SATA MLC Enterprise Value SSDs (Withdrawn)

Product Guide (withdrawn product)

The Lenovo Enterprise Value solid-state drives (SSDs) employ cost-effective MLC NAND technology to bring an affordable and performance-driven solution for read-intensive applications. These SSDs are available as 2.5-inch form factor drives with both simple-swap and hot-swap options, as well as 3.5-inch hot-swap drive options and 1.8-inch drive options. These SSDs use a single-chip controller with a SATA interface on the system side and n-channels of Micron NAND Flash internally. Packaged in an HDD replacement enclosure, these SSDs integrate easily in existing storage infrastructures.

Figure 1 shows SATA 2.5-inch MLC Enterprise Value SSD.

Figure 1. SATA 2.5-inch MLC Enterprise Value SSD

Did you know?

Unlike client drives, these solid-state drives for System x® are equipped with a robust suite of enterprise features, including SMART attributes, hot-plug support, and uCode. They also leverage enterprise data path protection to verify data to and from NAND at every possible location and protect the integrity of the data. The NAND flash in these SSDs is screened and then tested specifically for enterprise customer use. Overall, these SSDs provide outstanding IOPS/watt and cost/IOPS for enterprise solutions and are an excellent choice for read-intensive applications like web serving, content delivery, and streaming video.

Providing that additional peace of mind, Lenovo Enterprise Value MLC SSDs are covered under Lenovo warranty. These drives carry a 1-year limited warranty, or when installed in a System x server, these drives assume your system's base warranty.

Part number information

Table 1 lists the information for ordering part numbers and feature codes.

Effective June 30, 2014, the 64 GB, 128 GB, 256 GB, and 512 GB SATA MLC Enterprise Value SSDs were withdrawn from marketing. After this date, you can no longer obtain these SSDs directly from Lenovo. You can obtain these SSDs through authorized remarketers or Lenovo authorized System x dealers while supplies last.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
1.8-inch SSDs		
64GB SATA 1.8" MLC Enterprise Value SSD	49Y5834*	A3AQ
128GB SATA 1.8" MLC Enterprise Value SSD	00W1222*	A3TG
256GB SATA 1.8" MLC Enterprise Value SSD	00W1227*	A3TH
512GB SATA 1.8" MLC Enterprise Value SSD	49Y5993*	A3AR
2.5-inch SSDs		
64GB SATA 2.5" MLC HS Enterprise Value SSD	49Y5839*	A3AS
64GB SATA 2.5" MLC SS Enterprise Value SSD	49Y5849*	A3AT
128GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8648*	A2U4
128GB SATA 2.5" MLC SS Enterprise Value SSD	90Y8668*	A2UB
128GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	90Y8984*	A36B
256GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8643*	A2U3
256GB SATA 2.5" MLC SS Enterprise Value SSD	90Y8663*	A2UC
256GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	90Y8989*	A36C
512GB SATA 2.5" MLC HS Enterprise Value SSD	49Y5844*	A3AU
512GB SATA 2.5" MLC SS Enterprise Value SSD	49Y5854*	A3AV
3.5-inch SSDs		
64GB SATA 3.5" MLC HS Enterprise Value SSD	00W1286*	A3G1
128GB SATA 3.5" MLC HS Enterprise Value SSD	00W1291*	A3G3
256GB SATA 3.5" MLC HS Enterprise Value SSD	00W1296*	A3G4
512GB SATA 3.5" MLC HS Enterprise Value SSD	00W1301*	A3G2

* Withdrawn from marketing, not available for ordering.

The part numbers include the following items:

- One SSD without a drive tray (1.8-inch SSDs) or one SSD mounted on a 2.5-inch hot-swap drive tray (2.5-inch HS SSDs) or 2.5-inch simple-swap drive tray (2.5-inch SS SSDs) or 3.5-inch hot swap drive tray (3.5-inch SDDs)
- Support Flyer for SSD
- Warranty Flyer
- Important Notices Flyer

Features

The SATA MLC Enterprise Value SDDs have the following features:

