

ThinkSystem CD8P Read Intensive NVMe PCIe 5.0 SSDs

Product Guide

The ThinkSystem CD8P Read Intensive NVMe PCIe 5.0 SSDs, available in capacities up to 30.72TB, are general-purpose yet high-performance NVMe PCIe Gen 5 SSDs. They are engineered for greater performance and endurance in a cost-effective design, and to support a broader set of workloads. Now with SED encryption as standard, these drives help ensure data security, even when the drive is removed from the server.

The CD8P SSDs are available in either the 2.5-inch hot-swap and EDSFF E3.S hot-swap form factor.

SED support: All drives listed in this product guide include SED drive encryption. Our naming convention for new drives doesn't include SED in the name.



Figure 1. ThinkSystem CD8P Read Intensive NVMe PCIe 5.0 SSDs

Did you know?

The CD8P SSDs are part of the new family of PCIe 5.0 SSDs that match the performance of the ThinkSystem V3 family of servers. By having a Gen 5 host interface, sequential performance is doubled compared to Gen 4 SSDs. The NVMe host interface also maximizes flash storage performance and minimizes latency.

Lenovo Read Intensive SSDs like the CD8P SSDs are suitable for read-intensive and general-purpose data center workloads, however their NVMe PCIe interface means the drives also offer high performance. Overall, these SSDs provide outstanding IOPS/watt and cost/IOPS for enterprise solutions.

Part number information

The following table lists the part numbers and feature codes for ThinkSystem servers.

Table 1. Ordering information

Part number	Feature	Description	Vendor part number
2.5-inch hot-swap drives			
4XB7A93480	C0BB	ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPUG1T92
4XB7A93481	C0BA	ThinkSystem 2.5" U.2 CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPUG3T84
4XB7A93482	C0B9	ThinkSystem 2.5" U.2 CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPUG7T68
4XB7A93483	C0B8	ThinkSystem 2.5" U.2 CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPUG15T3
4XB7A93484	C0B7	ThinkSystem 2.5" U.2 CD8P 30.72TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPUG30T7
E3.S hot-swap drives			
4XB7A93810	C0R2	ThinkSystem E3.S CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPJE1T92
4XB7A93811	C0R3	ThinkSystem E3.S CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPJE3T84
4XB7A93812	C0R4	ThinkSystem E3.S CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPJE7T68
4XB7A93813	C0R5	ThinkSystem E3.S CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	KCD8DPJE15T3

The part numbers include the following items:

- One solid-state drive
- Attached hot-swap tray (for hot-swap drives)
- Documentation flyer

Features

Non-Volatile Memory Express (NVMe) is PCIe high performance SSD technology that provides high I/O throughput and low latency. NVMe interfaces remove SAS/SATA bottlenecks and unleash all of the capabilities of contemporary NAND flash memory. Each of the CD8P SSDs have direct PCIe 5.0 x4 connection, which provides at significantly greater bandwidth and lower latency than SATA/SAS-based SSD solutions. NVMe drives are also optimized for heavy multi-threaded workloads by using internal parallelism and many other improvements, such as enlarged I/O queues.

The ThinkSystem CD8P Read Intensive NVMe PCIe 5.0 SSDs have the following features:

- Based on the Kioxia CD8P-R drives
- Available in two form factors:
 - 15mm 2.5-inch drives in a hot-swap tray
 - E3.S EDSFF drives in a hot-swap tray
- Direct PCIe 5.0 x4 connection for each NVMe drive, resulting in up to 14 GBps overall throughput, compared to 7.5 GBps for a PCIe 4.0 connection.

- Also supports PCIe 4.0 and 3.0 host connection for previous-generation servers
- Based on KIOXIA BiCS FLASH Gen 5 TLC flash memory
- Single-port design, optimized for data center class workloads
- Consistent performance and reliability for demanding 24x7 environments
- Designed for high-density storage deployments
- Power loss protection (PLP) and end-to-end data correction
- Supports Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T).
- SED support for TCG Opal and Ruby SSCs
- Supports the following specifications:
 - PCI Express Base Specification, Revision 5.0, May 28, 2019
 - NVMe Express Specification, Revision 2.0, July 23, 2021
 - NVMe Express Management Interface, Revision 1.1d, March 11, 2021

Read Intensive SSDs and Write Intensive SSDs have similar read IOPS performance, but the key difference between them is their endurance -- how long they can reliably perform write operations. Read Intensive SSDs have a better cost/IOPS ratio but lower endurance compared to Write Intensive SSDs. SSD write endurance is typically measured by the number of program/erase (P/E) write cycles that the drive incurs over its lifetime, listed as the total bytes of written data (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 Read Intensive solid-state drives, careful planning must be done to use them only in read-intensive or mixed up to 70% read/30% write environments to ensure that the TBW of the drive will not be exceeded before the required life expectancy.

