Lenovo ThinkSystem Ready Node HS350X V3
Product Guide

The Lenovo ThinkSystem Ready Node HS350X V3 is an ideal Dense storage, 1-socket 2U rack server for small businesses up to large enterprises that need industry-leading reliability, management, and security, as well as maximizing performance and flexibility for future growth. The HS350X V3 is based on the new 4th generation Intel Xeon Scalable processor family (formerly codenamed "Sapphire Rapids") and on the 5th generation Intel Xeon Scalable processor family (formerly codenamed "Emerald Rapids").

The HS350X V3 is designed to handle a broad range of workloads: including Business Applications, big data analytics, Cloud, Database, AI/data lakes, data observability, file shares/object buckets (Cloudian), multimedia streaming, VDI, Virtualization and backup and recovery (Commvault).

Figure 1. Lenovo ThinkSystem Ready Node HS350X V3 with 3.5-inch front drive bays

Did you know?

The HS350X V3 server has been designed to take advantage of the features of the 5th and 4th generation Intel Xeon Scalable processors, such as the full performance of 330W 64-core processor, support for 5600 MHz memory and PCIe Gen 5.0/4.0 support. The HS350X V3 is optimized for flexible storage configurations with multiple drive options and supporting up to 24x 3.5" drives in the front. This level of flexibility ensures that you can configure the server optimal for Object and backup Storage and a broad range of other workloads.

Key features

Combining performance and flexibility, the HS350X V3 server is a great choice for enterprises of all sizes. The server offers a broad selection of drive and slot configurations and offers numerous high performance features. Outstanding reliability, availability, and serviceability (RAS) and high-efficiency design can improve your business environment and can help save operational costs.

Scalability and performance

The HS350X V3 offers numerous features to boost performance, improve scalability and reduce costs:

- Supports one 5th or 4th generation Intel Xeon Processor Scalable processor
  - Up to 64 cores and 128 threads
  - Core speeds of up to 2.2 GHz
  - TDP ratings of up to 350 W
- Support for DDR5 memory DIMMs to maximize the performance of the memory subsystem:
  - Up to 16 DDR5 memory DIMMs, 16 DIMMs per processor
  - 8 memory channels per processor (2 DIMMs per channel)
  - Supports 1 DIMM per channel operating at 4800 MHz
  - Supports 2 DIMMs per channel operating at 4400 MHz
  - Using 64G RDIMMs, the server supports up to 1TB of system memory
- Supports 24x 3.5-inch drive bays for lower-cost high-capacity HDD storage.
- Supports up to 2x U.2 NVMe drives in a rear bay.
- Supports high-speed RAID controllers from Broadcom providing 12 Gb SAS connectivity to the drive backplanes. A variety of PCIe 4.0 and PCIe 5.0 RAID adapters are available.
- Supports M.2 drives for convenient operating system boot functions or data storage. Available M.2 adapters support either one M.2 drive or two M.2 drives. Optional RAID with the use of Intel VROC.
- Up to 4x PCIe slots (3x rear), plus a slot dedicated to an OCP 3.0 adapter.
- The server has a dedicated industry-standard OCP 3.0 small form factor (SFF) slot, with a PCIe 5.0 x16 interface, supporting Ethernet network adapters and fibre adapter.
- The server offers PCI Express 5.0 I/O expansion capabilities that doubles the theoretical maximum bandwidth of PCIe 4.0 (32GT/s in each direction for PCIe Gen 5, compared to 16 GT/s with PCIe Gen 4 and 8 GT/s with PCIe Gen 3). A PCIe 5.0 x16 slot provides 128 GB/s bandwidth, enough to support a dual-port 100GbE network connection.

Availability and serviceability

The HS350X V3 provides many features to simplify serviceability and increase system uptime:

- Designed to run 24 hours a day, 7 days a week
- The server offers hot-swap drives, supporting RAID redundancy for data protection and greater system uptime.
- The server has up to two hot-swap redundant power supplies and up to six hot-swap redundant fans to provide availability for business-critical applications.
- Optional front-accessible slots and drives so that most major components and cables (except power) are located at the front of the server
- The light path diagnostics feature uses LEDs to lead the technician to failed (or failing) components, which simplifies servicing, speeds up problem resolution, and helps improve system availability.
- NVMe Solid-state drives (SSDs) offer more reliability and performance than traditional mechanical HDDs for greater uptime.
- Auto restart in the event of a momentary loss of AC power
- Three-year customer-replaceable unit and onsite limited warranty (varies by geography), 9 x 5 next business day. Optional service upgrades are available.

Manageability and security

Systems management features simplify local and remote management of the HS350X V3:

- Ethernet connector on the OCP module can also function as a management connector using the shared management capacity. (BMC management).
- UEFI-based, accessible from F1 during boot, provides system inventory information, graphical UEFI Setup, platform update function, RAID Setup wizard, operating system installation function, and diagnostic functions.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Support for industry standard management protocols, IPMI 2.0, SNMP 3.0
- An integrated hardware Trusted Platform Module (TPM) supporting TPM 2.0 enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Administrator and power-on passwords help protect from unauthorized access to the server.
- Supports Secure Boot to ensure only a digitally signed operating system can be used. Supported with HDDs and SSDs, as well as 7mm and M.2 drives.
- Intel Execute Disable Bit functionality can prevent certain classes of malicious buffer overflow attacks when combined with a supported operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system..

Energy efficiency

The HS350X V3 offers the following energy-efficiency features to save energy, reduce operational costs, and increase energy availability:

- Energy-efficient system board components help lower operational costs.
- High-efficiency power supplies with 80 PLUS Platinum certifications
- Solid-state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- The server uses hexagonal ventilation holes, which can be grouped more densely than round holes,

providing more efficient airflow through the system and thus keeping your system cooler.

Components and connectors

The Lenovo HS350X V3 Motherboard offers flexibility in regards to connectors it offers at the rear.

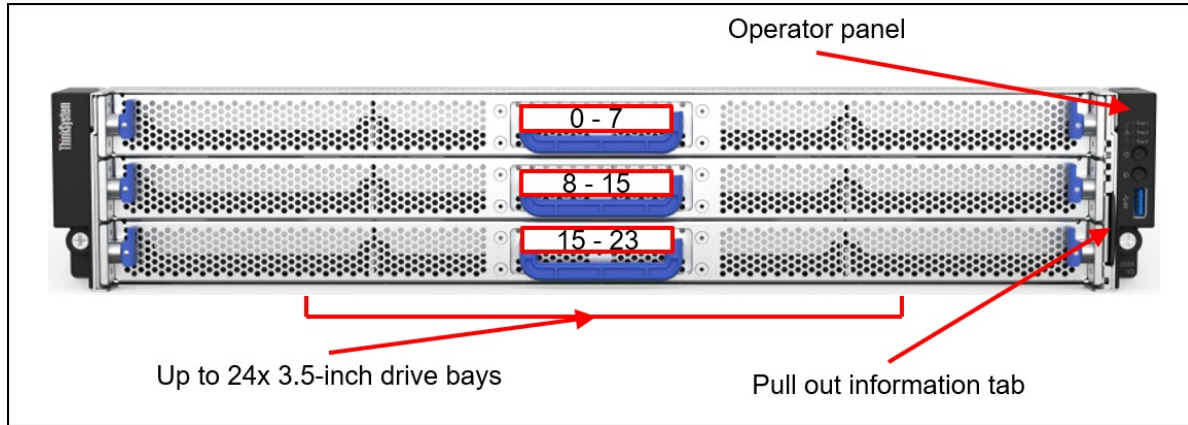The following figure shows the front of the HS350X V3.