- 1.8-inch, 2.5-inch and 3.5-inch industry standard form factors
- Support for a conventional 2.5-inch or 3.5-inch drive bay (2.5-inch or 3.5-inch SSDs, respectively) or eXFlash SSD drive bay or SSD drive bay on selected iDataPex®, BladeCenter® and Flex System™ servers (1.8-inch drives)
- 6 Gbps SATA interface
- Utilizate industry-leading 25 nm MLC
- Cost-effective MLC NAND technology with high read performance
- Enterprise Data Path Protection to ensure NAND integrity
- Endurance: up to 350 TB of total bytes written (TBW) for a 512 GB drives at 90% full disk based on predefined usage pattern (see explanation below)
- Energy-saving 2.5 - 3.5 watt power consumption per drive
- Absence of moving parts reduces potential failure points in the server
- Native command queuing support
- Self-monitoring, analysis, and reporting technology (SMART) command set

Technical specifications

Table 2 (Parts 1 and 2) presents technical specifications for the Enterprise Value solid-state drives.

Table 2. Enterprise Value SSD technical specifications (Part 1: 2.5-inch SSDs)

Feature	64 GB		128 GB			256 GB			512 GB	
Part number	49Y5839	49Y5849	90Y8648	90Y8668	90Y8984	90Y8643	90Y8663	90Y8989	49Y5844	49Y5854
Hot-swap drive	Yes	No	Yes	No	No	Yes	No	No	Yes	No
Form factor	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.	2.5-in.
Interface	6 Gbps SATA		6 Gbps SATA			6 Gbps SATA			6 Gbps SATA	
Capacity	64 GB		128 GB			256 GB			512 GB	
Endurance	36 TB		72 TB			72 TB			72 TB	
IOPS read*	50,000		50,000			50,000			50,000	
IOPS write*	7,000		7,500			7,500			7,500	
Sequential read rate†	350 MBps		350 MBps			350 MBps			350 MBps	
Sequential write rate†	100 MBps		140 MBps			140 MBps			140 MBps	
Read latency	0.5 ms		0.5 ms			0.5 ms			0.5 ms	
Write latency	3.5 ms		3.5 ms			3.5 ms			3.5 ms	
Shock, operating	1500 G/1.0 ms		1500 G/1.0 ms			1500 G/1.0 ms			1500 G/1.0 ms	
Vibration, operating	2–500Hz at 3.1 G		2–500Hz at 3.1 G			2–500Hz at 3.1 G			2–500Hz at 3.1 G	

* 4 KB block transfers
† 128 KB block transfers

Table 2. Enterprise Value SSD technical specifications (Part 2: 1.8-inch and 3.5-inch SSDs)

Feature	64 GB		128 GB		256 GB		512 GB	
Part number	49Y5834	00W1286	00W1222	00W1291	00W1227	00W1296	49Y5993	00W1301
Hot-swap drive	Yes§	Yes	Yes§	Yes	Yes§	Yes	Yes§	Yes
Form factor	1.8-in.	3.5-in.	1.8-in.	3.5-in.	1.8-in.	3.5-in.	1.8-in.	3.5-in.
Interface	6 Gbps SATA		6 Gbps SATA		6 Gbps SATA		6 Gbps SATA	
Capacity	64 GB		128 GB		256 GB		512 GB	
Endurance	36 TB		72 TB		175 TB		350 TB	
IOPS read*	50,000		50,000		50,000		50,000	
IOPS write*	7,000		7,500		7,500		7,500	
Sequential read rate†	350 MBps		350 MBps		350 MBps		350 MBps	
Sequential write rate†	100 MBps		140 MBps		140 MBps		140 MBps	
Read latency	0.5 ms		0.5 ms		0.5 ms		0.5 ms	
Write latency	3.5 ms		3.5 ms		3.5 ms		3.5 ms	
Shock, operating	1500 G/1.0 ms		1500 G/1.0 ms		1500 G/1.0 ms		1500 G/1.0 ms	
Vibration, operating	2–500Hz at 3.1 G		2–500Hz at 3.1 G		2–500Hz at 3.1 G		2–500Hz at 3.1 G	

§ This SSD can be a hot-swap or non-hot-swap drive depending on a server in which it is installed.
* 4 KB block transfers
† 128 KB block transfers

Enterprise Value SSDs and Enterprise SSDs have similar read and write IOPS performance, but the key difference between them is their endurance (or life time) (that is, how long they can perform write operations because SSDs have a finite number of program/erase (P/E) cycles). Enterprise Value SSDs have a better cost/IOPS ratio but lower endurance compared to Enterprise SSDs. SSD write endurance is typically measured by the number of program/erase (P/E) cycles, that the drive incurs over its lifetime, listed as TBW in the device specification.

