

Intel S4500 Entry SATA 6Gb SSDs Product Guide

The Intel S4500 Entry SATA solid-state drives (SSDs) for Lenovo servers use Intel 3D NAND TLC Flash Memory technology with a 6Gbps SATA interface to provide an affordable solution with industry leading performance. Compared with the Intel S3520 series, these new drives offer improved performance and lower latency. The S4500 SSDs are optimized for read-intensive applications such as boot, web servers, lower data rate operational databases and analytics.



Figure 1. Intel S4500 Entry SATA SSD (without the hot-swap drive tray)

Did you know?

By combining the latest Intel 3D NAND TLC Flash Memory technology with Intel's latest controller technology, the design of the S4500 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 S4500 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 ordering information for drives for System x, NeXtScale and Flex System servers.

Table 1. Ordering information for System x

Part number	Feature	Description
2.5-inch drives with G3HS hot-swap tray		
7SD7A05732	B0Z8	Intel S4500 240GB Enterprise Entry SATA G3HS 2.5" SSD
7SD7A05730	B0ZA	Intel S4500 960GB Enterprise Entry SATA G3HS 2.5" SSD
4XB7A08493	B0ZB	Intel S4500 1.92TB Enterprise Entry SATA G3HS 2.5" SSD
3.5-inch drives with hot-swap tray		
7SD7A05729	B0ZD	Intel S4500 240GB Enterprise Entry SATA HS 3.5" SSD
7SD7A05727	B0ZF	Intel S4500 960GB Enterprise Entry SATA HS 3.5" SSD
4XB7A08495	B0ZG	Intel S4500 1.92TB Enterprise Entry SATA HS 3.5" SSD

The following table lists the ordering information for drives for ThinkServer systems.

Table 2. Ordering information for ThinkServer systems

Part number	Description
2.5-inch drives with hot-swap tray	
4XB0N68504	Lenovo ThinkServer Gen 5 2.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68505	Lenovo ThinkServer Gen 5 2.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68506	Lenovo ThinkServer Gen 5 2.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68510	Lenovo ThinkServer 2.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series
4XB0N68511	Lenovo ThinkServer 2.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series
4XB0N68512	Lenovo ThinkServer 2.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series
3.5-inch drives with hot-swap tray	
4XB0N68507	Lenovo ThinkServer Gen 5 3.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68508	Lenovo ThinkServer Gen 5 3.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68509	Lenovo ThinkServer Gen 5 3.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD
4XB0N68513	Lenovo ThinkServer 3.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series
4XB0N68514	Lenovo ThinkServer 3.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series
4XB0N68515	Lenovo ThinkServer 3.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series
2.5-inch drives in a 3.5-inch non-hot-swap tray for TS150	
4XB0N68516	Lenovo ThinkServer TS150 2.5" S4500 240GB Entry SATA 6Gbps SSD with 3.5" Tray
4XB0N68517	Lenovo ThinkServer TS150 2.5" S4500 480GB Entry SATA 6Gbps SSD with 3.5" Tray
4XB0N68518	Lenovo ThinkServer TS150 2.5" S4500 960GB Entry SATA 6Gbps SSD with 3.5" Tray

Features

The Intel S4500 Entry SATA SSDs have the following features:

- 2.5-inch or 3.5-inch form factors
- Cost-effective Intel 3D NAND TLC Flash Memory
- Endurance of 1 drive writes per day (DWPD) for 5 years, using Intel Standard Endurance Technology (SET).
- SATA TLC 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 5.6 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 S4500 Entry 960 GB drive has an endurance of 1,860 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 1,019 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 1,699 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 S4500 Entry SATA SSDs.