Figure 2. Front view of the ThinkSystem HS350X V3 with 3.5-inch drive bays

At a high level the front of the server offers the following:

- Three layers of bay drives
- Two Button(Power on, System locator) w/ LED
- One system health LED
- One Network status LED
- Three Tray Error LED
- One USB 3.2 G1 (5 Gb/s) connector

The following figure shows the components visible from the rear of the server. The figure shows one configuration, with three PCIe slots and 1x 2.5-inch drive bays drive bay.
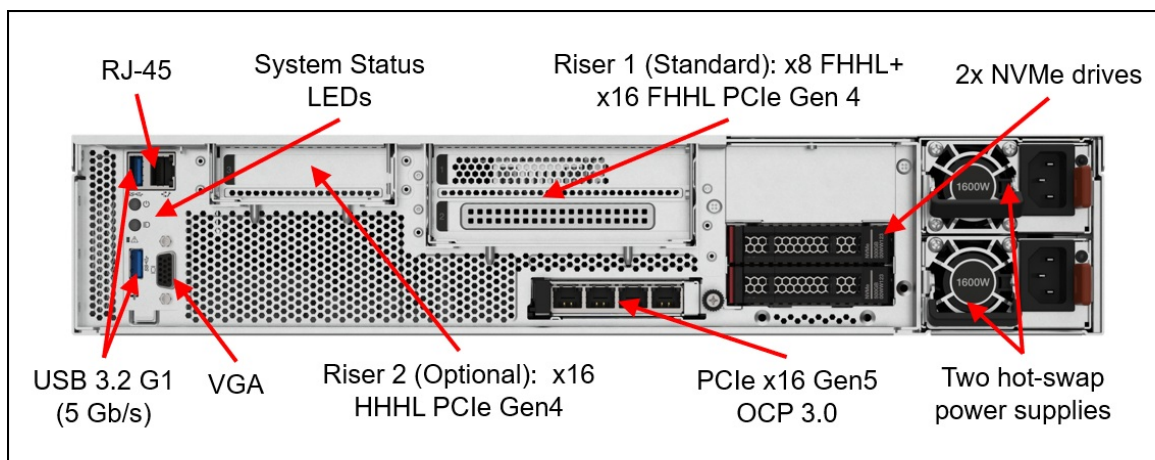

Figure 3. Rear view of the ThinkSystem Ready Node HS350X V3 (configuration with riserr slots)

The following figure shows the locations of key components inside the server.
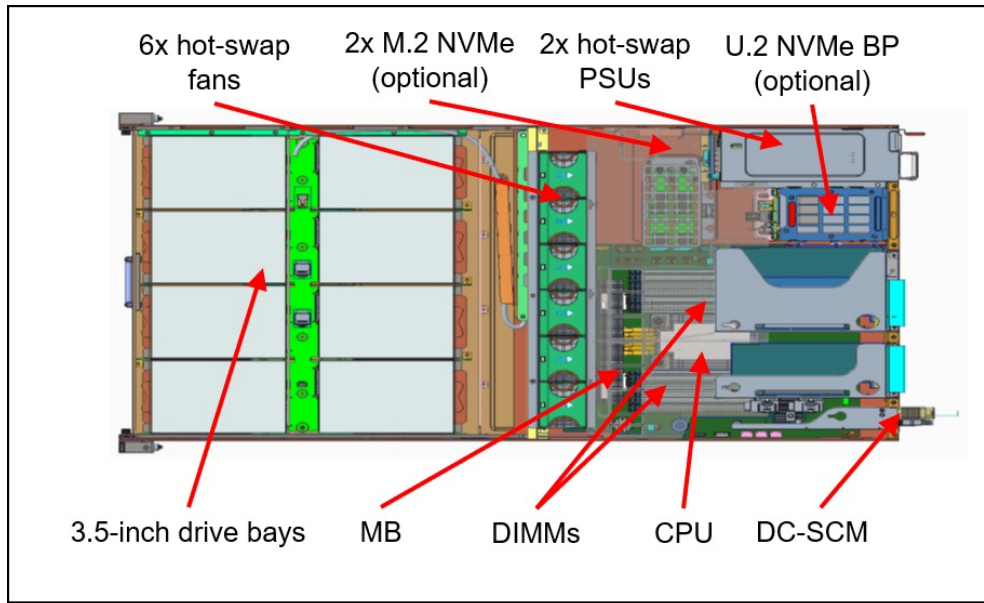

Figure 4. Internal view of the ThinkSystem Ready Node HS350X V3

Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Machine types	7DE3 - 3 year warranty
Form factor	2U rack
Processor	One of the 4th generation Intel Xeon Scalable processor family (formerly codenamed "Sapphire Rapids") or one of the 5th generation Intel Xeon Scalable processor family (formerly codenamed "Emerald Rapids"). Supports processors up to 64 cores, core speeds of up to 2.2 GHz, and TDP ratings of up to 350 W.
Chipset	Intel Emmitsburg PCH, LGA 4677 Socket E package with Thermal Design Power up to 350 W.
Memory	16 DIMM slots with one processor. Processor has 8 memory channels, with 2 DIMMs per channel (DPC). Lenovo TruDDR5 RDIMMs, 10x4 RDIMMs. DIMMs operate at up to 5600 MHz at 1 DPC and up to 4400 MHz at 2 DPC.
Persistent memory	No support.
Memory maximum	Up to 1TB by using 16x 64GB RDIMMs
Memory protection	ECC, Memory RAS Support.

Components	Specification
Disk drive bays	Up to 24x 3.5-inch and 2x 2.5-inch hot-swap drive bays: • Front bays can be 3.5-inch (24 bays) • Rear bays can be U.2 NVMe 2.5-inch (2 bays) • Mix of SSD/NVME/SATA HDD into 2.5 HDD Tray, not supported • Mix of 2.5 HDD/3.5 HDD into 3.5 HDD Tray, not supported • Mix HDD with different capacity, not supported The server also supports these drives: • On Board: ◦ 2* M.2 NVMe SSD as boot drives (Via CPU PCIe Lanes), supports Intel VROC

Maximum internal storage	• 2.5-inch drives:
	   ◦ 12.8 TB using 2x 6.4 TB 2.5-inch U.2 NVMe SSDs
	• 3.5-inch drives:
	   ◦ 528 TB using 24x 22TB 3.5-inch HDDs

Storage controller	• HBA:
	   ◦ Broadcom 9600-24i SATA/SAS HBA Card (non-RAID)
	• RAID:
	   ◦ Broadcom 9670-24i SATA/SAS RAID Card

Optical drive bays	No internal optical drive
Tape drive bays	No internal backup drive
Network interfaces	Dedicated OCP 3.0 SFF slot with PCIe 5.0 x16 host interface. Supports a variety of 2-port and 4-port adapters with 1, 10, 25 or 100 GbE network connectivity.