The TBW value assigned to a solid-state device is the total bytes of written data (based on the number of P/E cycles) that a drive can be guaranteed to complete (% of remaining P/E cycles = % of remaining TBW). Reaching this limit does not cause the drive to immediately fail. It simply denotes the maximum number of writes that can be guaranteed. A solid-state device will not fail upon reaching the specified TBW. At some point based on manufacturing variance margin, after surpassing the TBW value, the drive will reach the end-of-life point, at which the drive will go into a read-only mode. Because of such behavior by Enterprise Value solid-state drives, careful planning must be done to use them only in read-intensive environments to ensure that the TBW of the drive will not be exceeded prior to the required life expectancy.

The endurance of Enterprise Value drives is specified based on the following access pattern: 50% random data and 50% sequential data with block size mixes of 5% of the data as 4 KB block size, 5% of the data as 8 KB block size, 10% of the data as 16 KB block size, 35% of the data as 64 KB block size, and 35% of the data as 128 KB block size. The Enterprise Value drives described here are capable of up to 350 TB (512 GB SSDs) of lifetime writes, with the workload stated above as the worse case. For the 512 GB SSD to last in five years inside of the 350 TB of TBW, the drive write workload must be limited to no more than 190 GB of writes per day. For the device to last in three years, the drive write workload must be limited to no more than 320 GB of writes per day.

Supported servers

Table 3 (Parts 1 and 2) lists the compatibility information for the SATA MLC Enterprise Value SSDs and System x, iDataPlex, and NeXtScale servers.

Table 3. System x, iDataPlex, and NeXtScale compatibility (Part 1)

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)	x3750 M4 (8752)	x3850 X6/x3950 X6 (3837)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
1.8" SSDs													
49Y5834	64GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	Y	N	N	Y	Y
00W1222	128GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	Y	N	N	N	N
00W1227	256GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	Y	N	N	N	Y
49Y5993	512GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	Y	N	N	N	N
2.5" SSDs													

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)	x3750 M4 (8752)	x3850 X6/x3950 X6 (3837)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
49Y5839	64GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N	N	N	N	N	N
49Y5849	64GB SATA 2.5" MLC SS Enterprise Value SSD	Y	N	N	N	N	N	N	N	N	N	Y	N
90Y8648	128GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N	N	N	N	N	N
90Y8668	128GB SATA 2.5" MLC SS Enterprise Value SSD	Y	N	N	Y	N	Y	N	N	N	N	Y	N
90Y8984	128GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	N	N	N	N	N	N
90Y8643	256GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	N	Y	N	Y	N	N	N	N	N	N
90Y8663	256GB SATA 2.5" MLC SS Enterprise Value SSD	Y	N	N	Y	N	Y	N	N	N	N	Y	N
90Y8989	256GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	N	N	N	N	N	N
49Y5844	512GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	N	Y	N	N	N	N	N	N
49Y5854	512GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N	Y	N
3.5" SSDs													
00W1286	64GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	Y	N	Y	N	N	N	N	N
00W1291	128GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	Y	N	Y	N	N	N	N	N
00W1296	256GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	Y	N	Y	N	N	N	N	N
00W1301	512GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	Y	N	Y	N	N	N	N	N

Table 3. System x, iDataPlex, and NeXtScale compatibility (Part 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)
1.8" SSDs													
49Y5834	64GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	N	N	Y	Y	Y	Y	N
00W1222	128GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	N	N	Y	Y	Y	Y	N
00W1227	256GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	N	N	Y	Y	Y	Y	N
49Y5993	512GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	N	N	Y	Y	Y	Y	N
2.5" SSDs													
49Y5839	64GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
49Y5849	64GB SATA 2.5" MLC SS Enterprise Value SSD	N	Y	N	N	Y	N	N	N	N	N	N	Y
90Y8648	128GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
90Y8668	128GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	Y	Y	N	Y	N	N	N	Y
90Y8984	128GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	N	N	N	N	N	N
90Y8643	256GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
90Y8663	256GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	Y	Y	N	Y	N	N	N	Y
90Y8989	256GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	N	N	N	N	N	N
49Y5844	512GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
49Y5854	512GB SATA 2.5" MLC SS Enterprise Value SSD	N	Y	N	N	Y	N	N	N	N	N	N	Y
3.5" SSDs													
00W1286	64GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	Y	N	N	N	N	N
00W1291	128GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	Y	N	N	N	N	N
00W1296	256GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	Y	N	N	N	N	N
00W1301	512GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	Y	N	N	N	N	N

Table 4 lists the compatibility information for the SATA MLC Enterprise Value SSDs and the BladeCenter® and Flex System™ servers.