For example, the 3.84 TB GB CD8P Read Intensive drive has an endurance of 7,008 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 3,840 GB of writes per day, which is equivalent to 1.0 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 6,400 GB of writes per day, which is equivalent to 1.7 full drive writes per day.

The benefits of drive encryption

All ThinkSystem CD8P Read Intensive NVMe PCIe 5.0 SSDs support drive encryption.

Self-encrypting drives (SEDs) provide benefits in three main ways:

- By encrypting data on-the-fly at the drive level with no performance impact
- By providing instant secure erasure (cryptographic erasure, thereby making the data no longer readable)
- By enabling auto-locking to secure active data if a drive is misplaced or stolen from a system while in use

The following sections describe the benefits in more details.

Automatic encryption

It is vital that a company keep its data secure. With the threat of data loss due to physical theft or improper inventory practices, it is important that the data be encrypted. However, challenges with performance, scalability, and complexity have led IT departments to push back against security policies that require the use of encryption. In addition, encryption has been viewed as risky by those unfamiliar with key management, a process for ensuring a company can always decrypt its own data. Self-encrypting drives comprehensively resolve these issues, making encryption both easy and affordable.

When the self-encrypting drive is in normal use, its owner need not maintain authentication keys (otherwise known as credentials or passwords) in order to access the data on the drive. The self-encrypting drive will encrypt data being written to the drive and decrypt data being read from it, all without requiring an authentication key from the owner.

Drive retirement and disposal

When hard drives are retired and moved outside the physically protected data center into the hands of others, the data on those drives is put at significant risk. IT departments retire drives for a variety of reasons, including:

- Returning drives for warranty, repair, or expired lease agreements
- Removal and disposal of drives
- Repurposing drives for other storage duties

Nearly all drives eventually leave the data center and their owner's control. Corporate data resides on such drives, and when most leave the data center, the data they contain is still readable. Even data that has been striped across many drives in a RAID array is vulnerable to data theft because just a typical single stripe in today's high-capacity arrays is large enough to expose for example, hundreds of names and bank account numbers.

In an effort to avoid data breaches and the ensuing customer notifications required by data privacy laws, companies use different methods to erase the data on retired drives before they leave the premises and potentially fall into the wrong hands. Current retirement practices that are designed to make data unreadable rely on significant human involvement in the process, and are thus subject to both technical and human failure.

The drawbacks of today's drive retirement practices include the following:

- Overwriting drive data is expensive, tying up valuable system resources for days. No notification of completion is generated by the drive, and overwriting won't cover reallocated sectors, leaving that data exposed.
- Methods that include degaussing or physically shredding a drive are expensive. It is difficult to ensure the degauss strength is optimized for the drive type, potentially leaving readable data on the drive. Physically shredding the drive is environmentally hazardous, and neither practice allows the drive to be returned for warranty or expired lease.
- Some companies have concluded the only way to securely retire drives is to keep them in their control, storing them indefinitely in warehouses. But this is not truly secure because a large volume of drives coupled with human involvement inevitably leads to some drives being lost or stolen.
- Professional disposal services is an expensive option and includes the cost of reconciling the services as well as internal reports and auditing. Transporting of the drives also has the potential of putting the data at risk.

Self-encrypting drives eliminate the need to overwrite, destroy, or store retired drives. When the drive is to be retired, it can be cryptographically erased, a process that is nearly instantaneous regardless of the capacity of the drive.

Instant secure erase

The self-encrypting drive provides instant data encryption key destruction via cryptographic erasure. When it is time to retire or repurpose the drive, the owner sends a command to the drive to perform a cryptographic erasure. Cryptographic erasure simply replaces the encryption key inside the encrypted drive, making it impossible to ever decrypt the data encrypted with the deleted key.

Self-encrypting drives reduce IT operating expenses by reducing asset control challenges and disposal costs. Data security with self-encrypting drives helps ensure compliance with privacy regulations without hindering IT efficiency. So called "Safe Harbor" clauses in government regulations allow companies to not have to notify customers of occurrences of data theft if that data was encrypted and therefore unreadable.

Furthermore, self-encrypting drives simplify decommissioning and preserve hardware value for returns and repurposing by:

- Eliminating the need to overwrite or destroy the drive
- Securing warranty returns and expired lease returns
- Enabling drives to be repurposed securely

Auto-locking

Insider theft or misplacement is a growing concern for businesses of all sizes; in addition, managers of branch offices and small businesses without strong physical security face greater vulnerability to external theft. Self-encrypting drives include a feature called auto-lock mode to help secure active data against theft.