PCIe slots	*Rear*: Up to 3x PCIe slots, 1x slot dedicated to an OCP 3.0 adapter and NVMe backplane to support 2x 2.5-inch drive configurations also support an additional internal bay for a cabled RAID adapter or HBA.
	
	• Slots are configured using the following riser cards:
	   ◦ Riser 1 (Standard Configuration):
	      ■ slot1: 1* X8 FHHL (For SATA/SAS RAID/ HBA)
	      ■ slot2: 1* X16 FHHL
	   ◦ Riser 2 (Optional Configuration):
	      ■ slot3: 1* X16 HHHL
	• OCP Slot:
	   ◦ 1* OCP3.0 Card
	      ■ Support one PCIe x16 Gen5 OCP 3.0 slot
	
	Riser 1 (slots 1- 2) and Riser 2 (slots 3) are installed in slots in the system board, are cabled to ports on the system board. See the I/O expansion for details.

GPU support	no support
Ports	Front: operator panel LEDs, 1x USB 3.2 G1 (5 Gb/s) port, power button with status LED. Rear: system status LEDs, 2x USB 3.2 G1 (5 Gb/s) ports, 1x VGA video port, 1x RJ-45 1GbE systems management port. No external serial port.
Cooling	There are six 6038 system fans, +12 Volt hot plug single rotor. Fans are N+1 Redundant.

Components	Specification
Power supply	Up to two hot-swap redundant AC power supplies, 80 PLUS Platinum certification. 1300W, 1600W AC options, and 1300W Titanium, supporting 220 V AC
Video	ASpeed 2600 on SCM, DRAM Chip DDR4 SDRAM 512MB 667/800 Mhz Graphic Memory, Video Memory Cache depend on resolution.
Hot-swap parts	Drives, power supplies, and fans.
Systems management	BMC, UEFI, operator panel with status LEDs. AMI based. No support for xClarity.
Security features	Chassis intrusion switch, Power-on password, administrator's password, Root of Trust module supporting TPM 2.0 and Platform Firmware Resiliency (PFR). Optional lockable front security bezel.
Operating systems supported	Red Hat Enterprise Linux, Rocky Linux, Ubuntu basic support. See the Operating system support section for specifics.
Limited warranty	Three-year (model dependent) customer-replaceable unit and onsite limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through Lenovo Services: 4-hour or 2-hour response time, 6-hour fix time, 1-year or 2-year warranty extension, software support for Lenovo hardware and some third-party applications.
Dimensions	Width: 447 mm (17.6 in.), height: 87 mm (3.4 in.), depth: 858 mm (33.8 in.). See Physical and electrical specifications for details.
Weight	Maximum: 40 kg (88.2 lb)

Models

ThinkSystem Ready Node HS350X V3 models can be configured by using the Lenovo Data Center Solution Configurator (DCSC).

Topics in this section:

- CTO models
- Base feature codes

CTO models

ThinkSystem Ready Node HS350X V3 models can be configured by using the Lenovo Data Center Solution Configurator (DCSC).

Configure-to-order (CTO) models are used to create models with factory-integrated server customizations. For CTO models, two types of base CTO models are available for the HS350X V3 as listed in the columns in the following table:

- General purpose base CTO models are for general business (non-HPC) and is selectable by choosing **General Purpose** mode in DCSC.

- HPC and AI base models are intended for High Performance Computing (HPC) and Artificial Intelligence (AI) configurations and solutions, including configurations for Lenovo Scalable Infrastructure (LeSI), and is enabled using either the **HPC & AI LeSI Solutions** mode or **HPC & AI Hardware** mode in DCSC. These configurations can also be built using System x and Cluster Solutions Configurator (x-config). **Tip**: Some HPC and AI models are not be listed in DCSC and can only be configured in x-config.

Preconfigured server models may also be available for the HS350X V3, however these are region-specific; that is, each region may define their own server models, and not all server models are available in every region.

The following table lists the base CTO models of the ThinkSystem Ready Node HS350X V3 server.

Table 2. Base CTO models

Feature code	Description
7DE3CTO2WW	ThinkSystem ReadyNodes HS350X V3

Base feature codes

Models of the HS350X V3 are based on 3.5-inch drive bays at the front (called the 3.5-inch chassis). For models, the feature codes for these chassis bases are as listed in the following table.

Table 3. Chassis base feature codes

Feature code	Description
C0Z8	ThinkSystem HS350X V3 Chassis

Processor options

The HS350X V3 supports processors in the 5th and 4th Gen Intel Xeon Scalable Processor family. The server supports one processor.

Topics in this section:

- Processor options
- Processor features
- One-processor configurations

Processor options

All supported processors have the following characteristics:

- 8 DDR5 memory channels at 2 DIMMs per channel
- Up to 4 UPI links between processors at 16 GT/s
- 80 PCIe 5.0 I/O lanes

The following table lists the 5th Gen processors that are currently supported by the HS350X V3.

Table 4. 5th Gen Intel Xeon Processor support

Feature code	Description	Quantity supported
BYWK	Intel Xeon Gold 6530 32C 270W 2.1GHz Processor	1
BYW9	Intel Xeon Gold 6554S 36C 270W 2.2GHz Processor	1
BYWB	Intel Xeon Platinum 8592V 64C 330W 2.0GHz Processor	1

The following table lists the 4th Gen processors that are currently supported by the HS350X V3.

Table 5. 4th Gen Intel Xeon Processor support

Feature code	Description	Quantity supported
BQ6L	Intel Xeon Gold 5416S 16C 150W 2.0GHz Processor	1
BPQD	Intel Xeon Gold 6448Y 32C 225W 2.1GHz Processor	1
BPPM	Intel Xeon Gold 6454S 32C 270W 2.2GHz Processor	1
BPPQ	Intel Xeon Platinum 8460Y+ 40C 300W 2.0GHz Processor	1
BPPK	Intel Xeon Platinum 8461V 48C 300W 2.2GHz Processor	1
BN0M	Intel Xeon Platinum 8480+ 56C 350W 2.0GHz Processor	1

Processor features

Processors supported by the HS350X V3 introduce new embedded accelerators to add even more processing capability:

- QuickAssist Technology (Intel QAT)

  Help reduce system resource consumption by providing accelerated cryptography, key protection, and data compression with Intel QuickAssist Technology (Intel QAT). By offloading encryption and decryption, this built-in accelerator helps free up processor cores and helps systems serve a larger number of clients.