Table 4. BladeCenter and Flex System compatibility

Part number	Description	HS22 (7870)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7873)	x220 (7906)	x222 (7916)	x240 (8737, E5-2600)	x240 (8737, E5-2600 v2)	x440 (7917)
1.8" SSDs											
49Y5834	64GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	N	N	N
00W1222	128GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	N	Y	Y
00W1227	256GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	N	Y	Y
49Y5993	512GB SATA 1.8" MLC Enterprise Value SSD	N	N	N	N	N	Y	N	Y	Y	Y
2.5" SSDs											
49Y5839	64GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	N	Y	N	Y	N	Y
49Y5849	64GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
90Y8648	128GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	N	Y	N	Y	Y	Y
90Y8668	128GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
90Y8984	128GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	Y	N	N	N
90Y8643	256GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	N	Y	N	Y	Y	Y
90Y8663	256GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
90Y8989	256GB SATA 2.5" MLC Enterprise Value SSD for Flex System x222	N	N	N	N	N	N	Y	N	N	N
49Y5844	512GB SATA 2.5" MLC HS Enterprise Value SSD	Y	Y	Y	Y	N	Y	N	Y	N	Y
49Y5854	512GB SATA 2.5" MLC SS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
3.5" SSDs											
00W1286	64GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
00W1291	128GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
00W1296	256GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N
00W1301	512GB SATA 3.5" MLC HS Enterprise Value SSD	N	N	N	N	N	N	N	N	N	N

See the ServerProven® website for the latest compatibility information for System x, BladeCenter, iDataPlex and Flex System servers: http://ibm.com/servers/eserver/serverproven/compat/us/

Supported storage controllers

The SATA MLC Enterprise Value SSDs require a supported disk controller. Table 5 lists the System x controllers that support these solid-state drives installed in a supported server.

SSD Caching support: The SATA MLC Enterprise Value SSDs do not support MegaRAID CacheCade feature of the supported ServeRAID controllers.

Table 5. Controllers for System x, iDataPlex, and NeXtScale servers supported with the SSDs (Part 1)

Part number	Product 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)	x3750 M4 (8752)	x3850 X6/x3950 X6 (3837)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
Onboard	ServeRAID M5210e SAS/SATA Controller	N	N	N	N	N	N	N	Y	N	N	N	N
46C9110	ServeRAID M5210 SAS/SATA Controller	N	Y	N	Y	N	Y	Y	Y	N	N	N	N
00AE882	ServeRAID F5115-200GB SAS/SATA Controller	N	N	N	N	N	N	Y	N	N	N	N	N
00AE886	ServeRAID F5115-800GB SAS/SATA Controller	N	N	N	N	N	N	Y	N	N	N	N	N
Onboard	ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	Y	N	N	N	N	N	N
81Y4481	ServeRAID M5110 SAS/SATA Controller	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N
81Y4448	ServeRAID M1115 SAS/SATA Controller	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	Y
81Y4492	ServeRAID H1110 SAS/SATA Controller	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	Y
90Y4304	ServeRAID M5016 SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
46M0829	ServeRAID M5015 SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
46M0916	ServeRAID M5014 SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
46M0831	ServeRAID M1015 SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
Onboard	ServeRAID C105	N	N	N	N	N	N	N	N	N	N	N	N
Onboard	ServeRAID C100	N	N	N	N	N	N	N	N	N	N	N	Y
46M0912	6Gb Performance Optimized HBA	N	Y	Y	Y	Y	Y	N	N	N	N	Y	N
46C8988	N2115 SAS/SATA HBA	Y	Y	N	Y	Y	Y	Y	N	N	N	N	Y
47C8675	N2215 SAS/SATA HBA	N	Y	N	Y	N	Y	Y	N	N	N	N	N

Table 5. Controllers for System x, iDataPlex, and NeXtScale servers supported with the SSDs (Part 2)

