ServeRAID M5225-2GB External SAS/SATA Controller
Product Guide (withdrawn product)

The ServeRAID M5225-2GB SAS/SATA Controller is a 12 Gb SAS RAID controller with two external connectors to connect to SAS expansion enclosures. The adapter is part of the ServeRAID M Series family, which offers a complete server storage solution that consists of RAID controllers, cache/flash modules, energy packs, and software feature upgrades in an ultra-flexible offerings structure. These products are optimized to deliver performance that is demanded by the ever-growing I/O requirements of today's enterprises. The M5225-2GB is a small form factor PCIe RAID adapter for external storage, and it shares a common set of ServeRAID M Series Features on Demand (FoD) upgrades that are available for the entire family.

The following figure shows the ServeRAID M5225-2GB SAS/SATA Controller.

Figure 1. ServeRAID M5225-2GB SAS/SATA Controller

Did you know?

The ServeRAID M5225-2GB SAS/SATA Controller is optimized for high-performance, external data storage, with a 12 Gbps SAS controller that features a 2 GB DDR3 1866 MHz cache memory with flash backup and PCIe 3.0 host interface.

The ServeRAID M5200 portfolio is designed around several base solutions with upgrades that are rich with features to satisfy various storage needs while minimizing parts-on-the-floor upgrades.

Upgrade features, such as support for RAID 6 and 60, performance optimization, and caching with solid-state drives (SSDs) no longer require a hardware key. They are implemented through FoD software licenses.

Part number information

The following table lists the ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
Base controller		
ServeRAID M5225-2GB SAS/SATA Controller	00AE938	A5ND
Features on Demand (FoD) upgrades*		
ServeRAID M5200 Series RAID 6 Upgrade-FoD	47C8706	A3Z5
ServeRAID M5200 Series Performance Accelerator-FoD	47C8710	A3Z7
ServeRAID M5200 Series SSD Caching Enabler-FoD	47C8712	A3Z8

* One M5200 Series FoD upgrade activates the feature on all M5200 Series and M5100 Series controllers that are installed in the server.

The ServeRAID M5225-2GB option part number includes the following items:

- One ServeRAID M5225 adapter card with the full-height (3U) bracket and 2 GB Flash/Cache Module
- Low-profile (2U) bracket
- One Offload Power Module
- Two power module cables (425 mm and 925 mm)
- Documentation package

ServeRAID M5200 RAID 6 Upgrade, SSD Performance Accelerator, and SSD Caching Enabler option part numbers include the following items:

- One M5200 Series upgrade authorization letter
- Feature Activation Instructions

Features

The ServeRAID M5225-2GB SAS/SATA Controller has 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 can 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, can 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 mirrors data when an inconsistent stripe is detected for RAID 1 and re-creates the parity from the peer disks for RAID 5 or RAID 6. Consistency checks can be scheduled to occur 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 occurred or are about to occur.

- Patrol read for media scanning and repairing

  Patrol read is a background sentry service that proactively discovers and corrects 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 re-create 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 in which the patrol read task can be started, 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 can define a physical disk as a hot spare to replace a failed drive. Hot spares can be configured as 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.

- Drive roaming

  Drive roaming occurs when the physical disks are changed to different ports on the same controller. When the drives are placed on different channels, the controller detects the RAID configuration from the configuration data on the drives.

- Human Interface Infrastructure (HII) utility for pre-boot array configuration and management

  HII 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, which reduces administrative efforts and simplifies troubleshooting.

- 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 step forward in securing data on a disk drive from any unauthorized access or modification that results from theft, loss, or repurposing of drives. Instant secure erase permanently removes data when SEDs are repurposed or decommissioned. SafeStore local key management provides the necessary management and protection of SEDs by using a simple pass phrase, security key identifier, and security key file that can be set and applied to all SEDs that are 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.

- MegaRAID flash cache protection

  MegaRAID flash cache protection uses NAND flash memory (which is powered by a supercapacitor) to protect data that is stored in the controller cache. This module eliminates the need for a lithium-ion battery, which is 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 by using power from the offload power module. After the power is restored to the RAID controller, the content of the NAND flash is transferred back to the DRAM, which is flushed to disk.

