



Intel S3520 Enterprise Entry SATA SSD Product Guide

The S3520 Enterprise Entry SATA solid-state drives (SSDs) for Lenovo servers use Intel 3D NAND flash memory technology with a SATA 6Gbps interface to provide an affordable solution with industry leading performance. Compared with the Intel S3510 series, these new drives offer significantly improved endurance and lower power consumption. The S3520 SSDs are optimized for read-intensive applications such as boot, web servers, lower data rate operational databases and analytics.

The S3520 is shown in the following figure.



Figure 1. Intel S3520 Enterprise Entry SATA SSD in a 2.5-inch hot-swap form factor

Did you know?

By combining the latest MLC NAND flash memory technology with Intel's latest controller technology, the design of the S3520 Enterprise Entry SATA SSDs delivers consistent performance, reduced power consumption, and end-to-end data protection, as well as being optimized for IOPS/watt and cost/IOPS.

Rigorous testing of S3520 Enterprise Entry SATA SSDs by Lenovo through the ServerProven program assures a high degree of storage subsystem compatibility and reliability. Providing additional peace of mind, these drives are covered under Lenovo warranty.

Part number information

The following table lists the System x part numbers and feature codes.

Table 1. System x ordering information

Part number	Feature	Description
2.5-inch hot-swap drives - System x		
01GR802	AXGD	Intel S3520 1.2TB Enterprise Entry SATA G3HS 2.5" SSD
01GR817	AXGF	Intel S3520 1.6TB Enterprise Entry SATA G3HS 2.5" SSD
3.5-inch hot-swap drives - System x		
01GR807	AXGE	Intel S3520 1.2TB Enterprise Entry SATA HS 3.5" SSD
01GR822	AXGG	Intel S3520 1.6TB Enterprise Entry SATA HS 3.5" SSD

The part numbers include the following items:

- One SSD (hot-swap drives have a hot-swap tray attached to the drive)
- Support flyer for SSDs
- Warranty flyer and Important Notices document

Features

The Intel S3520 Enterprise Entry SATA SSDs have the following features:

- Industry standard 2.5-inch or 3.5-inch form factors
- Cost-effective Intel 3D Multi-Level Cell (MLC) NAND flash memory
- Endurance of 1.0 drive writes per day (DWPD) for 5 years, using Intel Standard Endurance Technology (SET).
- SATA MLC solid-state drive with high read performance and consistently low latencies to fulfill client needs in the enterprise space
- High reliability and enhanced ruggedness
- Energy savings, with 3.5 W typical power consumption per drive
- Absence of moving parts to reduce potential failure points in the server
- S.M.A.R.T. support
- Advanced Encrypting Standard (AES) 256-bit encryption
- Full end-to-end data path protection
- Thermal throttling to extend the life of the drive
- Enhanced power loss data protection

SSDs have a huge but finite number of program/erase (P/E) cycles, which affect how long they can perform write operations and thus their life expectancy. Enterprise Entry SSDs typically have a better cost per read IOPS ratio but lower endurance and performance compared to Enterprise Performance SSDs. SSD write endurance is typically measured by the number of program/erase cycles that the drive can incur over its lifetime, which is listed as total bytes written (TBW) in the device specification.

The TBW value that is assigned to a solid-state device is the total bytes of written data that a drive can be guaranteed to complete. Reaching this limit does not cause the drive to immediately fail; the TBW simply denotes the maximum number of writes that can be guaranteed. A solid-state device does *not* fail upon reaching the specified TBW. However, at some point after surpassing the TBW value (and based on manufacturing variance margins), the drive reaches the end-of-life point, at which time the drive goes into read-only mode. Because of such behavior, careful planning must be done to use SSDs in the application environments to ensure that the TBW of the drive is not exceeded before the required life expectancy.

For example, the Intel S3520 480 GB drive has an endurance of 945 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 518 GB of writes per day, which is equivalent to 1.1 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 863 GB of writes per day, which is equivalent to 1.8 full drive writes per day.

Technical specifications

The following table presents technical specifications for the Intel S3520 Enterprise Entry SATA SSDs.