Using a self-encrypting drive when auto-lock mode is enabled simply requires securing the drive with an authentication key. When secured in this manner, the drive's data encryption key is locked whenever the drive is powered down. In other words, the moment the self-encrypting drive is switched off or unplugged, it automatically locks down the drive's data.

When the self-encrypting drive is then powered back on, it requires authentication before being able to unlock its encryption key and read any data on the drive, thus protecting against misplacement and theft.

While using self-encrypting drives just for the instant secure erase is an extremely efficient and effective means to help securely retire a drive, using self-encrypting drives in auto-lock mode provides even more advantages. From the moment the drive or system is removed from the data center (with or without authorization), the drive is locked. No advance thought or action is required from the data center administrator to protect the data. This helps prevent a breach should the drive be mishandled and helps secure the data against the threat of insider or outside theft.

Technical specifications

The following tables present the technical specifications for the CD8P SSDs. Note that the performance data and power consumption is based on a PCIe 5.0 host interface.

Table 2. Technical specifications

Feature	1.92 TB drive	3.84 TB drive	7.68 TB drive	15.36 TB drive	30.72 TB drive
Interface	PCIe 5.0 x4	PCIe 5.0 x4	PCIe 5.0 x4	PCIe 5.0 x4	PCIe 5.0 x4
Form factors	2.5-inch E3.S	2.5-inch E3.S	2.5-inch E3.S	2.5-inch E3.S	2.5-inch
Capacity	1.92 TB	3.84 TB	7.68 TB	15.36 TB	30.72 TB
SED encryption	TCG Opal 2.0	TCG Opal 2.0	TCG Opal 2.0	TCG Opal 2.0	TCG Opal 2.0
Endurance (drive writes per day for 5 years)	1 DWPD	1 DWPD	1 DWPD	1 DWPD	1 DWPD
Endurance (total bytes written)	3504 TB	7008 TB	14,016 TB	28,032 TB	56,064 TB
Data reliability (UBER)	< 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	2,500,000 hours	2,500,000 hours	2,500,000 hours	2,500,000 hours	2,500,000 hours
Performance & Power - PCIe 5.0 host interface					
IOPS reads (4 KB blocks)	1,600,000	1,900,000	2,000,000	2,000,000	1,600,000
IOPS writes (4 KB blocks)	150,000	200,000	200,000	200,000	150,000
Sequential read rate (128 KB blocks)	12,000 MBps	12,000 MBps	12,000 MBps	12,000 MBps	10,000 MBps
Sequential write rate (128 KB blocks)	3500 MBps	5500 MBps	5500 MBps	5500 MBps	4900 MBps
Latency (random R/W)	69 µs / 10 µs	69 µs / 10 µs	69 µs / 10 µs	69 µs / 10 µs	99 µs / 10 µs
Typical power (typical)	18 W	19 W	21 W	23 W	24 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

Part Number	Description	2S AMD V3				2S Intel V3			4S 8S Intel V3			Multi Node		GPU Rich				1S V3		
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
2.5-inch hot-swap drives																				
4XB7A93480	ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93481	ThinkSystem 2.5" U.2 CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93482	ThinkSystem 2.5" U.2 CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93483	ThinkSystem 2.5" U.2 CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93484	ThinkSystem 2.5" U.2 CD8P 30.72TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
E3.S hot-swap drives																				
4XB7A93810	ThinkSystem E3.S CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
4XB7A93811	ThinkSystem E3.S CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
4XB7A93812	ThinkSystem E3.S CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
4XB7A93813	ThinkSystem E3.S CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N

Table 4. Server support (Part 2 of 4)

Part Number	Description	Edge					Super Computing					1S Intel V2			2S Intel V2		
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)
2.5-inch hot-swap drives																	
4XB7A93480	ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
4XB7A93481	ThinkSystem 2.5" U.2 CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
4XB7A93482	ThinkSystem 2.5" U.2 CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
4XB7A93483	ThinkSystem 2.5" U.2 CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
4XB7A93484	ThinkSystem 2.5" U.2 CD8P 30.72TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
E3.S hot-swap drives																	
4XB7A93810	ThinkSystem E3.S CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93811	ThinkSystem E3.S CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93812	ThinkSystem E3.S CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93813	ThinkSystem E3.S CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 5. Server support (Part 3 of 4)