Part number	Product 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)
Onboard	ServeRAID M5210e SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
46C9110	ServeRAID M5210 SAS/SATA Controller	N	N	N	Y	N	Y	N	Y	N	N	N	N
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
Onboard	ServeRAID M5110e SAS/SATA Controller	N	N	N	N	N	N	N	N	N	N	N	N
81Y4481	ServeRAID M5110 SAS/SATA Controller	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y
81Y4448	ServeRAID M1115 SAS/SATA Controller	N	N	Y	Y	Y	Y	Y	N	N	Y	N	Y
81Y4492	ServeRAID H1110 SAS/SATA Controller	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y
90Y4304	ServeRAID M5016 SAS/SATA Controller	N	N	N	N	N	N	N	N	Y	N	Y	N
46M0829	ServeRAID M5015 SAS/SATA Controller	Y	Y	N	N	N	N	N	N	Y	N	Y	N
46M0916	ServeRAID M5014 SAS/SATA Controller	Y	Y	N	N	N	N	N	N	Y	N	Y	N
46M0831	ServeRAID M1015 SAS/SATA Controller	Y	Y	N	N	N	N	N	N	N	N	N	N
Onboard	ServeRAID C105	N	N	N	N	N	N	N	N	N	N	N	N
Onboard	ServeRAID C100	N	N	N	N	N	N	N	N	N	N	N	N
46M0912	6Gb Performance Optimized HBA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46C8988	N2115 SAS/SATA HBA	N	N	N	Y	N	Y	Y	Y	N	Y	Y	N
47C8675	N2215 SAS/SATA HBA	N	N	N	Y	N	Y	N	Y	N	N	N	N

Table 6 lists the BladeCenter and Flex System controllers that support Lenovo SATA Enterprise Value SSDs installed in a supported server.

SSD Caching support: The SATA MLC Enterprise Value SSDs do not support Performance Accelerator and SSD Caching Enabler features of the supported ServeRAID controllers.

Table 6. BladeCenter and Flex System compatibility

Part number	Description	HS22 (7870)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7873)	x220 (7906)	x222 (7916)	x240 (8737, E5-2600)	x240 (8737, E5-2600 v2)	x440 (7917)
90Y4390	ServeRAID M5115 SAS/SATA Controller	N	N	N	N	N	Y	N	Y	Y	Y
90Y4750	ServeRAID H1135 Controller	N	N	N	Y	N	Y	N	N	N	N
Onboard	ServeRAID C105	N	N	N	N	N	N	N	N	N	N
Onboard	Integrated LSI SAS2004	N	Y	Y	N	N	N	N	Y	Y	Y
Onboard	Integrated SATA Controller (Intel C600 chipset)	N	N	N	N	N	N	Y	N	N	N
46C7167	ServeRAID-MR10ie (CIOv) Controller	N	N	N	N	N	N	N	N	N	N
Onboard	Integrated LSI SAS1064e	Y	N	N	N	N	N	N	N	N	N
46M6908	SSD Expansion Card for BladeCenter HX5	N	N	N	N	N	N	N	N	N	N

See the ServerProven website for the latest information about the adapters supported by each System x server type: http://ibm.com/servers/eserver/serverproven/compat/us/

Supported operating systems

Solid-state drives operate transparently to users, storage systems, applications, databases, and operating systems. The controllers that support SSDs are supported by the following operating systems:

- Microsoft Windows Server 2003, Web Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter x64 Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise x64 Edition
- Microsoft Windows Server 2003/2003 R2, Standard Edition
- Microsoft Windows Server 2003/2003 R2, Standard x64 Edition
- Microsoft Windows Small Business Server 2003/2003 R2 Premium Edition
- Microsoft Windows Small Business Server 2003/2003 R2 Standard Edition
- Microsoft Windows Server 2008 Foundation
- 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

- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Red Hat Enterprise Linux 4 AS for AMD64/EM64T
- Red Hat Enterprise Linux 4 AS for x86
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server Edition with Xen
- 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 LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for x86
- SUSE LINUX Enterprise Server 10 with Xen 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 ESX 4.0
- VMware ESX 4.1
- VMware ESXi 4.0
- VMware ESXi 4.1
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.5 (ESXi)

See the ServerProven website for the latest information about the specific versions and service packs supported: http://ibm.com/servers/eserver/serverproven/compat/us/. Click **System x servers**, then **Disk controllers** to see the support matrix. Click the check mark that is associated with the System x server in question to see the details of the operating system support.

