

ThinkSystem U.3 CD6 Read Intensive NVMe PCIe 4.0 SSDs

Product Guide (withdrawn product)

The ThinkSystem U.3 CD6 Read Intensive NVMe solid-state drives (SSDs) in capacities up to 7.68 TB are advanced data center SSDs from Kioxia that are designed for scale out environments, where read performance, Quality of Service (QoS) and power efficiency are key metrics. The CD6 drives are targeted for general purpose server applications and scale-out environments. With a PCIe 4.0 x4 interface, they are designed for greater performance and endurance in a cost-effective design, and to support a broader set of workloads.



Figure 1. ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

Did you know?

The ThinkSystem U.3 CD6 Read Intensive NVMe SSDs are designed for scale-out environments and workloads, including:

- Cloud Computing, requiring high data transfer and IOPS performance, and low-latency.
- Container Orchestration, requiring high transfer rates and IOPS performance in combination with high queue depths in random R/W environments.
- Content Delivery Networks, requiring read-intensive performance typically 95% read/5% write.
- Databases, requiring low-latency and high transactions per minute.
- Media Streaming, requiring high read bandwidth for streaming content to many subscribers simultaneously.

Part number information

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

Withdrawn: The drive listed below is now withdrawn from marketing.

Table 1. Part numbers and feature codes for ThinkSystem

Part number	Feature code	Description
4XB7A76321	BK21	ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

The part numbers include the following items:

- One 2.5-inch solid-state drive installed in a hot-swap tray
- Documentation

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 NVMe PCI SSD has direct PCIe 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.

ThinkSystem U.3 CD6 Read Intensive NVMe SSDs have the following features:

- U.3 NVMe PCIe 4.0 x4 host interface (backward compatible with U.2)
- ThinkSystem 2.5-inch hot-swap drive tray
- Based on the Kioxia KCD61LUL drives
- 96-layer BiCS FLASH 3D TLC memory
- 1 drive-write-per-day (DWPD) SSD for read-intensive workloads
- PCIe 4.0 x4 host connection for each NVMe drive, resulting in up to 6.2 GBps overall throughput.
- Full Power-Loss-Protection and End-to-End Data Protection
- Low power consumption (maximum 20 W)

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, 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 7.68TB CD6-R drive has an endurance of 14,016 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 7,680 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 12,800 GB of writes per day, which is equivalent to 1.7 full drive writes per day.

Technical specifications

The following table presents technical specifications for the ThinkSystem CD6 Read Intensive drives.

Table 2. Technical specifications

Feature	7.68 TB drive
Host interface	PCIe 4.0 x4
Capacity	7.68 TB
SED encryption	None
Endurance (total bytes written)	14,016 TB
Endurance (drive writes per day for 5 years)	1.0 DWPD
Data reliability (UBER)	< 1 in 10^{17} bits read
MTBF	2,500,000 hours
IOPS reads (4 KB blocks, PCIe 4.0)	1,000,000
IOPS writes (4 KB blocks, PCIe 4.0)	85,000
Sequential read rate (128 KB blocks, PCIe 4.0)	6200 MBps
Sequential write rate (128 KB blocks, PCIe 4.0)	4000 MBps
Latency (random read)	100 μ s
Latency (random write)	35 μ s
Maximum power	19 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

Part Number	Description	AMD V3				2S Intel V3/V4				4S 8S Intel V3		Multi Node V3/V4		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)	SR630 V4 (7DG8 / 7DG9)	SR650 V4 (7DGC / 7DGD)	SR650a V4 (7DGC / 7DGD)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	ST45 V3 (7DH4 / 7DH5)	ST50 V3 (7DF4 / 7DF3)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
4XB7A76321	ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 4. Server support (Part 2 of 4)

Part Number	Description	GPU Rich				Edge				Super Computing									
		SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	SR780a V3 (7DJ5)	SE100 (7DGR)	SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SC750 V4 (7DDJ)	SC777 V4 (7DKA)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)
4XB7A76321	ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	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	1S Intel V2			2S Intel V2			AMD V1			Dense V2			4S V2	8S				
		ST150 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)	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)
4XB7A76321	ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N

Table 6. Server support (Part 4 of 4)

Part Number	Description	4S V1			1S Intel V1			2S Intel V1						Dense V1					
		SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST150 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)	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)
4XB7A76321	ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	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 3.0 support: The Kioxia CD6 drives offer a PCIe 4.0 host interface, however they are backward compatible with a PCIe 3.0 host interface. Note however that servers with a PCIe 3.0 host interface will not see the same performance levels (especially sequential read and write rates). ThinkSystem NVMe switch adapters also provide a PCIe 3.0 host interface to attached drives.

