

ThinkSystem Intel S4510 Entry SATA 6Gb SSDs

Product Guide

The Intel S4510 Entry SATA solid-state drives (SSDs) for Lenovo servers use Intel 64-layer 3D NAND TLC Flash Memory technology with a 6Gbps SATA interface to provide an affordable solution with industry leading performance. Compared with the Intel S4500 series, these new drives offer improved performance and significantly improved endurance. The S4510 SSDs are optimized for read-intensive applications such as boot, web servers, lower data rate operational databases and analytics.



Figure 1. ThinkSystem Intel S4510 Entry SATA 6Gb 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 S4510 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 S4510 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 ThinkSystem servers.

Table 1. Ordering information

Part number	Feature	Description
2.5-inch drives with hot-swap tray		
4XB7A10247	B498	ThinkSystem 2.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD
4XB7A10248	B499	ThinkSystem 2.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD
4XB7A10249	B49A	ThinkSystem 2.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD
4XB7A13622	B49B	ThinkSystem 2.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD
4XB7A13623	B49C	ThinkSystem 2.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD
4XB7A13624	B96X	ThinkSystem 2.5" Intel S4510 7.68TB Entry SATA 6Gb Hot Swap SSD
7mm 2.5-inch drives with hot-swap tray		
4XB7A38152	B96Q	ThinkSystem 7mm Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD
4XB7A38153	B96S	ThinkSystem 7mm Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD
4XB7A38154	B96R	ThinkSystem 7mm Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD
3.5-inch drives with hot-swap tray		
4XB7A13625	B49D	ThinkSystem 3.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD
4XB7A13626	B49E	ThinkSystem 3.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD
4XB7A13627	B49F	ThinkSystem 3.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD
4XB7A13628	B49G	ThinkSystem 3.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD
4XB7A13629	B49H	ThinkSystem 3.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD
2.5-inch drives for ThinkSystem SD650		
4XB7A13666	B49J	ThinkSystem SD650 2.5" Intel S4510 240GB Entry SATA Hot Swap SSD
4XB7A13667	B49K	ThinkSystem SD650 2.5" Intel S4510 480GB Entry SATA Hot Swap SSD
3.5-inch drives for ThinkSystem ST50		
4XB7A14914	B4N4	ThinkSystem ST50 3.5" Intel S4510 240GB Entry SATA 6Gb Non Hot Swap SSD
4XB7A14915	B4N5	ThinkSystem ST50 3.5" Intel S4510 480GB Entry SATA 6Gb Non Hot Swap SSD
4XB7A14916	B4N6	ThinkSystem ST50 3.5" Intel S4510 960GB Entry SATA 6Gb Non Hot Swap SSD

Features

The Intel S4510 Entry SATA SSDs have the following features:

- 2.5-inch drives in multiple form factors:
 - 2.5-inch SFF hot-swap tray
 - 3.5-inch LFF hot-swap tray
 - 7mm hot-swap tray
 - Tray-less for SD650
 - 3.5-inch LFF non-hot-swap tray for ST50
- Cost-effective Intel 3D NAND TLC Flash Memory
- Endurance of up to 2 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 typical write power consumption as low as 2.4 W 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 S4510 960 GB drive has an endurance of 3.4 PB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 1,863 GB of writes per day, which is equivalent to 1.9 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 3,105 GB of writes per day, which is equivalent to 3.2 full drive writes per day.

Technical specifications

The following table presents technical specifications for the Intel S4510 Entry SATA SSDs.

Table 2. Technical specifications

Feature	240 GB drive	480 GB drive	960 GB drive	1.92 TB drive	3.84 TB drive	7.68 TB drive
Interface	6 Gbps SATA	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	7.68 TB
Endurance (drive writes per day)	2.1 DWPD	1.4 DWPD	1.9 DWPD	2.0 DWPD	1.9 DWPD	1.9 DWPD
Endurance (total bytes written)	900 TB	1.2 PB	3.4 PB	7.1 PB	13.1 PB	26.2 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	< 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	2,000,000 hours
IOPS reads (4 KB blocks)	90,000	95,000	95,000	97,000	97,000	89,500
IOPS writes (4 KB blocks)	16,000	18,000	36,000	35,500	32,000	21,000
Sequential read rate (128 KB blocks)	560 MBps	560 MBps	560 MBps	560 MBps	560 MBps	550 MBps
Sequential write rate (128 KB blocks)	280 MBps	490 MBps	510 MBps	510 MBps	510 MBps	510 MBps
Read latency (sequential)	36 µs	36 µs	36 µs	36 µs	36 µs	35 µs
Write latency (sequential)	37 µs	37 µs	37 µs	37 µs	37 µs	40 µs
Read latency (random)	103 µs	103 µs	103 µs	103 µs	103 µs	102 µs
Write latency (random)	62 µs	73 µs	54 µs	54 µs	59 µs	79 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	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)	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)	3.13 G _{RMS} (5-800 Hz)
Typical power (Active Write Avg)	2.4 W	3.0 W	3.0 W	3.2 W	3.6 W	4.6 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 2)

