



ThinkSystem Intel S4610 Mainstream SATA 6Gb SSDs Product Guide

The Intel S4610 Mainstream SATA solid-state drives (SSDs) for Lenovo servers are advanced data center SSDs optimized for mixed read-write performance, endurance and strong data protection. Compared with the Intel S4600 series, these new drives offer improved performance and lower latency.

The Intel SSD S4610 drives with 3 full drives writes per day (DWD) are an excellent choice as cache in transactional application and high-speed storage for enterprise databases.

The Intel S4610 Enterprise Mainstream SATA solid-state drive is shown in the following figure.



Figure 1. ThinkSystem Intel S4610 Mainstream SATA 6Gb SSDs

Did you know?

By combining the Intel 3D NAND TLC Flash Memory technology and Intel's latest controller, the design of Intel S4610 Mainstream SATA SSDs delivers consistent performance, reduced power consumption, and end-to-end data protection, as well as being optimized for endurance and IOPS/watt.

Rigorous testing of Intel S4610 Mainstream SATA SSDs by Lenovo through the ServerProven® program ensures 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 for ThinkSystem

Part number	Feature	Description
2.5-inch hot-swap drives		
4XB7A13633	B49L	ThinkSystem 2.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13634	B49M	ThinkSystem 2.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13635	B49N	ThinkSystem 2.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13636	B49P	ThinkSystem 2.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13637	B49Q	ThinkSystem 2.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD
3.5-inch hot-swap drives		
4XB7A13639	B49R	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13640	B49S	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13641	B49T	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13642	B49U	ThinkSystem 3.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD
4XB7A13643	B49V	ThinkSystem 3.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD
2.5-inch drives for ThinkSystem SD650 (non-hot-swap when used in the SD650)		
4XB7A13670	B49W	ThinkSystem SD650 2.5" Intel S4610 240GB Mainstream SATA Hot Swap SSD
4XB7A13933	B49X	ThinkSystem SD650 2.5" Intel S4610 480GB Mainstream SATA Hot Swap SSD
4XB7A13934	B49Y	ThinkSystem SD650 2.5" Intel S4610 960GB Mainstream SATA Hot Swap SSD
4XB7A13935	B49Z	ThinkSystem SD650 2.5" Intel S4610 1.92TB Mainstream SATA Hot Swap SSD
3.5-inch simple-swap drives		
4XB7A13960	B5Y5	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Simple Swap SSD
4XB7A13961	B5Y6	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Simple Swap SSD
4XB7A13962	B5Y7	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Simple Swap SSD

Features

The Intel S4610 Mainstream SATA SSDs have the following features:

- Industry-standard 2.5-inch or 3.5-inch form factors
- Cost-effective Intel 3D NAND TLC Flash Memory
- Endurance of 3 drive writes per day (DWPD) for 5 years, using Intel High Endurance Technology (HET).
- 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

The key difference between Performance SSDs such as the S3710 SSDs, Mainstream SSDs such as the S4610 SSDs, and Entry SSDs, such as the S4510 SSDs, is their endurance (life expectancy). SSDs have a huge, but finite, number of program/erase (P/E) cycles, which determines how long the drives can perform write operations and thus their life expectancy. Mainstream SSDs have better endurance than the Entry SSDs, but at a higher cost/IOPS ratio.

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 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, but 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 S4610 960 GB drive has an endurance of 6.0 PB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 3,288 GB of writes per day, which is equivalent to 3.4 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 5,479 GB of writes per day, which is equivalent to 5.7 full drive writes per day.

Technical specifications

The following table presents technical specifications for the Intel S4610 Mainstream SATA SSDs.

Table 2. Technical specifications

Feature	240 GB drive	480 GB drive	960 GB drive	1.92 TB drive	3.84 TB drive
Interface	6 Gbps SATA				
Capacity	240 GB	480 GB	960 GB	1.92 TB	3.84 TB
Endurance (drive writes per day)	3.2 DWPD	3.4 DWPD	3.4 DWPD	3.0 DWPD	3.1 DWPD
Endurance (total bytes written)	1.4 PB	3.0 PB	6.0 PB	10.5 PB	22.0
Data reliability	< 1 in 10 ¹⁷ bits read				
MTBF	2,000,000 hours				
IOPS reads (4 KB blocks)	92,000	96,000	96,000	97,000	96,000
IOPS writes (4 KB blocks)	28,000	44,500	51,000	46,500	42,000
Sequential read rate (128 KB blocks)	560 MBps				
Sequential write rate (128 KB blocks)	320 MBps	510 MBps	510 MBps	510 MBps	510 MBps
Read latency (seq)	36 µs				
Write latency (seq)	37 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} (5-800 Hz)				
Typical power (Active Write Avg)	2.4 W	2.9 W	2.7 W	2.8 W	3.0 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. ThinkSystem server support (Part 1)