- Intel Dynamic Load Balancer (Intel DLB)

  Improve the system performance related to handling network data on multi-core Intel Xeon Scalable processors. Intel Dynamic Load Balancer (Intel DLB) enables the efficient distribution of network processing across multiple CPU cores/threads and dynamically distributes network data across multiple CPU cores for processing as the system load varies. Intel DLB also restores the order of networking data packets processed simultaneously on CPU cores.

- Intel Data Streaming Accelerator (Intel DSA)

  Drive high performance for storage, networking, and data-intensive workloads by improving streaming data movement and transformation operations. Intel Data Streaming Accelerator (Intel DSA) is designed to offload the most common data movement tasks that cause overhead in data center-scale deployments. Intel DSA helps speed up data movement across the CPU, memory, and caches, as well as all attached memory, storage, and network devices.

- Intel In-Memory Analytics Accelerator (Intel IAA)

  Run database and analytics workloads faster, with potentially greater power efficiency. Intel In-Memory Analytics Accelerator (Intel IAA) increases query throughput and decreases the memory footprint for in-memory database and big data analytics workloads. Intel IAA is ideal for in-memory databases, open source databases and data stores like RocksDB, Redis, Cassandra, and MySQL.

- Intel Advanced Matrix Extensions (Intel AMX)

  Intel Advanced Matrix Extensions (Intel AMX) is a built-in accelerator in all Silver, Gold, and Platinum processors that significantly improves deep learning training and inference. With Intel AMX, you can fine-tune deep learning models or train small to medium models in just minutes. Intel AMX offers discrete accelerator performance without added hardware and complexity.

The processors also support a separate and encrypted memory space, known as the SGX Enclave, for use by Intel Software Guard Extensions (SGX). The size of the SGX Enclave supported varies by processor model. Intel SGX offers hardware-based memory encryption that isolates specific application code and data in memory. It allows user-level code to allocate private regions of memory (enclaves) which are designed to be protected from processes running at higher privilege levels.

One-processor configurations

The HS350X V3 can be used with only one processor installed. Most core functions of the server are connected to processor 1.

With only one processor, the server has the following capabilities:

- 16 memory DIMMs for a 1TB maximum
- Rear slots: Slot 1-2 (riser 1) and slots 3 (riser 2) are available

Drive support is as follows:

- Front SATA drives are supported - 24 drives (3.5-inch)
- Rear NVMe drives are supported - up to 2 drives (2.5-inch)
- M.2 drives are supported

Controller support is as follows:

- RAID adapters/HBAs installed in slots 1-3

The following components are not supported:

- AnyBay backplanes
- Middle bay NVMe backplane
- Rear 3.5-inch drive bay backplane

Memory options

The HS350X V3 uses Lenovo TruDDR5 memory.

Lenovo TruDDR5 memory uses the highest quality components that are sourced from Tier 1 DRAM suppliers and only memory that meets the strict requirements of Lenovo is selected. It is compatibility tested and tuned to maximize performance and reliability. From a service and support standpoint, Lenovo TruDDR5 memory automatically assumes the system warranty, and Lenovo provides service and support worldwide.

For more information on DDR5 memory, see the Lenovo Press paper, *Introduction to DDR5 Memory*, available from https://lenovopress.com/lp1618.

The following rules apply when selecting the memory configuration:

For best performance, consider the following:

- Ensure the memory installed is at least the same speed as the memory bus of the selected processor.c
- Populate all 8 memory channels.

The following memory protection technologies are supported:

- ECC detection/correction
- Bounded Fault detection/correction
- SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description)
- ADDDC (for 10x4-based memory DIMMs, not supported with 9x4 DIMMs)

See the Lenovo Press article "RAS Features of the Lenovo ThinkSystem Intel Servers" for more information about memory RAS features: https://lenovopress.lenovo.com/lp1711-ras-features-of-the-lenovo-thinksystem-intel-servers

If memory channel mirroring is used, then DIMMs must be installed in pairs (minimum of one pair per processor), and both DIMMs in the pair must be identical in type and size. 50% of the installed capacity is available to the operating system. Memory rank sparing is not supported.

Table 6. Supported memory options

Part number	Feature code	Description	Maximum supported
CTO only	C0XN	ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMM	16
CTO only	C0Y3	ThinkSystem 32GB TruDDR5 4800MHz (1Rx4) 9x4 RDIMM	16
CTO only	C0Y0	ThinkSystem 64GB TruDDR5 4800MHz (2Rx4) 10x4 RDIMM	16

Internal storage

The HS350X V3 offers the following internal storage options:

In the front, three layer trays to support:

- Up to 24x 3.5-inch hot-swap drives

In the rear, one bay to support:

- Up to 2x 2.5-inch hot-swap drives (dedicated slot)

Internal, onboard to support:

- Up to 2x M.2 drives for boot functions, supporting NVMe drives

Front and rear bays support hot-swap type drives.

In this section:

- NVMe drive support
- Front drive bays
- M.2 drives
- Intel VROC onboard RAID

NVMe drive support

The HS350X V3 supports NVMe drives to maximize storage performance.

- Up to 2 NVMe drives in a 2.5-inch drive configuration, without oversubscription (that is, each x4 drive has a dedicated x4 (4 lanes) connection to the processor)
  - Up to 2 installed in the rear bays

No NVMe retimer adapters are needed or supported.

Front drive bays

The front drive bay layers support the following configurations:

- 24x 3.5-inch drive bays (all hot-swap)

- Three-layer HDD tray design

- Eight HDDs in each layer

- HDD tray warning LED on the front panel

- HDD status/activity LED on BP

Additionally: 2x 2.5-inch drive bays in the rear (all hot-swap).