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 6 and 60 is activated with M5200 Series RAID 6 Upgrade (47C8706). 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 FastPath SSD performance acceleration

  MegaRAID FastPath software provides high-performance I/O acceleration for SSD-based virtual drives by using a 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 M5200 Series Performance Accelerator (47C8710). 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 CacheCade SSD caching for traditional hard disk drives

  MegaRAID CacheCade read/write software accelerates the performance of hard disk drive (HDD) arrays with only an incremental investment in 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 M5200 Series SSD Caching feature (47C8712) enabled. 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.

Technical specifications

The ServeRAID M5225-2GB SAS/SATA Controller has the following specifications:

- LSI SAS3108 12 Gbps RAID on Chip (ROC) controller with the 1.2 GHz dual-core processor
- PCI Low Profile, Half-length - MD2 form factor
- Eight external 12 Gbps SAS/SATA ports (support for 12, 6, or 3 Gbps SAS speeds and 6 or 3 Gbps SATA speeds). Up to 12 Gbps throughput per port
- Two external x4 mini-SAS HD connectors (SFF-8644)
- PCI Express 3.0 x8 host interface
- Support for RAID levels 0, 1, 10, 5, and 50 standard; support for RAID 6, 60 with the extra upgrade
- 2 GB of onboard data cache (DDR3 that is running at 1866 MHz) with flash backup (MegaRAID flash cache protection technology)
- Supports SAS and SATA HDDs and SSDs
- Intermix of SAS and SATA HDDs and SSDs is supported, but the mixing of different drives type in the same array (drive group) is not recommended
- Intermixing of 12 Gbps and 6 Gbps drives is supported
- Supports connections to external drive enclosures
- Supports up to 240 devices
- Support for self-encrypting drives (SEDs) with MegaRAID SafeStore as a standard feature
- Optional support for SSD performance acceleration with MegaRAID FastPath and SSD caching with MegaRAID CacheCade Pro 2.0
- Support for up to 64 virtual disks, up to 128 arrays, up to 16 virtual disks per array, and up to 32 physical drives per array
- Support for logical drive sizes greater than 2 TB
- Configurable stripe size from 64 KB 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

The power module is mounted in a special power module slot in a supported server (refer to the *Installation and User Guide* for the server for details). One of the power module cables (425 mm or 925 mm) supplied with the M5225 adapter is used to connect the power module to the flash cache module mounted on the M5225 adapter.

The following figure shows the flash cache module, power module, and power module cable.
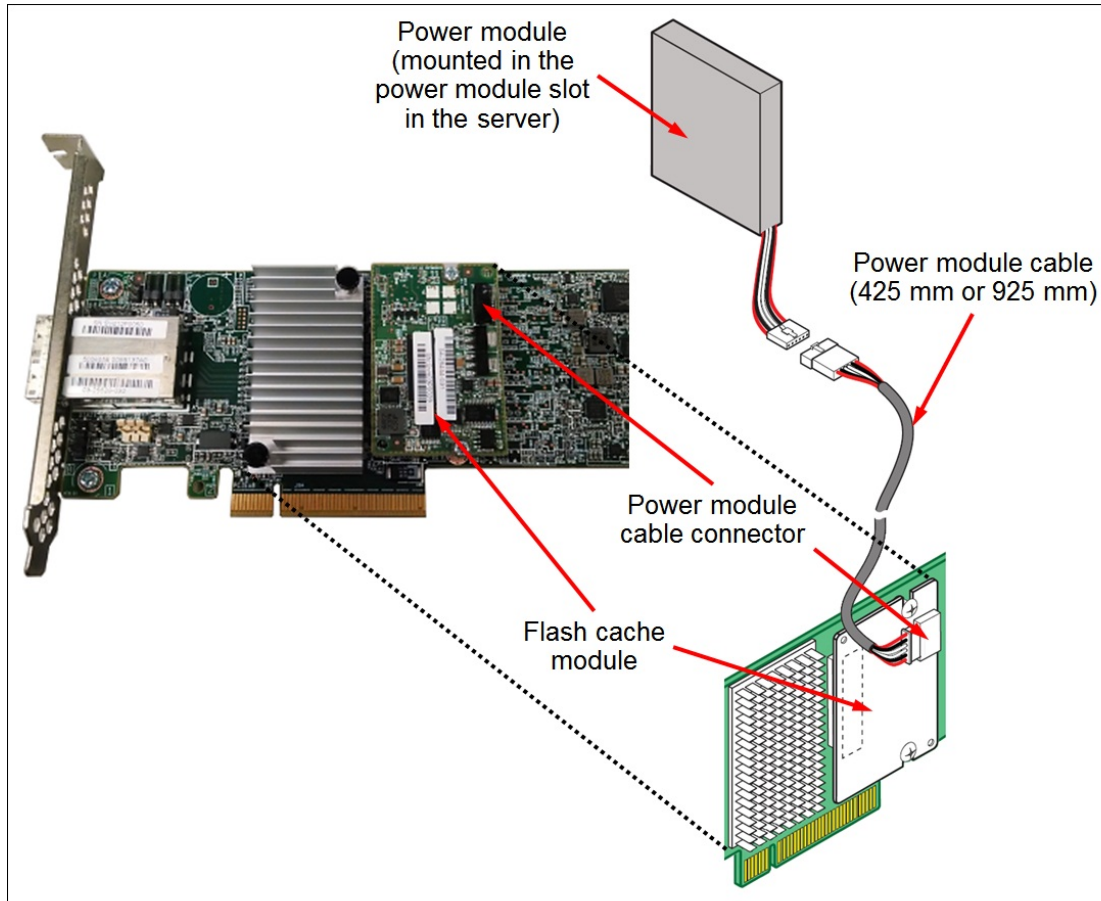