Part Number	Description	E	1S Intel				2S Intel							AMD				
		SE350 (7Z46 / 7D1X)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y51 / 7Y52)	ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)
2.5-inch drives with hot-swap tray																		
4XB7A10247	ThinkSystem 2.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
4XB7A10248	ThinkSystem 2.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
4XB7A10249	ThinkSystem 2.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
4XB7A13622	ThinkSystem 2.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
4XB7A13623	ThinkSystem 2.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
4XB7A13624	ThinkSystem 2.5" Intel S4510 7.68TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
7mm 2.5-inch drives with hot-swap tray																		
4XB7A38152	ThinkSystem 7mm Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A38153	ThinkSystem 7mm Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A38154	ThinkSystem 7mm Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3.5-inch drives with hot-swap tray																		
4XB7A13625	ThinkSystem 3.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
4XB7A13626	ThinkSystem 3.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
4XB7A13627	ThinkSystem 3.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
4XB7A13628	ThinkSystem 3.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
4XB7A13629	ThinkSystem 3.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
2.5-inch drives for ThinkSystem SD650																		
4XB7A13666	ThinkSystem Intel S4510 2.5" 7mm 240GB Entry SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Part Number	Description	E	1S Intel				2S Intel						AMD					
		SE350 (7Z46 / 7D1X)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y51 / 7Y52)	ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)
4XB7A13667	ThinkSystem Intel S4510 2.5" 7mm 480GB Entry SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3.5-inch drives for ThinkSystem ST50																		
4XB7A14914	ThinkSystem ST50 3.5" Intel S4510 240GB Entry SATA 6Gb Non Hot Swap SSD	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A14915	ThinkSystem ST50 3.5" Intel S4510 480GB Entry SATA 6Gb Non Hot Swap SSD	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A14916	ThinkSystem ST50 3.5" Intel S4510 960GB Entry SATA 6Gb Non Hot Swap SSD	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 4. Server support (Part 2 of 2)

Part Number	Description	4S		8S	4S V2		Dense/Blade				
		SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	SR950 (7X11 / 7X12)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
2.5-inch drives with hot-swap tray											
4XB7A10247	ThinkSystem 2.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A10248	ThinkSystem 2.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A10249	ThinkSystem 2.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13622	ThinkSystem 2.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13623	ThinkSystem 2.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13624	ThinkSystem 2.5" Intel S4510 7.68TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	Y	Y	N	N	N	N
7mm 2.5-inch drives with hot-swap tray											

Part Number	Description	4S		8S	4S V2		Dense/Blade				
		SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	SR950 (7X11 / 7X12)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XB7A38152	ThinkSystem 7mm Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	Y	Y	N	N	N	N
4XB7A38153	ThinkSystem 7mm Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	Y	Y	N	N	N	N
4XB7A38154	ThinkSystem 7mm Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	Y	Y	N	N	N	N
3.5-inch drives with hot-swap tray											
4XB7A13625	ThinkSystem 3.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A13626	ThinkSystem 3.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A13627	ThinkSystem 3.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A13628	ThinkSystem 3.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A13629	ThinkSystem 3.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
2.5-inch drives for ThinkSystem SD650											
4XB7A13666	ThinkSystem Intel S4510 2.5" 7mm 240GB Entry SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	Y	N	N
4XB7A13667	ThinkSystem Intel S4510 2.5" 7mm 480GB Entry SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	Y	N	N
3.5-inch drives for ThinkSystem ST50											
4XB7A14914	ThinkSystem ST50 3.5" Intel S4510 240GB Entry SATA 6Gb Non Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A14915	ThinkSystem ST50 3.5" Intel S4510 480GB Entry SATA 6Gb Non Hot Swap SSD	N	N	N	N	N	N	N	N	N	N
4XB7A14916	ThinkSystem ST50 3.5" Intel S4510 960GB Entry SATA 6Gb Non Hot Swap SSD	N	N	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 S4510 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 S4510 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>
- Intel SSD Data Center S4510 Series product page
<https://www.intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/dc-d3-s4510-series.html>
- ServerProven for SSDs
<http://www.lenovo.com/us/en/serverproven>
- 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
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Related product families

Product families related to this document are the following:

- [Drives](#)

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This document, LP0924, was created or updated on February 27, 2021.

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