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

Operating system support

The following table lists the supported operating systems.

Tip: This table is automatically generated based on data from [Lenovo ServerProven](#).

Table 7. Operating system support for ThinkSystem 2.5" U.3 CD6 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD, 4XB7A76321

Operating systems	SR645
Microsoft Windows Server 2016	Y
Microsoft Windows Server 2019	Y
Microsoft Windows Server 2022	Y
Microsoft Windows Server 2025	Y
Red Hat Enterprise Linux 7.6	Y ¹
Red Hat Enterprise Linux 7.7	Y ¹
Red Hat Enterprise Linux 7.8	Y ¹
Red Hat Enterprise Linux 7.9	Y ¹
Red Hat Enterprise Linux 8.1	Y ¹
Red Hat Enterprise Linux 8.10	Y
Red Hat Enterprise Linux 8.2	Y ¹
Red Hat Enterprise Linux 8.3	Y
Red Hat Enterprise Linux 8.4	Y
Red Hat Enterprise Linux 8.5	Y
Red Hat Enterprise Linux 8.6	Y
Red Hat Enterprise Linux 8.7	Y
Red Hat Enterprise Linux 8.8	Y
Red Hat Enterprise Linux 8.9	Y
Red Hat Enterprise Linux 9.0	Y
Red Hat Enterprise Linux 9.1	Y
Red Hat Enterprise Linux 9.2	Y
Red Hat Enterprise Linux 9.3	Y
Red Hat Enterprise Linux 9.4	Y
Red Hat Enterprise Linux 9.5	Y
SUSE Linux Enterprise Server 12 SP5	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	Y
SUSE Linux Enterprise Server 15 SP1	Y ¹
SUSE Linux Enterprise Server 15 SP1 with Xen	Y ¹
SUSE Linux Enterprise Server 15 SP2	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	Y
SUSE Linux Enterprise Server 15 SP3	Y
SUSE Linux Enterprise Server 15 SP3 with Xen	Y
SUSE Linux Enterprise Server 15 SP4	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y
SUSE Linux Enterprise Server 15 SP5	Y
SUSE Linux Enterprise Server 15 SP5 with Xen	Y
SUSE Linux Enterprise Server 15 SP6	Y

Operating systems	SR645
Ubuntu 22.04 LTS	Y
Ubuntu 24.04 LTS	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y
VMware vSphere Hypervisor (ESXi) 8.0 U1	Y
VMware vSphere Hypervisor (ESXi) 8.0 U2	Y
VMware vSphere Hypervisor (ESXi) 8.0 U3	Y

¹ The OS is not supported with EPYC 7003 processors.

Warranty

ThinkSystem U.3 CD6 Read Intensive NVMe 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 ThinkSystem U.3 CD6 Read Intensive NVMe SSDs have the following physical specifications:

Dimensions and weight (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 (5.3 oz)

Operating environment

The ThinkSystem U.3 CD6 Read Intensive NVMe SSDs are supported in the following environment:

- Temperature:
 - Operating: 0 to 70 °C (32 to 158 °F)
 - Transport: -40 to 80 °C (-40 to 176 °F)
- Relative humidity: 5 to 95% (non-condensing)
- Maximum altitude:
 - Operating: 5,486 m (18,000 ft)
 - Non-operating: 12,192 m (40,000 ft)
- Shock: 1,000 G (Max) at 0.5 ms
- Vibration, operating: 2.17 G_{RMS} (5-800 Hz)

Agency approvals

ThinkSystem U.3 CD6 Read Intensive NVMe SSDs conform to the following regulations:

- Underwriters Laboratories: UL60950-1
- Canada: CAN/CSA-C22.2 No.60950-1
- TUV: EN 60950-1
- BSMI (Taiwan): CNS 13438 (CISPR Pub. 22 Class B): D33003
- MSIP: KN22, KN24 (CISPR Pub. 22 Class B)
- Australia/New Zealand: AS/NZS CISPR32:2015 Class B
- Canada: ICES-003 Issue 6 Class B
- EMC: EN55022 (2015) Class B
- EMC: EN55035 (2017)
- RoHS 2011/65/EU: EN50581 (2012) Category 3

Related publications and links

For more information, see the following documents:

- Lenovo ThinkSystem SSD Portfolio
<https://lenovopress.com/lp1261-lenovo-thinksystem-ssd-portfolio>
- Lenovo ThinkSystem storage options product web page
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- Kioxia product page for the CD6-R product family:
link href="https://business.kioxia.com/en-us/ssd/data-center-ssd/cd6-r.html"}

Related product families

Product families related to this document are the following:

- [Drives](#)

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