Figure 2. Flash cache module, power module, and power module cable

Server compatibility

The following tables list the compatibility information for the ServeRAID M5225-2GB SAS/SATA Controller and System x®, iDataPlex®, and NeXtScale™ servers.

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

Table 2. 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)
00AE938	ServeRAID M5225-2GB SAS/SATA Controller	Y	Y	Y	Y	Y	N	N
47C8706	ServeRAID M5200 Series RAID 6 Upgrade-FoD	Y	Y	Y	Y	Y	Y	N
47C8710	ServeRAID M5200 Series Performance Accelerator-FoD	Y	Y	Y	Y	Y	Y	N
47C8712	ServeRAID M5200 Series SSD Caching Enabler-FoD	Y	Y	Y	Y	Y	Y	N

Table 3. Lenovo server compatibility: Intel Xeon processor E3 v3, E5 v3, and E7 v3 families

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, E5 v3)
00AE938	ServeRAID M5225-2GB SAS/SATA Controller	Y	Y	Y	Y	Y	Y	N
47C8706	ServeRAID M5200 Series RAID 6 Upgrade-FoD	N	N	Y	Y	Y	Y	N
47C8710	ServeRAID M5200 Series Performance Accelerator-FoD	N	N	Y	Y	Y	Y	N
47C8712	ServeRAID M5200 Series SSD Caching Enabler-FoD	N	N	Y	Y	Y	Y	N

Table 4. Lenovo server compatibility: Intel Xeon processor E5 v2 and E7 v2 families

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8753)	x3850 X6/x3950 X6 (6241, E7 v2)	dx360 M4 (7912, E5-2600 v2)
00AE938	ServeRAID M5225-2GB SAS/SATA Controller	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
47C8706	ServeRAID M5200 Series RAID 6 Upgrade-FoD	Y	N	Y	N	Y	Y	Y	Y	Y	N
47C8710	ServeRAID M5200 Series Performance Accelerator-FoD	Y	N	Y	N	Y	Y	Y	Y	Y	N
47C8712	ServeRAID M5200 Series SSD Caching Enabler-FoD	Y	N	Y	N	Y	Y	Y	Y	Y	N

For more information about the System x servers, including older servers that support the M5225-2GB adapter, see the following ServerProven® website: www.lenovo.com/us/en/serverproven/

External drive enclosures

The ServeRAID M5225-2GB SAS/SATA Controller supports connectivity to the external drive enclosures that are listed in the following table.