The specific combinations that are supported in the HS350X V3 are shown in the following figures. The feature codes listed are the backplane feature codes when ordering CTO and correspond to the feature codes listed in the table below the figure. Note that SATA/SAS and NVMe backplanes may be available either PCIe Gen4 (G4) or PCIe Gen5 (G5) as listed in the figures.
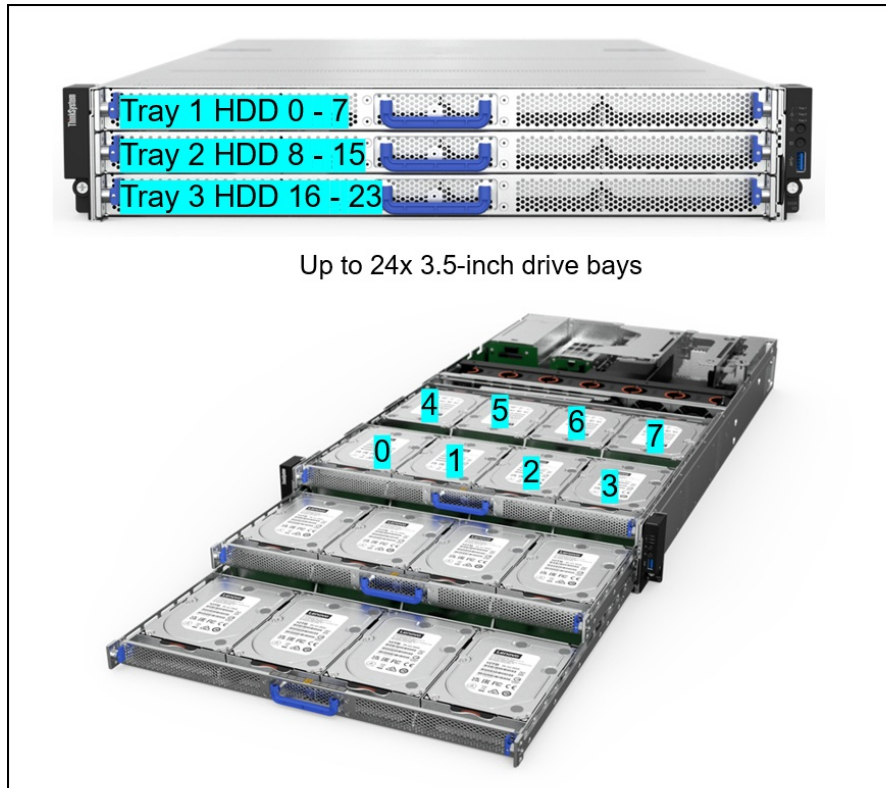
Figure 5. HS350X V3 front drive bay configurations - 3.5-inch drive bays
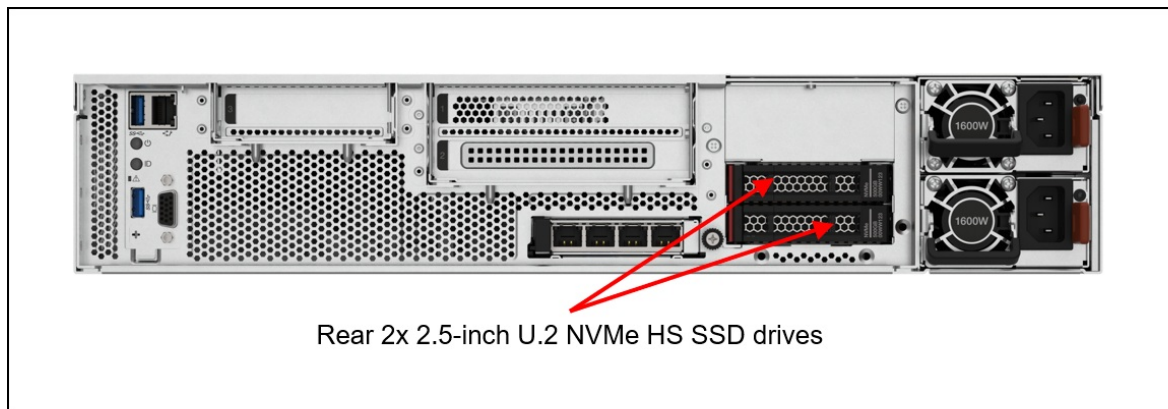
Figure 6. HS350X V3 Rear drive bay configuration - 2.5-inch drive bay

The backplanes used to provide these drive bays are listed in the following table.

Table 7. Backplanes for front and rear drive bays

Feature	Description	Bays	PCIe Gen	Maximum supported
Front 3.5-inch drive backplanes				
C0ZC	ThinkSystem HS350X V3 Front 8x 3.5" SATA/SAS BP	3	Gen4	3
Rear 2.5-inch drive backplanes				
C0ZA	ThinkSystem 2x 2.5" NVMe Rear BP and Cables	1	Gen5	1

M.2 drives

The HS350X V3 supports one or two M.2 form-factor NVMe drives for use as an operating system boot solution or as additional storage.

The M.2 drives install into an M.2 module which is mounted onboard horizontally internal to the server in front of the fans as shown in the Internal view of the server. In configurations with 2.5-inch rear drive bays or 3.5-inch front drives, the M.2 module is that same location in front of the fans.

The supported M.2 drives are listed in the following table.

Table 8. M.2 drives

Part number	Feature code	Description	SATA drives	NVMe drives	RAID	Maximum supported
CTO only	C0YX	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	Yes	VROC	2
CTO only	C0YS	ThinkSystem M.2 PM9A3 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	Yes	VROC	2

Intel VROC onboard RAID

Intel VROC (Virtual RAID on CPU) is a feature of the Intel processor that enables RAID support.

There are two separate functions of VROC in the HS350X V3:

- Intel VROC SATA RAID, formerly known as Intel RSTe
- Intel VROC NVMe RAID

VROC SATA RAID (RSTe) is available and supported with all SATA drives, both SATA SSDs and SATA HDDs. It offers a 6 Gb/s connection to each drive and on the HS350X V3 implements RAID levels 0 and 1. RAID 1 is limited to 2 drives per array. Hot-spare functionality is also supported.

VROC NVMe RAID offers RAID support for any NVMe drives directly connected to the ports on the server's system board. On the HS350X V3, it implements RAID levels 0, 1, 5, and 10. RAID 1 is limited to 2 drives per array, and RAID 10 is limited to 4 drives per array. Hot-spare functionality is also supported.

The following options are available as follows:

- VROC NVMe RAID on the HS350X V3 by default is disabled and does not support NVMe RAID. In configurator selecting "none" would mean default, same as JBOD.
- Selecting VROC Standard, feature code to support RAID-0/1/10.
- Selecting VROC Premium, feature code to support RAID-0/1/5/10.

VROC Standard or Premium are fulfilled as a Feature on Demand (FoD) license.

Table 9. VROC upgrade

Part number	Feature code	Description
CTO only	B0YH	Intel VROC Premium Key
CTO only	B0YJ	Intel VROC Standard Key

VROC Premium is only needed on the HS350X V3 for RAID-5 support with NVMe drives. You do not need the VROC Premium license upgrade under any of the following conditions:

- If you have SATA drives connected to the onboard SATA ports, you do not need VROC Premium.
- If you are using RAID 0, 1 or 10 with NVMe drives, you do not need VROC Premium.
- Limitation: Bootable OS RAID volume can't cross VMD controller.
- VROC is only supported in UEFI mode.

Virtualization support: Virtualization support for Intel VROC is as follows:

- **VROC SATA RAID (RSTe)** : VROC SATA RAID is not supported by virtualization hypervisors such as ESXi, KVM, Xen, and Hyper-V. Virtualization is only supported on the onboard SATA ports in AHCI (non-RAID) mode.
- **VROC (VMD) NVMe RAID** : VROC (VMD) NVMe RAID is supported by ESXi, KVM, Xen, and Hyper-V. ESXi support is limited to RAID 1 only; other RAID levels are not supported. Windows and Linux OSes support VROC RAID NVMe, both for host boot functions and for guest OS function, and RAID-0, 1, 5, and 10 are supported.