Table 3. Technical specifications

Feature	240 GB drive	480 GB drive	960 GB drive	1.92 TB drive	3.84 TB drive
Interface	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA
Capacity	240 GB	480 GB	960 GB	1.92 TB	3.84 TB
Endurance (drive writes per day)	1.42 DWPD	1.03 DWPD	1.06 DWPD	1.06 DWPD	1.09 DWPD
Endurance (total bytes written)	620 TB	900 TB	1.86 PB	3.27 PB	7.64 PB
Data reliability	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read
MTBF	2,000,000 hours	2,000,000 hours	2,000,000 hours	2,000,000 hours	2,000,000 hours
IOPS reads (4 KB blocks)	69,000	72,000	72,000	72,000	72,000
IOPS writes (4 KB blocks)	16,000	20,000	30,000	33,500	33,000
Sequential read rate (128 KB blocks)	500 MBps	500 MBps	500 MBps	500 MBps	500 MBps
Sequential write rate (128 KB blocks)	190 MBps	330 MBps	490 MBps	490 MBps	470 MBps
Read latency (seq)	36 µs	36 µs	36 µs	36 µs	36 µs
Write latency (seq)	36 µs	36 µs	36 µs	36 µs	36 µs
Shock, operating	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms
Vibration, operating	2.17 G _{RMS} (5-700 Hz)	2.17 G _{RMS} (5-700 Hz)	2.17 G _{RMS} (5-700 Hz)	2.17 G _{RMS} (5-700 Hz)	2.17 G _{RMS} (5-700 Hz)
Vibration, non-operating	3.13 G _{RMS} (5-800 Hz)	3.13 G _{RMS} (5-800 Hz)	3.13 G _{RMS} (5-800 Hz)	3.13 G _{RMS} (5-800 Hz)	3.13 G _{RMS} (5-800 Hz)
Typical power (Active Write Avg)	2.6 W	3.6 W	4.8 W	5.0 W	5.6 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, E5-2600 v4)	sd350 (5493)	nx360 M5 WCT (5467, E5-2600 v4)
2.5-inch drives with G3HS hot-swap tray									
7SD7A05732	Intel S4500 240GB Enterprise Entry SATA G3HS 2.5" SSD	Y	N	Y	Y	Y	Y	Y	N
7SD7A05730	Intel S4500 960GB Enterprise Entry SATA G3HS 2.5" SSD	Y	N	Y	Y	Y	Y	Y	N
4XB7A08493	Intel S4500 1.92TB Enterprise Entry SATA G3HS 2.5" SSD	Y	N	Y	Y	Y	Y	Y	N
3.5-inch drives with hot-swap tray									
7SD7A05729	Intel S4500 240GB Enterprise Entry SATA HS 3.5" SSD	Y	N	Y	Y	N	N	N	N
7SD7A05727	Intel S4500 960GB Enterprise Entry SATA HS 3.5" SSD	Y	N	Y	Y	N	N	N	N
4XB7A08495	Intel S4500 1.92TB Enterprise Entry SATA HS 3.5" SSD	Y	N	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 drives with G3HS hot-swap tray								
7SD7A05732	Intel S4500 240GB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	Y	Y
7SD7A05730	Intel S4500 960GB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	Y	Y
4XB7A08493	Intel S4500 1.92TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	N	N	N	Y	Y
3.5-inch drives with hot-swap tray								
7SD7A05729	Intel S4500 240GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N
7SD7A05727	Intel S4500 960GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N
4XB7A08495	Intel S4500 1.92TB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N

Server support - ThinkServer

The following tables list the ThinkServer systems that are compatible.

Support for ThinkServer systems with E5 v4 or E3 v6 processors

Support for sd350: The drives supported with the sd350 are listed in [System x table](#).

Table 6. Support for ThinkServer Generation 5 servers with E5 v4 or E3 v6 processors

Part number	Description	E5 v4					E3 v6		
		TD350 (E5 v4)	RD350 (E5 v4)	RD450 (E5 v4)	RD550 (E5 v4)	RD650 (E5 v4)	TS150 (E3 v6)	TS460 (E3 v6)	RS160 (E3 v6)
2.5-inch drives with hot-swap tray									
4XB0N68504	LTS Gen 5 2.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68505	LTS Gen 5 2.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68506	LTS Gen 5 2.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68510	LTS 2.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
4XB0N68511	LTS 2.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
4XB0N68512	LTS 2.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
3.5-inch drives with hot-swap tray									
4XB0N68507	LTS Gen 5 3.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68508	LTS Gen 5 3.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68509	LTS Gen 5 3.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	Y	Y	N	Y	N
4XB0N68513	LTS 3.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
4XB0N68514	LTS 3.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
4XB0N68515	LTS 3.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	Y
4XB0N68516	LTS TS150 2.5" S4500 240GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	Y	N	N
4XB0N68517	LTS TS150 2.5" S4500 480GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	Y	N	N
4XB0N68518	LTS TS150 2.5" S4500 960GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	Y	N	N