Table 5. External drive enclosures

Description	Part number	Max qty supported per one M5225
Lenovo Storage D1212 LFF Chassis, Dual ESM	4587A1x	8
Lenovo Storage D1224 SFF Chassis, Dual ESM	4587A3x	8
Lenovo Storage E1012 LFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B1	8
Lenovo Storage E1012 LFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B2	8
Lenovo Storage E1024 SFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B3	8
Lenovo Storage E1024 SFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B4	8

For details about supported connectivity topologies, drives, and cables for the Lenovo Storage E1012 and E1024, see the Lenovo Press Product Guide:
http://lenovopress.com/lp0043

Operating system support

The adapter supports the following operating systems:

Tip: This table is automatically generated based on data from Lenovo ServerProven.

Table 6. Operating system support for ServeRAID M5225-2GB SAS/SATA Controller, 00AE938

Operating systems	x3850/3950 X6 (3837)	x3850/3950 X6 (6241, E7 v2)	x3850/3950 X6 (6241, E7 v3)	x3850/3950 X6 (6241, E7 v4)	x3250 M6 (3633)	x3500 M5 (5464)	x3550 M5 (5463)	x3550 M5 (8869)	x3650 M5 (5462)	x3650 M5 (8871)	x3100 M5 (5457)	x3250 M5 (5458)
Microsoft Windows Server 2008 R2	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012 R2	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2016	N	Y [1]	Y [1]	Y [1]	Y	Y	Y	Y	Y	Y	N	Y
Microsoft Windows Server 2019	N	N	N	Y	Y	N	N	Y	N	Y	N	N
Microsoft Windows Server version 1709	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server version 1803	N	N	N	N	N	N	N	Y	N	Y	N	N
Red Hat Enterprise Linux 6 Server Edition	N	N	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 6 Server x64 Edition	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7	N	N	N	Y	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 8.0	N	N	N	Y	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 11 for AMD64/EM64T	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 for x86	N	N	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
SUSE Linux Enterprise Server 15	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
SUSE Linux Enterprise Server 15 with Xen	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
VMware vSphere 5.1 (ESXi)	N	Y	N	N	N	Y	Y	N	Y	N	Y	Y
VMware vSphere Hypervisor (ESXi) 5.5	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.0	N	Y	Y	Y	Y	Y [2]	Y [2]	Y	Y [2]	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.5	Y	N	N	Y	N	N	Y	Y	Y	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	Y	Y	Y	N	Y	N	Y	N	N

[1] [in box driver support only]

[2] [This is a limitation with Lenovo Customized VMWare image having a downlevel LSI/Avago Provider that doesn't work properly with LSI/Avago native driver This issue should be routed to the Lenovo VMware team that owns the Customized image Target Fixed Date: 2016/2/1]

Warranty

The ServeRAID M5225-2GB 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 M5225-2GB SAS/SATA Controller has the following physical specifications:

- Dimensions (approximate):
  - Height: 17 mm (0.7 in)
  - Width: 68 mm (2.7 in)
  - Depth: 170 mm (6.7 in)
  - Weight: 116 g (0.25 lb)

- Shipping dimensions (approximate):
  - Height: 56 mm (2.2 in)
  - Width: 150.0 mm (5.9 in)
  - Depth: 249 mm (9.8 in)
  - Weight: 500 g (1.1 lb)

Operating environment

The ServeRAID M5225-2GB SAS/SATA Controller is supported in the following environment:

- Temperature:
  - Operating: 5 - 40 °C (41 - 104 °F) at 0 - 5,000 m (0 - 16,404 ft)
  - Storage and transit: -40 - 60 °C (-40 - 140 °F) at 10,700 m (35,105 ft)
- Relative humidity: 8 - 93% (noncondensing)
- Maximum altitude: 5,000 m (16,404 ft)

Agency approvals

The adapter conforms to the following regulations:

- UL
- cUL
- IEC60950
- EMC
- FCC
- TUV
- CE
- VCCI
- BSMI
- C-tick
- KC

Related publications and links

For more information, see the following resources:

- ServeRAID M5225-2GB SAS/SATA Controller User's Guide
  https://support.lenovo.com/docs/UM920356
- ServeRAID M5225-2GB SAS/SATA Controller Quick Installation Guide
  https://support.lenovo.com/docs/UM920355
- 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

Related product families

Product families related to this document are the following:

- RAID Adapters

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