Controllers for internal storage

The HS350X V3 offers a variety of controller options for internal drives:

- For 2.5-inch and 3.5-inch drives:
  - Onboard SATA ports with software RAID support (Intel VROC SATA RAID, formerly known as Intel RSTe)
  - Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID)
  - RAID adapters and HBAs for SAS/SATA drives (PCIe slot-based)
  - RAID adapters and HBAs for SAS/SATA drives (cabled in a dedicated space)
- For M.2 drives internal to the server (see M.2 drives section)
  - SATA controller integrated on the M.2 adapters
  - NVMe controller integrated on the M.2 adapters (Intel VROC for RAID)

The following table lists the adapters used for the internal storage of the server.

Table 10. Internal Storage adapter support

Part number	Feature code	Description	Maximum supported	Slots supported
SAS HBA - PCIe 4.0				
CTO only	C0YM	ThinkSystem Broadcom 9600-24i SAS HBA RAID	1	1
RAID Adapter - PCIe 4.0				
CTO only	C0YN	ThinkSystem Broadcom 9670-24i Tri RAID	1	1
SuperCap				
CTO only	C0YP	ThinkSystem Broadcom RAID 930/940 SuperCap	1	N/A
CTO only	BVXQ	Super Cap Cable-80mm for RAID 94xx	1	N/A

Configuration notes:

- **Supercap support limits the number of RAID adapters installable** : RAID 9350 and 940 adapters include a power module (supercap) to power the flash memory. The server supports between 1 and 4 supercaps depending on the server configuration. The number of supercaps supported also determines the maximum number of RAID adapters with flash that can be installed in the server. Make sure SuperCap and cable are selected along with C0YN adapter.

For specifications about the RAID adapters and HBAs supported by the HS350X V3, see the ThinkSystem RAID Adapter and HBA Comparison, available from:

- https://lenovopress.lenovo.com/lp1288-thinksystem-raid-adapter-and-hba-reference

For details about these adapters, see the relevant product guide:

- SAS HBAs: https://lenovopress.com/servers/options/hba
- RAID adapters: https://lenovopress.com/servers/options/raid

Internal drive options

The following figure shows the front configurations of the HS350X V3. The server supports either at the front 3.5-inch hot-swap drives (up to 24x SATA drive bays) or 2.5-inch hot-swap drives (up to 2 bays) at the rear. The server also supports three rear slots (riser dependent) and 1x OCP slot.
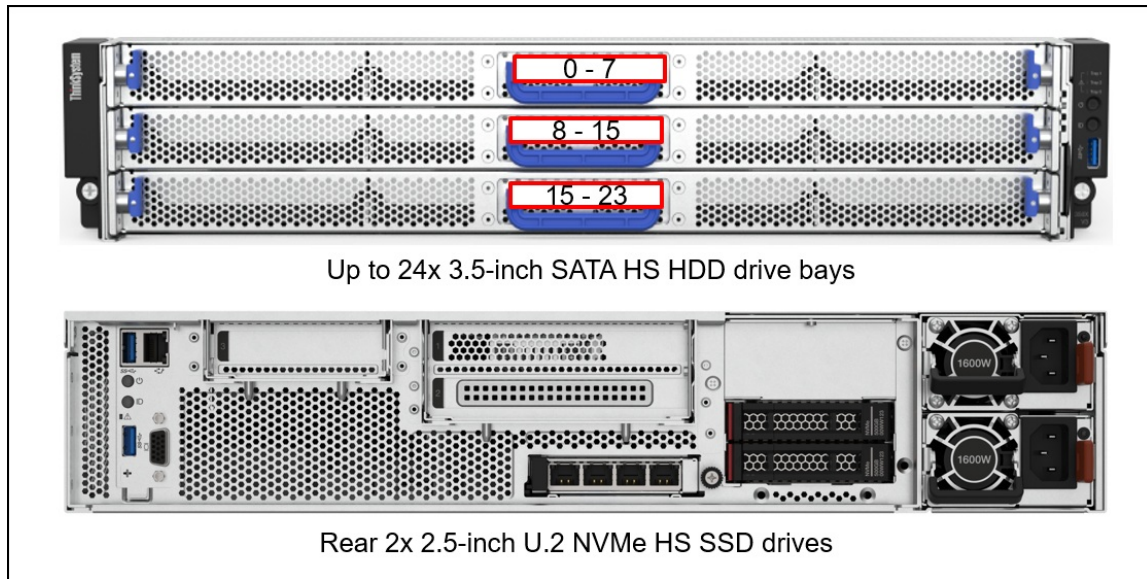
Figure 7. Front and rear view of the ThinkSystem Ready Node HS350X V3

The following tables list the drive options for internal storage of the server.

3.5-inch hot-swap drives:

- 3.5-inch hot-swap 6 Gb SATA HDDs

2.5-inch hot-swap drives:

- 2.5-inch hot-swap PCIe 4.0 NVMe SSDs

M.2 drives:

- M.2 NVMe drives SSDs

Table 11. 3.5-inch hot-swap 6 Gb SATA HDDs

Part number	Feature code	Description	SED support	Max Qty
3.5-inch hot-swap HDDs - 6 Gb NL SATA				
CTO only	C0Z1	ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	24
CTO only	C0YZ	ThinkSystem 3.5" 16TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	24
CTO only	C0Z0	ThinkSystem 3.5" 18TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	24
CTO only	C0YV	ThinkSystem 3.5" 20TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	24
CTO only	C0Z2	ThinkSystem 3.5" 22TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	24

Note: NVMe PCIe SSDs support surprise hot removal and hot insertion, provided the operating system supports PCIe SSD hot-swap.

Table 12. 2.5-inch hot-swap PCIe 4.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch HS SSDs - PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
CTO only	C0YQ	ThinkSystem 2.5" U.2 PM9A3 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	2
CTO only	C0YR	ThinkSystem 2.5" U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	2

Table 13. NVMe M.2 SSDs

Part number	Feature code	Description	SED support	Max Qty
M.2 SSDs - PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
CTO only	C0YX	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	2
CTO only	C0YS	ThinkSystem M.2 PM9A3 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	2

Internal backup units

The server does not supports any internal backup units, such as tape drives or RDX drives. External backup units are available as described in the External backup units section.

Optical drives

The server supports the external USB optical drive listed in the following table.

Table 14. External optical drive

Part number	Feature code	Description
7XA7A05926	AVV8	ThinkSystem External USB DVD RW Optical Disk Drive

The drive is based on the Lenovo Slim DVD Burner DB65 drive and supports the following formats: DVD-RAM, DVD-RW, DVD+RW, DVD+R, DVD-R, DVD-ROM, DVD-R DL, CD-RW, CD-R, CD-ROM.

I/O expansion

The HS350X V3 supports a total of up to 3x PCIe slots, 3x at the rear, plus 1x OCP 3.0 SFF slot for networking. The OCP slot is at the rear (but not both). Slot availability is based on risers configured.

Topics in this section:

- Slot layout and connections
- Ordering information

Slot layout and connections

The slots are provided by riser cards:

- Riser 1: Slots 1, 2 all full-height slots
- Riser 2: Slots 3, all half-height slot

The slots in each riser are either PCIe x16 or PCIe x8 depending on the riser card selected as listed in the table below. All x8 slots are open-ended and physically support x16 adapters. Depending on the risers selected, slots are either PCIe 5.0 or PCIe 4.0.