Part number	Description	Intel 2S								AMD			
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR670 (7Y36/37/38)	SR635 (7Y98/7Y99)	SR655 (7Y00/7Z01)	SR645 (7D2Y/7D2X)	SR665 (7D2W/7D2V)
2.5-inch hot-swap drives													
4XB7A13633	ThinkSystem 2.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
4XB7A13634	ThinkSystem 2.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
4XB7A13635	ThinkSystem 2.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
4XB7A13636	ThinkSystem 2.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
4XB7A13637	ThinkSystem 2.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
3.5-inch hot-swap drives													
4XB7A13639	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
4XB7A13640	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
4XB7A13641	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
4XB7A13642	ThinkSystem 3.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
4XB7A13643	ThinkSystem 3.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
2.5-inch drives for ThinkSystem SD650 (non-hot-swap when used in the SD650)													
4XB7A13670	ThinkSystem Intel S4610 2.5" 7mm 240GB Mainstream SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A13933	ThinkSystem Intel S4610 2.5" 7mm 480GB Mainstream SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A13934	ThinkSystem SD650 2.5" Intel S4610 960GB Mainstream SATA Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A13935	ThinkSystem SD650 2.5" Intel S4610 1.92TB Mainstream SATA Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N
3.5-inch simple-swap drives													
4XB7A13960	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N

Part number	Description	Intel 2S							AMD			
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR670 (7Y36/37/38)	SR635 (7Y98/7Y99)	SR655 (7Y00/7Z01)	SR645 (7D2Y/7D2X)
4XB7A13961	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	N	N	N	N	N	N	N	N
4XB7A13962	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	N	N	N	N	N	N	N	N

Table 4. ThinkSystem server support (Part 2)

Part number	Description	E	1S Intel			4S Intel				Dense/ Blade				
		SE350 (7Z46/7D1X)	ST50 (7Y48/7Y50)	ST250 (7Y45/7Y46)	SR150 (7Y54)	SR250 (7Y51/7Y52)	SR850 (7X18/7X19)	SR850P (7D2F/2D2G)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
2.5-inch hot-swap drives														
4XB7A13633	ThinkSystem 2.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13634	ThinkSystem 2.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13635	ThinkSystem 2.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13636	ThinkSystem 2.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y	Y
4XB7A13637	ThinkSystem 2.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	Y
3.5-inch hot-swap drives														
4XB7A13639	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	N	N	N	N	N	N	N	N
4XB7A13640	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	N	N	N	N	N	N	N	N
4XB7A13641	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	N	N	Y	N	Y	N	N	N	N	N	N	N	N
4XB7A13642	ThinkSystem 3.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A13643	ThinkSystem 3.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N
2.5-inch drives for ThinkSystem SD650 (non-hot-swap when used in the SD650)														

Part number	Description	E	1S Intel				4S Intel				Dense/ Blade			
		SE350 (7Z46/7D1X)	ST50 (7Y48/7Y50)	ST250 (7Y45/7Y46)	SR150 (7Y54)	SR250 (7Y51/7Y52)	SR850 (7X18/7X19)	SR850P (7D2F/2D2G)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XB7A13670	ThinkSystem Intel S4610 2.5" 7mm 240GB Mainstream SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	Y	N	N	
4XB7A13933	ThinkSystem Intel S4610 2.5" 7mm 480GB Mainstream SATA 6Gb Trayless SSD	N	N	N	N	N	N	N	N	N	Y	N	N	
4XB7A13934	ThinkSystem SD650 2.5" Intel S4610 960GB Mainstream SATA Hot Swap SSD	N	N	N	N	N	N	N	N	N	Y	N	N	
4XB7A13935	ThinkSystem SD650 2.5" Intel S4610 1.92TB Mainstream SATA Hot Swap SSD	N	N	N	N	N	N	N	N	N	Y	N	N	
3.5-inch simple-swap drives														
4XB7A13960	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	Y	Y	N	N	N	N	N	N	N	
4XB7A13961	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	Y	Y	N	N	N	N	N	N	N	
4XB7A13962	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Simple Swap SSD	N	N	N	Y	Y	N	N	N	N	N	N	N	

Operating system support

SATA 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 S4610 Mainstream 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 system'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 S4610 Mainstream SATA SSDs have the following physical specifications.

Dimensions and weight (approximate, without drive 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 drives)

Shipping dimensions and weight - 2.5-inch drives (approximate):

- 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):

- 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 S4610 Mainstream SATA SSDs are supported in the following environment:

- Temperature: 0 to 70 °C (32 to 158 °F)
- Temperature (non-operating): -55 to 95 °C (-67 to 203 °F)
- Relative humidity: 5 - 95% (noncondensing)
- Maximum altitude: 3,050 m (10,000 ft)

Agency approvals

The Intel S4610 Mainstream 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 page
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- Intel SSD Data Center S4610 Series product page
<https://www.intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/dc-d3-s4610-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
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>

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.
1009 Think Place - Building One
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.

© Copyright Lenovo 2020. All rights reserved.

This document, LP0925, was created or updated on May 5, 2020.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<http://lenovopress.com/LP0925>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <http://lenovopress.com/LP0925>.

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®

ServerProven®

ThinkSystem

The following terms are trademarks of other companies:

Intel® is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.

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