ServeRAID F5115-200GB and 800GB SAS/SATA Controllers for IBM System x

Product Guide (withdrawn product)

The ServeRAID F Series family of products offers MegaRAID data protection and flexible onboard flash technology that can be used in various ways to help improve performance and server storage density. These products are optimized to deliver the performance that is demanded by the ever-growing I/O requirements of today's enterprises. They integrate popular disk media such as SAS and SATA HDDs and emerging solid-state drives into an organization's storage infrastructure by offering embedded transparent caching and data storage capabilities with the onboard flash memory.

The following figure shows the ServeRAID F5115 Controller for IBM® System x®.

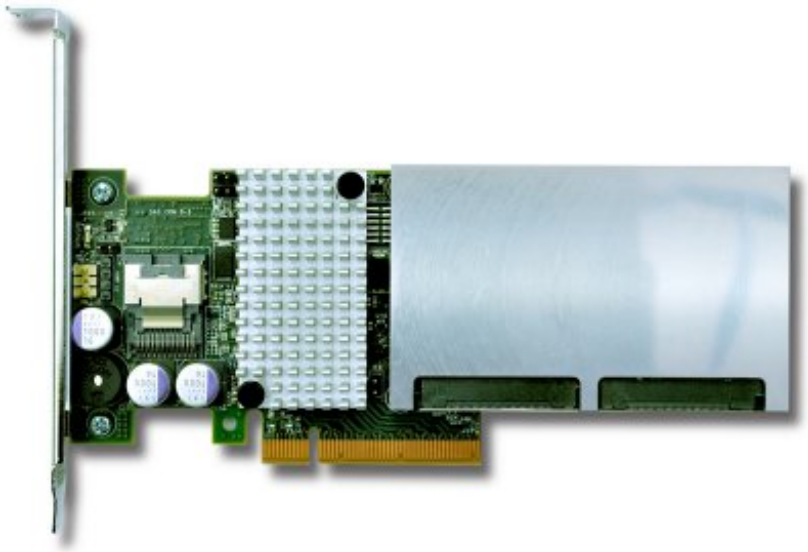

Figure 1. ServeRAID F5115 SAS/SATA Controller

Did you know?

The ServeRAID F Series portfolio is designed with individual flash modules onboard. These flash modules can be configured in a RAID array to support latency-sensitive data storage, including the boot volume, the golden image in a virtual desktop infrastructure (VDI) application, or storing tempdb or indexes and data objects from a database. Concurrently, they support a caching volume, dynamically identifying application hot data to be stored and serviced from the flash for improved performance and reduced latency.

Part number information

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

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
ServeRAID F5115-200GB SAS/SATA Controller for IBM System x	00AE882	A4Z7
ServeRAID F5115-800GB SAS/SATA Controller for IBM System x	00AE886	A4Z8

The ServeRAID F5115 option part numbers include the following items:

- One ServeRAID F5115 adapter card with full-height (3U) bracket
- Low-profile (2U) bracket
- Warranty Flyer
- Important Notices Flyer

Features

The ServeRAID F5115 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 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 physical disks or using 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
  The 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 a RAID 1 and recreates 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 occur or are about to occur.
- Patrol read for media scanning and repairing

Patrol read is a background sentry service designed to proactively 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 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 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 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.

- 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 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 FastPath SSD performance acceleration
  MegaRAID FastPath software provides high-performance I/O acceleration for SSD-based virtual drives by using 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.

- Intelligent caching for traditional hard drives
  Intelligent caching algorithms help identify application hot data (the frequently accessed data) that is stored and accessed from flash memory, enabling the lowest possible latency). By combining flash memory and HDDs, the solution enables the lower cost per GB at the lower cost per transaction ratios over products supporting only flash memory.

- 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.

- Human Interface Infrastructure (HII) utility
  The Human Interface Infrastructure (HII) configuration utility is a tool to configure controllers and physical and logical drives from the pre-boot UEFI environment.

- 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 and F 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.

Technical specifications

The ServeRAID F5115 SAS/SATA Controllers have the following specifications:

- PCI Low Profile, Half-length - MD2 form factor
- Four internal 6 Gbps SAS/SATA ports
- Up 6 Gbps throughput per port
- One internal Mini-SAS connector (SFF-8087)
- LSI SAS2208 6 Gbps RAID on Chip (ROC) controller
- PCI Express 3.0 x8 host interface
- Support for RAID 0, 1, 10, 5, 50, 6, and 60
- 1 GB onboard data cache (DDR3 running at 1333 MHz)
- 200 GB (F5115-200) or 800 GB (F5115-800) onboard flash memory:
    - Two embedded enterprise-grade eMLC NAND flash modules
    - Configurable as RAID 0 or RAID 1 volumes
    - Support for caching (write-through and write-back), data storage (including boot volume), or both
    - Automatic hot spot data caching with embedded caching software running on the controller
    - Endurance of up to 12.2 PB total bytes written (TBW) for the F5115-200, or up to 48.8 PB TBW for the F5115-800
- Support for SAS and SATA HDDs and SSDs; up to 128 devices supported
- Support for intermixing SAS and SATA HDDs and SSDs; mixing different types of drives in the same array (drive group) is not supported
- Support for self-encrypting drives (SEDs) with MegaRAID SafeStore
- Support for SSD performance acceleration with MegaRAID FastPath
- Support for up to 64 virtual drives
- Support for logical unit number (LUN) sizes up to 64 TB
- Configurable stripe unit 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

Solid-state memory: Solid-state memory cells have an intrinsic, finite number of program/erase cycles that each cell can incur. As a result, solid-state storage has a maximum amount of program/erase cycles to which it can be subjected. Solid-state storage that reaches this limit might fail to operate according to its specifications. Writes are tracked and reported by the adapters management utility and might be affected by application writes, data patterns, and maintenance tasks that are designed to maximize data integrity.