As discussed in the Internal storage section, the server supports drive bays in the rear of the server. The figure below shows the supported slots and rear drive bay.

The following figure shows the locations of the rear-accessible slots for each configuration selection. The OCP slot in located in the lower-center.
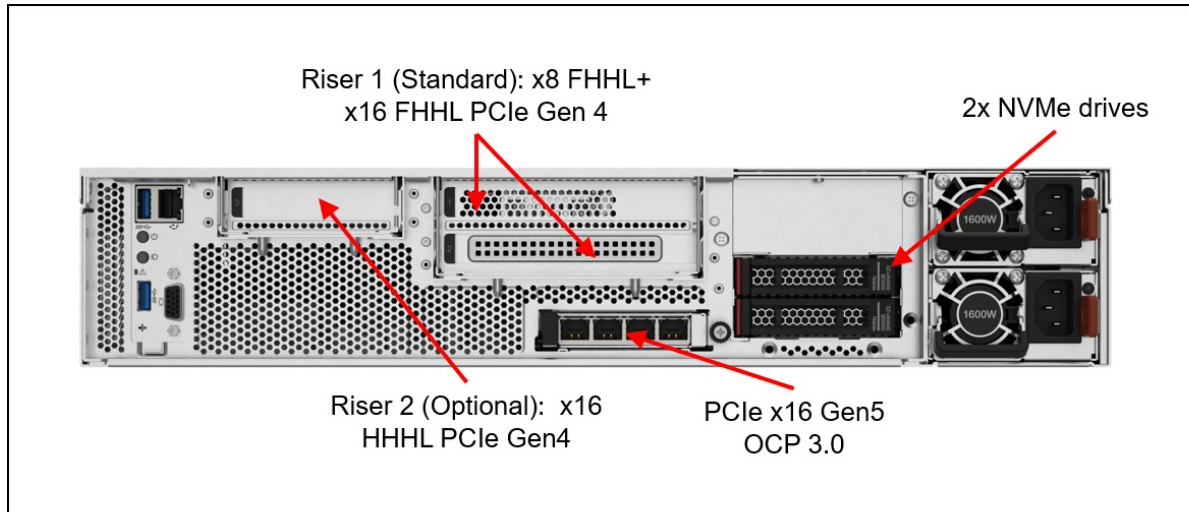
Figure 8. HS350X V3 rear slot supported

Ordering information

The following table lists the riser cards available for CTO builds.

Table 15. Riser cards

Part number	Feature code	Description	Slot configuration (Green = Gen5, Blue = Gen4)			Purpose
Rear Riser 1 (FH slots)			**Slot 1**	**Slot 2**	**Slot 3**	
CTO only	C0ZE	ThinkSystem HS350X V3 Riser 1	Gen4 x8	Gen4 x16	No slot	2 slots PCIe 4.0
CTO only	C0ZF	ThinkSystem HS350X V3 Riser 2 Kit	No slot	No slot	Gen4 x16	1 slot PCIe 4.0

Configuration rules:

- The server supports one OCP slot only, in the rear

Network adapters

The server has a dedicated OCP 3.0 SFF slot with PCIe 5.0 x16 host interface. See (figure 8) above for the location of the OCP slot.

The following table lists the supported OCP adapters. One port can optionally be shared for management for Wake-on-LAN and NC-SI support. Only 1 OCP card can be installed in the server, in the rear-accessible.

Table 16. Supported OCP adapters

Part number	Feature code	Description	Maximum supported
25 Gb Ethernet			
CTO only	C0YF	ThinkSystem Intel E810-XXVDA2 25GbE SFP28 2-Port OCP 3.0 Ethernet Adapter	1
CTO only	C0YL	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-Port OCP3.0 Ethernet Adapter	1
100 Gb Ethernet			
CTO only	C0Y1	ThinkSystem Intel E810-CQDA2 OCP3.0 Ethernet Network Adapter	1
CTO only	C0YK	ThinkSystem Broadcom 57508 100GbE QSFP28 2-Port OCP3.0 Ethernet Adapter	1
CTO only	C0YG	ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 2-Port OCP3.0 Ethernet Adapter	1

The following table lists additional supported network adapters that can be installed in the regular PCIe slot.

Table 17. Supported PCIe Network Adapter

Part number	Feature code	Description	Maximum supported
25 Gb Ethernet			
CTO only	C0YH	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	1

GPU adapters

The HS350X V3 des not support any graphics processing units (GPUs).

Fibre Channel host bus adapters

The following table lists the Fibre Channel HBAs supported by the HS350X V3.

Table 18. Fibre Channel HBAs

Part number	Feature code	Description	Max qty	Slots supported	PCIe lanes
32 Gb Fibre Channel HBAs					
CTO only	C0YJ	ThinkSystem Emulex LPe35002 32Gb 2-Port PCIe Fibre Channel Adapter V2	1	slot 2	Gen4 x16

For more information, see the list of Lenovo Press Product Guides in the Host bus adapters category:
https://lenovopress.com/servers/options/hba

SAS adapters for external storage

The HS350X V3 does not support external SAS adapters.

Flash storage adapters

The HS350X V3 currently does not support PCIe Flash Storage adapters.

Cooling

The HS350X V3 server supports the following:

- Six 6038 single rotor fans
- System +12 Volt hot plug fans supported
- Supporting N+1 Redundant.

These fans shall have the following electrical input, monitoring and control connections:

- 12V DC Power
- DC Power Return
- Tachometer Output
- Pulse Width Modulation Control

Power supplies

The HS350X V3 supports up to two redundant hot-swap power supplies.

The power supply choices are listed in the following table. Both power supplies used in server must be identical.

> **Tip**: When configuring a server in the DCSC configurator, power consumption is calculated precisely by interfacing with Lenovo Capacity Planner. You can therefore select the appropriate power supply for your configuration. However, do consider future upgrades that may require additional power needs.

Table 19. Power supply options

Part number	Feature code	Description	Connector	Max quantity	110V* AC	220V AC	240V DC PRC only	-48V DC
AC input power - 80 PLUS Titanium efficiency								
CTO Only	C0Y8	ThinkSystem CRPS GW-CRPS 1300W TT PSU	C13	2	No	Yes	Yes	No
AC input power - 80 PLUS Platinum efficiency								
CTO OnlY	C0Y9	ThinkSystem CRPS 1600W PT PSU	C13	2	No	Yes	Yes	No
CTO Only	C0Y6	ThinkSystem HS350X V3 AsPower 1300W PT PSU	C13	2	No	Yes	Yes	No
CTO Only	C0Y7	ThinkSystem HS350X V3 GW 1300W PT PSU	C13	2	No	Yes	Yes	No

* No support for 110V power at this time.

Supported power supplies are auto-sensing dual-voltage units, supporting both 220V AC (200-240V 50/60 Hz) power. For China customers, all power supplies support 240V DC.