Part Number	Description	AMD V1					Dense V2				4S V2	8S	4S V1	1S Intel V1						
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)
2.5-inch hot-swap drives																				
4XB7A93480	ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93481	ThinkSystem 2.5" U.2 CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93482	ThinkSystem 2.5" U.2 CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93483	ThinkSystem 2.5" U.2 CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93484	ThinkSystem 2.5" U.2 CD8P 30.72TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
E3.S hot-swap drives																				
4XB7A93810	ThinkSystem E3.S CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93811	ThinkSystem E3.S CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93812	ThinkSystem E3.S CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93813	ThinkSystem E3.S CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 6. Server support (Part 4 of 4)

Part Number	Description	2S Intel V1								Dense V1			
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
2.5-inch hot-swap drives													
4XB7A93480	ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93481	ThinkSystem 2.5" U.2 CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93482	ThinkSystem 2.5" U.2 CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93483	ThinkSystem 2.5" U.2 CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93484	ThinkSystem 2.5" U.2 CD8P 30.72TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
E3.S hot-swap drives													
4XB7A93810	ThinkSystem E3.S CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93811	ThinkSystem E3.S CD8P 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93812	ThinkSystem E3.S CD8P 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A93813	ThinkSystem E3.S CD8P 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N

Storage controller support

NVMe PCIe SSDs require a NVMe drive backplane and some form of PCIe connection to processors. PCIe connections can take the form of either an adapter (PCIe Interposer or PCIe extender/switch adapter) or simply a cable that connects to an onboard NVMe connector.

PCIe 4.0 & 3.0 support: The CD8P SSDs offer a PCIe 5.0 host interface, however they are backward compatible with a PCIe 4.0 or PCIe 3.0 host interface. Note however that servers or NVMe retimer/switch adapters with a PCIe 4.0 or 3.0 host interface will not see the same performance levels (especially sequential read and write rates).

Consult the relevant server product guide for details about required components for NVMe drive support.

Operating system support

The following tables list the supported operating systems.

Tip: These tables are automatically generated based on data from [Lenovo ServerProven](#).

Table 7. Operating system support for ThinkSystem 2.5" U.2 CD8P 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD, 4XB7A93480

Operating systems	SR630 V3 (4th Gen Xeon)	SR630 V3 (5th Gen Xeon)	SR635 V3	SR645 V3	SR650 V3 (4th Gen Xeon)	SR650 V3 (5th Gen Xeon)	SR655 V3	SR665 V3	SR630 V2	SR650 V2
Microsoft Windows 10	N	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows 11	N	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server 2016	N	N	N	N	N	N	N	N	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 8.10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.2	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 8.3	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 8.4	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 8.5	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 8.6	Y	N	Y	Y	Y	N	Y	Y	Y	Y
Red Hat Enterprise Linux 8.7	Y	N	Y	Y	Y	N	Y	Y	Y	Y
Red Hat Enterprise Linux 8.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	N	Y	Y	Y	N	Y	Y	Y	Y
Red Hat Enterprise Linux 9.1	Y	N	Y	Y	Y	N	Y	Y	Y	Y
Red Hat Enterprise Linux 9.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 15 SP2	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 15 SP3	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 15 SP3 with Xen	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	N	Y	Y	Y	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y	N	Y	Y	Y	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 18.04.5 LTS	N	N	N	N	N	N	N	N	Y	Y
Ubuntu 20.04 LTS	N	N	N	N	N	N	N	N	Y	Y
Ubuntu 20.04.5 LTS	N	N	Y	Y	N	N	Y	Y	N	N
Ubuntu 22.04 LTS	Y	N	Y	Y	Y	N	Y	Y	Y	Y

	SR630 V3 (4th Gen Xeon)	SR630 V3 (5th Gen Xeon)	SR635 V3	SR645 V3	SR650 V3 (4th Gen Xeon)	SR650 V3 (5th Gen Xeon)	SR655 V3	SR665 V3	SR630 V2	SR650 V2
Operating systems										
Ubuntu 22.04.3 LTS	N	Y	N	N	N	Y	N	N	N	N
Ubuntu 24.04 LTS	N	N	N	Y	Y	Y	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.7 U3	N	N	N	N	N	N	N	N	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	N	N	N	N	N	N	N	N	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	N	Y	Y	Y	N	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0 U1	Y	N	Y	Y	Y	N	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

IBM SKLM Key Management support

To effectively manage a large deployment of SEDs in Lenovo servers, IBM Security Key Lifecycle Manager (SKLM) offers a centralized key management solution. Certain Lenovo servers support Features on Demand (FoD) license upgrades that enable SKLM support.

The following table lists the part numbers and feature codes to enable SKLM support in the management processor of the server.