Support for ThinkServer systems with E5 v3 and E3 v5 processors

Table 7. Support for ThinkServer systems with E5 v3 and E3 v5 processors

Part number	Description	E5 v3						E3 v5			
		TD350 (E5 v3)	RD350 (E5 v3)	RD450 (E5 v3)	RD550 (E5 v3)	RD650 (E5 v3)	RQ750 (E5 v3)	TS150 (E3 v5)	TS450 (E3 v5)	TS460 (E3 v5)	RS160 (E3 v5)
2.5-inch drives with hot-swap tray											
4XB0N68504	LTS Gen 5 2.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68505	LTS Gen 5 2.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68506	LTS Gen 5 2.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68510	LTS 2.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
4XB0N68511	LTS 2.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
4XB0N68512	LTS 2.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
3.5-inch drives with hot-swap tray											
4XB0N68507	LTS Gen 5 3.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68508	LTS Gen 5 3.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68509	LTS Gen 5 3.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB0N68513	LTS 3.5" S4500 240GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
4XB0N68514	LTS 3.5" S4500 480GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
4XB0N68515	LTS 3.5" S4500 960GB Enterprise Entry SATA 6Gbps SSD for RS-Series	N	N	N	N	N	N	N	N	N	N
4XB0N68516	LTS TS150 2.5" S4500 240GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	N	N	N	N	N
4XB0N68517	LTS TS150 2.5" S4500 480GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	N	N	N	N	N
4XB0N68518	LTS TS150 2.5" S4500 960GB Entry SATA 6Gbps SSD with 3.5" Tray	N	N	N	N	N	N	N	N	N	N

Server support - Flex System

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

Tip: For the ThinkSystem SN550 and SN850, see the [ThinkSystem table](#).

Table 8. Support for Flex System servers

Part number	Description	x240 (8737, E5-2600 v2)	x240 (7162)	x240 M5 (9532, E5 v3)	x240 M5 (9532, E5 v4)	x440 (7167)	x880/x480/x280 X6 (7903)	x280/x480/x880 X6 (7196)	Storage Expansion Node
7SD7A05732	Intel S4500 240GB Enterprise Entry SATA G3HS 2.5" SSD	N	N	Y	Y	N	N	N	N
7SD7A05730	Intel S4500 960GB Enterprise Entry SATA G3HS 2.5" SSD	N	N	Y	Y	N	N	N	N
4XB7A08493	Intel S4500 1.92TB Enterprise Entry SATA G3HS 2.5" SSD	N	N	Y	Y	N	N	N	N
7SD7A05729	Intel S4500 240GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N	N
7SD7A05727	Intel S4500 960GB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N	N
4XB7A08495	Intel S4500 1.92TB Enterprise Entry SATA HS 3.5" SSD	N	N	N	N	N	N	N	N

Operating system support

SSDs operate transparently to users, storage systems, applications, databases, and operating systems.

Operating system support is based on the controller used to connect to the drives. Consult the controller product guide for more information:

- RAID controllers: <https://lenovopress.com/servers/options/raid>
- SAS HBAs: <https://lenovopress.com/servers/options/hba>

Warranty

The Intel S4500 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: 63 g (2.2 oz lb) (66 g for the 1.92 TB and 3.84 TB drives)

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 S4500 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://www3.lenovo.com/us/en/data-center/servers/server-options/system-x-options/server-storage/c/system-x-storage>
- Intel SSD Data Center S4500 Series product page
<https://www.intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/dc-s4500-series.html>
- ServerProven for SSDs
<http://static.lenovo.com/us/en/serverproven/xseries/storage/hssdmatrix.shtml>
- Lenovo Press product guides for RAID controllers
<https://lenovopress.com/servers/options/raid>
- 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>

Related product families

Product families related to this document are the following:

- [Drives](#)

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