N	Y	Y
81Y9806	1TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	Y	Y	Y	Y	N	Y	Y
81Y9810	2TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD	Y	Y	Y	Y	N	Y	Y

See ServerProven for the latest information about the System x servers and drives support:
<http://www.lenovo.com/us/en/serverproven/xseries/controllers/matrix.shtml>

Operating system support

The adapter supports the following operating systems:

Tip: This table is automatically generated based on data from [Lenovo ServerProven](#). Note that older servers are not listed. Visit ServerProven to see OS support for those servers.

Table 13. Operating system support for ServeRAID M5110 SAS/SATA Controller, 81Y4481

Operating systems	x3100 M5 (5457)	x3250 M5 (5458)
Microsoft Windows Server 2008 R2	Y	Y
Microsoft Windows Server 2012	Y	Y
Microsoft Windows Server 2012 R2	Y	Y
Microsoft Windows Server 2016	Y	Y
Red Hat Enterprise Linux 5 Server with Xen x64 Edition	N	Y
Red Hat Enterprise Linux 5 Server x64 Edition	Y	Y
Red Hat Enterprise Linux 6 Server x64 Edition	N	Y
Red Hat Enterprise Linux 7	Y	Y
SUSE Linux Enterprise Server 11 for AMD64/EM64T	Y	Y
SUSE Linux Enterprise Server 11 for x86	Y	Y
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	N	Y
VMware vSphere 5.1 (ESXi)	Y	Y
VMware vSphere Hypervisor (ESXi) 5.5	Y	Y
VMware vSphere Hypervisor (ESXi) 6.0	Y	Y

Warranty

The ServeRAID M5110 SAS/SATA Controller carries a 1-year limited warranty. When installed in a supported System x server, the adapter assumes the system's base warranty and any warranty upgrades.

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)

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-IV

Related publications and links

For more information, see the following documents:

- Lenovo System x storage options product web page
<https://www3.lenovo.com/us/en/data-center/servers/server-options/system-x-options/server-storage/c/system-x-storage>
- ServeRAID M5110 SAS/SATA Controller User's Guide
<https://support.lenovo.com/docs/UM104021>
- ServeRAID M5110 SAS/SATA Controller Quick Installation Guide
<https://support.lenovo.com/docs/UM104020>
- ServeRAID M5100 Series Battery Kit Quick Installation Guide
<https://support.lenovo.com/us/en/docs/UM104005>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>
- Lenovo RAID Management Tools and Resources (includes links to drivers and management tools)
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- System x Configuration and Options Guide
<https://support.lenovo.com/us/en/documents/SCOD-3ZVQ5W>
- US Announcement Letter:
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-048>

Related product families

Product families related to this document are the following:

- [RAID Adapters](#)

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This document, TIPS0857, was created or updated on March 20, 2019.

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