Supported servers

The following table lists the compatibility information for the ServeRAID F5115 controllers and IBM System x and IBM iDataPlex® servers.

Table 2. System x and iDataPlex compatibility (part 1 of 2)

Part number	Description	x3250 M5 (5458)	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)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
00AE882	ServeRAID F5115-200GB SAS/SATA Controller	N	N	N	N	N	N	Y	N	N	N
00AE886	ServeRAID F5115-800GB SAS/SATA Controller	N	N	N	N	N	N	Y	N	N	N

Table 2. System x and iDataPlex compatibility (part 2 of 2)

Part number	Description	x3100 M4 (2582)	x3250 M4 (2583)	x3300 M4 (7382)	x3500 M4 (7383, E5-2600)	x3530 M4 (7160, E5-2400)	x3550 M4 (7914, E5-2600)	x3630 M4 (7158, E5-2400)	x3650 M4 (7915, E5-2600)	x3690 X5 (7147)	x3750 M4 (8722)	x3850 X5/x3950 X5 (7143)	dx360 M4 (7912, E5-2600)
00AE882	ServeRAID F5115-200GB SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
00AE886	ServeRAID F5115-800GB SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N

For more information about the System x servers that support each adapter, see the IBM ServerProven® website:

http://ibm.com/servers/eserver/serverproven/compat/us/

Supported drives

The ServeRAID F5115 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 drives and the servers with which they are supported are listed in the following table.

Table 3. Supported drives

Part number	Description	x3650 M4 BD (5466)
3.5-inch SAS Hot-Swap HDDs		
49Y6092	IBM 300GB 15K 6Gbps SAS 3.5" G2HS HDD	Y
49Y6097	IBM 450GB 15K 6Gbps SAS 3.5" G2HS HDD	Y
49Y6102	IBM 600GB 15K 6Gbps SAS 3.5" G2HS HDD	Y
3.5-inch NL SAS Hot-Swap HDDs		
90Y8567	IBM 1TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	Y
90Y8572	IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	Y
90Y8577	IBM 3TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	Y
49Y6210	IBM 4TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD	Y
3.5-inch NL SATA Hot-Swap HDDs		
81Y9786	IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y
81Y9790	IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y
81Y9794	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y
81Y9798	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y
49Y6002	IBM 4TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD	Y
3.5-inch SATA Hot-Swap SSDs		
00W1286	IBM 64GB SATA 3.5" MLC HS Enterprise Value SSD	Y
00W1291	IBM 128GB SATA 3.5" MLC HS Enterprise Value SSD	Y
00W1296	IBM 256GB SATA 3.5" MLC HS Enterprise Value SSD	Y
00W1301	IBM 512GB SATA 3.5" MLC HS Enterprise Value SSD	Y

Supported operating systems

The ServeRAID F5115 SAS/SATA Controllers support the following operating systems:

- Red Hat Enterprise Linux 5 Server 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 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LinuxEnterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T

For the latest information about the specific versions and service levels that are supported and any other prerequisites, see the IBM ServerProven website:

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

Warranty

The ServeRAID F5115 SAS/SATA Controllers carry a 1-year limited warranty. When installed in a supported System x server, the adapters assume your system's base warranty and any IBM ServicePac® upgrade.

Physical specifications

The ServeRAID F5115 SAS/SATA Controllers have the following physical specifications:

Dimensions (approximate):

- Height: 19 mm (0.8 in.)
- Width: 69 mm (2.7 in.)
- Depth: 169 mm (6.7 in.)
- Weight: 194 g (0.4 lb)

Shipping dimensions (approximate):

- Height: 64 mm (2.5 in.)
- Width: 206 mm (8.1 in.)
- Depth: 276 mm (10.9 in.)
- Weight: 536 g (1.2 lb)

Operating environment

The ServeRAID F5115 SAS/SATA Controllers are supported in the following environment:

- Temperature:
  - Operating: 0 to 45 degrees °C (32 to 113 °F) at 0 to 5,000 m (0 to 16,404 ft)
  - Non-operating (storage and transit): -45 to 105 °C (-49 to 221 °F)
- Relative humidity: 20% to 80% (non-condensing)
- Maximum altitude: 5,000 m (16,404 ft)

Agency approvals

The adapters conform 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 documents:

- IBM US Announcement Letter:
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-018
- System x RAID products home page:
  http://www.ibm.com/systems/storage/product/systemx/scsi_raid.html
- ServeRAID F5115 support and downloads:
  http://ibm.com/support/entry/portal/search_results?q=F5115
- IBM ServeRAID software matrix:
  http://ibm.com/support/entry/portal/docdisplay?lndocid=SERV-RAID
- *IBM System x Configuration and Options Guide* :
  http://ibm.com/systems/xbc/cog/

Related product families

Product families related to this document are the following:

- RAID Adapters

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