Table 3. Technical specifications

Feature	240 GB drive	480 GB drive	800 GB drive	960 GB drive	1.2 TB drive	1.6 TB drive
Interface	6 Gbps SATA					
Capacity	240 GB	480 GB	800 GB	960 GB	1.2 TB	1.6 TB
Endurance (drive writes per day)	1.4 DWPD	1.1 DWPD	1.1 DWPD	1.0 DWPD	1.1 DWPD	1.0 DWPD
Endurance (total bytes written)	599 TB	945 TB	1663 TB	1750 TB	2455 TB	2925 TB
Data reliability	< 1 in 10 ¹⁷ bits read					
MTBF	2,000,000 hours					
IOPS reads (4 KB blocks)	67,500	67,500	65,500	67,500	67,500	67,500
IOPS writes (4 KB blocks)	17,000	17,000	17,000	17,000	17,500	17,000
Sequential read rate (128 KB blocks)	450 MBps					
Sequential write rate (128 KB blocks)	380 MBps					
Read latency (seq)	40 µs					
Write latency (seq)	42 µs					
Shock, operating	1,000 G (Max) at 0.5 ms					
Vibration, operating	2.17 G _{RMS} (5-700 Hz)					
Vibration, non-operating	3.13 G _{RMS} (5-700 Hz)					
Typical power	3.5 W					

Server support - System x

The following tables list the System x servers that are compatible.

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 v4)	sd350 (5493)	nx360 M5 WCT (5467, E5 v4)
2.5-inch hot-swap drives - System x									
01GR802	Intel S3520 1.2TB Enterprise Entry SATA G3HS 2.5" SSD	Y	Y	Y	Y	Y	Y	Y	N
01GR817	Intel S3520 1.6TB Enterprise Entry SATA G3HS 2.5" SSD	Y	Y	Y	Y	Y	Y	Y	N
3.5-inch hot-swap drives - System x									
01GR807	Intel S3520 1.2TB Enterprise Entry SATA HS 3.5" SSD	Y	Y	Y	Y	N	N	N	N
01GR822	Intel S3520 1.6TB Enterprise Entry SATA HS 3.5" SSD	Y	Y	Y	Y	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)
2.5-inch hot-swap drives - System x								
01GR802	Intel S3520 1.2TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	Y	Y
01GR817	Intel S3520 1.6TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	Y	Y
3.5-inch hot-swap drives - System x								
01GR807	Intel S3520 1.2TB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N
01GR822	Intel S3520 1.6TB Enterprise Entry SATA HS 3.5" SSD	N	N	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)
2.5-inch hot-swap drives - System x									
01GR802	Intel S3520 1.2TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	N	N	Y
01GR817	Intel S3520 1.6TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	N	N	Y
3.5-inch hot-swap drives - System x									
01GR807	Intel S3520 1.2TB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N	N
01GR822	Intel S3520 1.6TB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N	N

Server support - Flex System

The following table lists the compatibility information for Flex System servers.

Table 7. Support for Flex System servers

Part number	Description	x240 (8737, E5-2600 v2)	x240 (7162)	x240 M5 (9532)	x440 (7167)	x880/x480/x280 X6 (7903)	x280/x480/x880 X6 (7196)	Storage Expansion Node
01GR802	Intel S3520 1.2 TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	N	N
01GR817	Intel S3520 1.6 TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	N	N

Storage controller support

The S3520 Enterprise Entry SATA SSDs require a supported disk controller. The following table lists the controllers and the servers that support those controllers.

ThinkSystem controllers and servers are listed in the following table.

Table 8. ThinkSystem server support

Part number	Description													
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR850 (7X18/7X19)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SN550 (7X16)	SN850 (7X15)
None	Onboard RSTe SATA controller	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	Y
7Y37A01088	430-8i SAS/SATA 12Gb HBA	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	
7Y37A01089	430-16i SAS/SATA 12Gb HBA	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	
7Y37A01082	RAID 530-8i PCIe 12Gb Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	
7Y37A01083	RAID 730-8i 1GB Cache PCIe 12Gb Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	
7Y37A01084	RAID 930-8i 2GB Flash PCIe 12Gb Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	
7Y37A01085	RAID 930-16i 4GB Flash PCIe 12Gb Adapter	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	
Feature AUJK	SD530 HW RAID Kit	N	N	N	N	N	N	N	N	N	Y	N	N	
7M27A03918	RAID 530-4i 2 Drive Adapter Kit for SN550	N	N	N	N	N	N	N	N	N	N	Y	N	
7M17A03932	RAID 530-4i 4 Drive Adapter Kit for SN850	N	N	N	N	N	N	N	N	N	N	N	Y	

System x, NeXtScale and Flex System controllers and servers are listed in the following table.