Table 8. FoD upgrades for SKLM support

Part number	Feature code	Description
Security Key Lifecycle Manager - FoD (United States, Canada, Asia Pacific, and Japan)		
00D9998	A5U1	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S
00D9999	AS6C	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S
Security Key Lifecycle Manager - FoD (Latin America, Europe, Middle East, and Africa)		
00FP648	A5U1	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S
00FP649	AS6C	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S

The IBM Security Key Lifecycle Manager software is available from Lenovo using the ordering information listed in the following table.

Table 9. IBM Security Key Lifecycle Manager licenses

Part number	Description
7S0A007FWW	IBM Security Key Lifecycle Manager Basic Edition Install License + SW Subscription & Support 12 Months
7S0A007HWW	IBM Security Key Lifecycle Manager For Raw Decimal Terabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007KWW	IBM Security Key Lifecycle Manager For Raw Decimal Petabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007MWW	IBM Security Key Lifecycle Manager For Usable Decimal Terabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007PWW	IBM Security Key Lifecycle Manager For Usable Decimal Petabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months

The following tables list the ThinkSystem servers that support the FoD license upgrade.

Table 10. IBM SKLM Key Management license upgrade support (Part 1 of 4)

Part Number	Description	2S AMD V3				2S Intel V3		4S 8S Intel V3			Multi Node		GPU Rich				1S V3			
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	N	N	Y	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	Y
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	N	Y	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	Y

Table 11. IBM SKLM Key Management license upgrade support (Part 2 of 4)

Part Number	Description	Edge					Super Computing					1S Intel V2		2S Intel V2			
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y

Table 12. IBM SKLM Key Management license upgrade support (Part 3 of 4)

Part Number	Description	AMD V1					Dense V2				4S V2	8S	4S V1		1S Intel V1						
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS		SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N

Table 13. IBM SKLM Key Management license upgrade support (Part 4 of 4)

Part Number	Description	2S Intel V1								Dense V1			
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N

Warranty

The CD8P SSDs carry a one-year, customer-replaceable unit (CRU) limited warranty. When the SSDs are installed in a supported server, these drives assume the server'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 CD8P SSDs have the following physical specifications:

Dimensions and weight of the 2.5-inch drives (approximate, without the drive tray):

- Height: 15 mm (0.6 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 130 g (6.7 oz)

Operating environment

The CD8P SSDs are supported in the following environment:

- Temperature (operating):
 - 1.92TB, 3.84TB: 0°C to 76°C
 - 7.68TB, 15.36TB: 0°C to 73°C
 - 30.72TB: 0°C to 72°C
- Temperature (non-operating): -40 to 85 °C (-40 to 185 °F)
- Relative humidity (operating, non-operating): 5 to 95% (noncondensing)
- Maximum altitude:
 - Operating: -305 to +5,486 m (-1,000 to +18,000 feet)
 - Non-operating: -305 to +12,192 m (-1,000 to +40,000 feet)
- Shock:
 - Operating 9.8 km/s² (1,000 G) / 0.5ms duration
 - Non-operating (Transporting) 9.8 km/s² (1,000 G) / 0.5ms duration
- Vibration:
 - Operating: 21.27m/s² (2.17 G_{RMS}) (5 to 800Hz)
 - Non-operating: 30.38m/s² (3.10 G_{RMS}) (2 to 500Hz)

Agency approvals

The CD8P SSDs conform to the following regulations:

- Safety
 - UL (1) UL 62368-1 (USA)
 - cUL CSA C22.2 No. 62368-1 (Canada)
 - TÜV EN 62368-1 (EU)
- EMC
 - KS C 9832 (Korea)
 - FCC (3) FCC part 15 Subpart B (USA)
 - BSMI CNS 15936 (CISPR Pub. 32) (Taiwan)
 - CE EN55032, EN61000, EN55035 (EU, UK)
 - UKCA EN55032, EN61000, EN55035 (UK)
 - RCM AS/NZS CISPR 32 (Australia, New Zealand)
 - ISED ICES-003 (Canada)
 - VCCI VCCI-CISPR32 (Japan)
 - Moroccan conformity mark NM EN 55032, NM EN 55035 (Morocco)
- IEC 60950-1, IEC 62368-1
- EU: RoHS 2 Directive 2011/65/EU Category 3 EN IEC63000

Related publications and links

For more information, see the following documents:

- Lenovo ThinkSystem SSD Portfolio Comparison
<https://lenovopress.com/lp1261-lenovo-thinksystem-ssd-portfolio>
- Kioxia product page for CD8P SSDs:
<https://americas.kioxia.com/en-us/business/ssd/data-center-ssd/cd8p-r.html>

Related product families

Product families related to this document are the following:

- [Drives](#)

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