Warranty

The SATA MLC Enterprise Value SSDs carry a 1-year, customer-replaceable unit (CRU) limited warranty. When installed on a System x server, these drives assume the system's base warranty and any warranty upgrade.

Solid-state memory cells have an intrinsic, finite number of program/erase cycles that each cell can incur. As a result, each solid state device has a maximum amount of program/erase cycles to which it can be subjected. The warranty for Lenovo solid-state drives (SSDs) is limited to drives that have not reached the maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the SSD product. A drive that reaches this limit may fail to operate according to its Specifications.

Physical specifications

The 3.5-inch MLC HS Enterprise Value SSDs have the following physical specifications.

Dimensions and weight (approximate, without a 3.5-inch tray):

- Height: 7 mm (0.3 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 73 g (0.2 lb)

Shipping dimensions and weight (approximate):

- Height: 95 mm (3.7 in.)
- Width: 257 mm (10.1 in.)
- Depth: 193 mm (7.6 in.)
- Weight: 484 g (1.1 lb)

The 2.5-inch MLC HS and SS Enterprise Value SSDs have the following physical specifications.

Dimensions and weight (approximate):

- Height: 7 mm (0.3 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 73 g (0.2 lb)

Shipping dimensions and weight (approximate):

- Height: 63 mm (2.5 in.)
- Width: 174 mm (6.85 in.)
- Depth: 133 mm (5.2 in.)
- Weight: 440 g (1.0 lb)

The 1.8-inch MLC Enterprise Value SSDs have the following physical specifications.

Dimensions and weight (approximate):

- Height: 5 mm (0.2 in.)
- Width: 54 mm (2.1 in.)
- Depth: 79 mm (3.1 in.)
- Weight: 45 g (0.1 lb)

Shipping dimensions and weight (approximate):

- Height: 32 mm (1.3 in.)
- Width: 226 mm (8.9 in.)
- Depth: 150 mm (5.9 in.)
- Weight: 400 g (0.9 lb)

Operating environment

The MLC Enterprise Value SSDs are supported in the following environment:

- Temperature: 0 - 70 °C (32 - 158°F) at 0 - 914 m (0 - 3,000 ft)
- Relative humidity: 8 - 85% (noncondensing)
- Maximum altitude: 3,050 m (10,000 ft)

Agency approvals

The drives conform to the following regulations:

- UL
- CSA
- TUV
- CE Mark
- C-Tick Mark
- IEC
- Taiwan (BSMI Certification)
- Korea EMI
- EMC
- FCC
- VCCI

Related publications

For more information see the following documents:

- US Announcement Letter for 128 GB and 256 GB 1.8-inch SSDs
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-228
- US Announcement Letter for 3.5-inch SSDs
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-211
- US Announcement Letter for 128 GB and 256 GB 2.5-inch SSDs
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-013
- US Announcement Letter for 64 GB and 512 GB 1.8-inch and 2.5-inch SSDs
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-125
- Lenovo Press Product Guides for System x servers, switches and options
  http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat
- Lenovo Press Product Guides for Flex System servers, switches and options
  http://www.redbooks.ibm.com/portals/flexsystem?Open&page=pgbycat
- Lenovo Press Product Guides for BladeCenter servers, switches and options
  http://www.redbooks.ibm.com/portals/bladecenter?Open&page=pgbycat
- *ServeRAID Adapter Quick Reference*
  http://www.redbooks.ibm.com/abstracts/tips0054.html
- *System x Configuration and Options Guide*
  http://www.ibm.com/systems/xbc/cog/

Related product families

Product families related to this document are the following:

- Drives

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION ”AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This document, TIPS0879, was created or updated on February 2, 2015.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
  https://lenovopress.lenovo.com/TIPS0879
- Send your comments in an e-mail to:
  comments@lenovopress.com

This document is available online at https://lenovopress.lenovo.com/TIPS0879.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at https://www.lenovo.com/us/en/legal/copytrade/.

The following terms are trademarks of Lenovo in the United States, other countries, or both:
Lenovo®
BladeCenter®
Flex System
NeXtScale
ServeRAID
ServerProven®
System x®
eXFlash
iDataPlex®

The following terms are trademarks of other companies:

Intel® is a trademark of Intel Corporation or its subsidiaries.

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Microsoft®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.