Table 9. Controllers for supported servers

Part number	Description	v3		Xeon v4				FS	
		x3850 X6/x3950 X6 (6241, E7 v3)	nx360 M5 (5465, E5-2600 v3)	x3550 M5 (8869)	x3650 M5 (8871)	x3850 X6/x3950 X6 (6241, E7 v4)	nx360 M5 (5465, E5-2600 v4)	sd350 (5493)	x240 M5 (9532)
Onboard	ServeRAID M1200e Controller	N	N	N	N	N	N	N	Y
46C9114	ServeRAID M1215 Controller	N	Y	Y	Y	N	Y	N	N
46C9110	ServeRAID M5210 Controller	Y	Y	Y	Y	Y	Y	N	N
00JX142	ServeRAID M5215 Controller	N	N	N	N	N	N	N	Y
00YD430	H701-L 6Gb HBA Mezz Card	N	N	N	N	N	N	Y	N
47C8675	N2215 SAS/SATA HBA	Y	Y	Y	Y	Y	Y	N	N

The following table list the ThinkServer controllers that support these solid-state drives installed in a supported server.

Table 10. Supported controllers - ThinkServer

		TS450	TD350	RD350	RD450	RD550	RD650
4XB0F28691	AnyRAID 510i	N	Y	N	Y	Y	Y
4XB0F28693	AnyRAID 720i	N	Y	N	Y	Y	Y
4XB0F28694	AnyRAID 720ix	N	Y	N	Y	Y	Y
4XC0G88834	RAID 500	N	N	Y	Y	N	N
4XC0G88850	RAID 520i	Y	Y	Y	Y	Y	Y
4XC0G88836	RAID 710	N	N	Y	Y	N	N
4XC0G88849	RAID 720i	Y	Y	Y	Y	Y	Y

Operating system support

SSDs 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 2008 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- 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
- Red Hat Enterprise Linux 7
- 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
- SUSE LINUX Enterprise Server 12
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.5 (ESXi)
- VMware vSphere 6.0 (ESXi)
- VMware vSphere 6.5 (ESXi)

Note: The controllers that support the SSDs do not necessarily support all the operating systems listed. Check ServerProven for the latest operating system compatibility for these controllers.

<http://www.lenovo.com/us/en/serverproven/>

Warranty

The Intel S3520 Enterprise Entry SATA SSDs carry a one-year, customer-replaceable unit (CRU) limited warranty. When the SSDs are installed in a supported server, these drives assume the servers's base warranty and any warranty upgrades.

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 drives have the following physical specifications (approximate, without the tray):

- Height: 7 mm (0.3 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 66 g (0.15 lb)

Shipping dimensions and weight - 2.5-inch drives (approximate, including the tray):

- Height: 63 mm (2.5 in.)
- Width: 174 mm (6.9 in.)
- Depth: 133 mm (5.2 in.)
- Weight: 434 g (1.0 lb)

Shipping dimensions and weight - 3.5-inch drives (approximate, including the tray):

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

Operating environment

The SSDs are supported in the following environment:

- Temperature: 0 - 70°C (32 - 158°F)
- Relative humidity: 5 - 95% (noncondensing)
- Maximum altitude: 3,050 m (10,000 ft)

Agency approvals

The Intel S3520 Enterprise Entry SATA SSDs conform to the following regulations:

- FCC Title 47, Part 15B, Class B
- CA/CSA-CEI/IEC CISPR 22:02
- EN 55024: 1998
- EN 55022: 2006
- EN-60950-1 2nd Edition
- UL/CSA EN-60950-1 2nd Edition
- Low Voltage Directive 2006/95/EC
- C-Tick: AS/NZS3584
- BSMI: CNS 13438
- KCC Article 11.1
- RoHS DIRECTIVE 2011/65/EU
- WEEE Directive 2002/96/EC

Related publications and links

For more information, see the following documents:

- Lenovo ThinkSystem storage options product web page
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- Lenovo System x storage options product web page
<https://www.lenovo.com/us/en/data-center/servers/server-options/system-x-options/server-storage/c/system-x-storage>
- Intel SSD Data Center S3520 Series product page
<http://www.intel.com/content/www/us/en/solid-state-drives/solid-state-drives-dc-s3520-series.html>
- ServerProven for SSDs
<http://static.lenovo.com/us/en/serverproven/xseries/storage/hssdmatrix.shtml>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>
- Lenovo RAID Management Tools and Resources
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- ServeRAID Adapter Quick Reference
<http://lenovopress.com/tips0054>

Related product families

Product families related to this document are the following:

- [Drives](#)

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