Power supply options do not include a line cord. For server configurations, the inclusion of a power cord is model dependent. Configure-to-order models can be configured without power cords if desired.

Power supply LEDs

The supported hot-swap power supplies have the following LEDs:

- Power input LED:
    - Green: The power supply is connected to the AC power source
    - Off: The power supply is disconnected from the AC power source or a power problem has occurred
- Power output LED:
    - Green: The server is on and the power supply is working normally
    - Blinking green: The power supply is in Zero-output/Standby mode (see below)
    - Off: The server is powered off, or the power supply is not working properly
- Power supply error LED:
    - Off: The power supply is working normally
    - Yellow: The power supply has failed

Zero-output mode: The power supply unit is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server.

Power cords

Line cords and rack power cables with C13 connectors can be ordered as listed in the following table.

Table 20. Power cords

Part number	Feature code	Description
Rack cables - C13 to C14		
4L67A08365	B0N4	2.0m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
39Y7932	6263	4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
4L67A08366	6311	2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
Line cords		
39Y7921	6217	2.8m, 220-240V, C13 to CEI 23-16 (Italy/Chile) Line Cord
39Y7917	6212	2.8m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord
39Y7919	6216	2.8m, 10A/250V, C13 to SEV 1011-S24507 (Swiss) Line Cord
39Y7924	6211	2.8m, 10A/250V, C13 to AS/NZ 3112 (Australia/NZ) Line Cord
39Y7925	6219	2.8m, 220-240V, C13 to KETI (S Korea) Line Cord
39Y7920	6218	2.8m, 10A/250V, C13 to SI 32 (Israel) Line Cord
39Y7918	6213	2.8m, 10A/250V, C13 to DK2-5a (Denmark) Line Cord
39Y7922	6214	2.8m, 10A/250V, C13 to SABS 164 (S Africa) Line Cord
81Y2381	6579	4.3m, 10A/230V, C13 to SI 32 (Israel) Line Cord
4L67A08357	6533	2.8m, 200V, C13 to JIS C-8303 (Japan) Line Cord
81Y2377	6577	4.3m, 10A/230V, C13 to BS 1363/A (UK) Line Cord
81Y2382	6575	4.3m, 10A/230V, C13 to DK2-5a (Denmark) Line Cord
81Y2389	6531	4.3m, 10A/250V, C13 to 76 CNS 10917-3 (Taiwan) Line Cord
81Y2390	6578	4.3m, 10A/230V, C13 to SEV 1011-S24507 (Sws) Line Cord
81Y2383	6574	4.3m, 10A/230V, C13 to AS/NZS 3112 (Aus/NZ) Line Cord
CTO Only	AT5Q	2.8m, 10A/230V, C13 to BS 1363/A (UK) Line Cord
4L67A08362	6495	4.3m, 12A/200V, C13 to JIS C-8303 (Japan) Line Cord
81Y2385	6494	4.3m, 12A/220V, C13 to KSC 8305 (S. Korea) Line Cord
81Y2376	6572	4.3m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord
81Y2379	6576	4.3m, 10A/230V, C13 to SABS 164 (South Africa) Line Cord
81Y2375	6317	2.8m, 10A/240V, C13 to CNS 10917-3 (Taiwan) Line Cord
81Y2380	6493	4.3m, 10A/230V, C13 to CEI 23-16 (Italy/Chile) Line Cord
4L67A08361	6373	4.3m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord
46M2592	A1RF	2.8m, 10A/250V, C13 to NEMA 6-15P Line Cord

Systems management

The HS350X V3 contains

- System Management features including BMC (Aspeed AST2600) and IPMI feature, iKVM feature, Node Management, mounting of remote media through BMC and DCM feature.
- UEFI is an interface packed with various features, including system information and settings, boot and runtime services, BMC settings, system event logs, and user security.

Security

Rack installation

The following table lists the rack installation options that are available for the HS350X V3.

Table 21. Rack installation options

Part number	Feature	Description
Rail Kits		
CTO only	C0YA	ThinkSystem HS350X V3 L shape Rail Kit

The following table summarizes the rail kit features and specifications.

Table 22. Rail kit features and specifications summary

Feature	ThinkSystem HS350X V3 L shape Rail Kit
Option part number	None (Feature C0YA)
Rail type	L-shelf, 2U, toolless installation
Toolless installation	Yes
CMA support	No
Supported rack type	Four-post IBM and Lenovo standard rack, complying with the IEC standard
In-rack server maintenance	No
1U PDU support	Yes
0U PDU support	Limited support*
Supported mounting holes	Square
Thickness of mounting flanges	2.0-3.3 mm (0.08-0.13 inches)
Supported distance between front and rear mounting flanges‡	550 to 914 mm (21.7 to 36.0 inches)
Rail length†	550 mm (21.7 inches)

* If you want to install the rails and a 0U PDU into the same rack, the rack must meet the height and depth requirements as described in ThinkSystem Rail Support Matrix.
‡ For best performance, it is recommended that you install the rails to the racks with a 719-mm distance (28.31-inch, Lenovo rack default distance) between the front and rear mounting flanges.
† Measured when mounted on the rack, from the front surface of the front mounting flange to the rear most point of the rail. Rail is in closed position.

Operating system support

The HS350X V3 supports the following operating systems:

- Red Hat Enterprise Linux 9.2
- Ubuntu 22.04 LTS 64-bit

Note: Ubuntu 22.04 support is 22.04.3 or later. See OSIG for the latest version and point release information.

The HS350X V3 server is also certified or tested with the following operating systems:

- Rocky Linux

See Operating System Interoperability Guide (OSIG) for the complete list of supported, certified, and tested operating systems, including version and point releases: https://lenovopress.lenovo.com/osig#server_families=thinksystem&servers=hs350x-v3-7de3&support=all

Physical and electrical specifications

The HS350X V3 has the following overall physical dimensions, excluding components that extend outside the standard chassis, such as EIA flanges, front security bezel (if any), and power supply handles:

- Width: 447 mm (17.6 inches)
- Height: 87 mm (3.4 inches)
- Depth: 858 mm (33.8 inches)

The following table lists the detailed dimensions. See the figure below for the definition of each dimension.

Table 23. Detailed dimensions

Dimension	Description
481 mm	X_a = Width, to the outsides of the front EIA flanges
447 mm	X_b = Width, to the rack rail mating surfaces
447 mm	X_c = Width, to the outer most chassis body feature
87 mm	Y_a = Height, from the bottom of chassis to the top of the chassis
801 mm	Z_a = Depth, from the rack flange mating surface to the rearmost I/O port surface
814 mm	Z_b = Depth, from the rack flange mating surface to the rearmost feature of the chassis body
835 mm	Z_c = Depth, from the rack flange mating surface to the rearmost feature such as power supply handle
44 mm	Z_d = Depth, from the forwardmost feature on front of EIA flange to the rack flange mating surface
44 mm	Z_e = Depth, from the front of security bezel (if applicable) or forwardmost feature to the rack flange mating surface
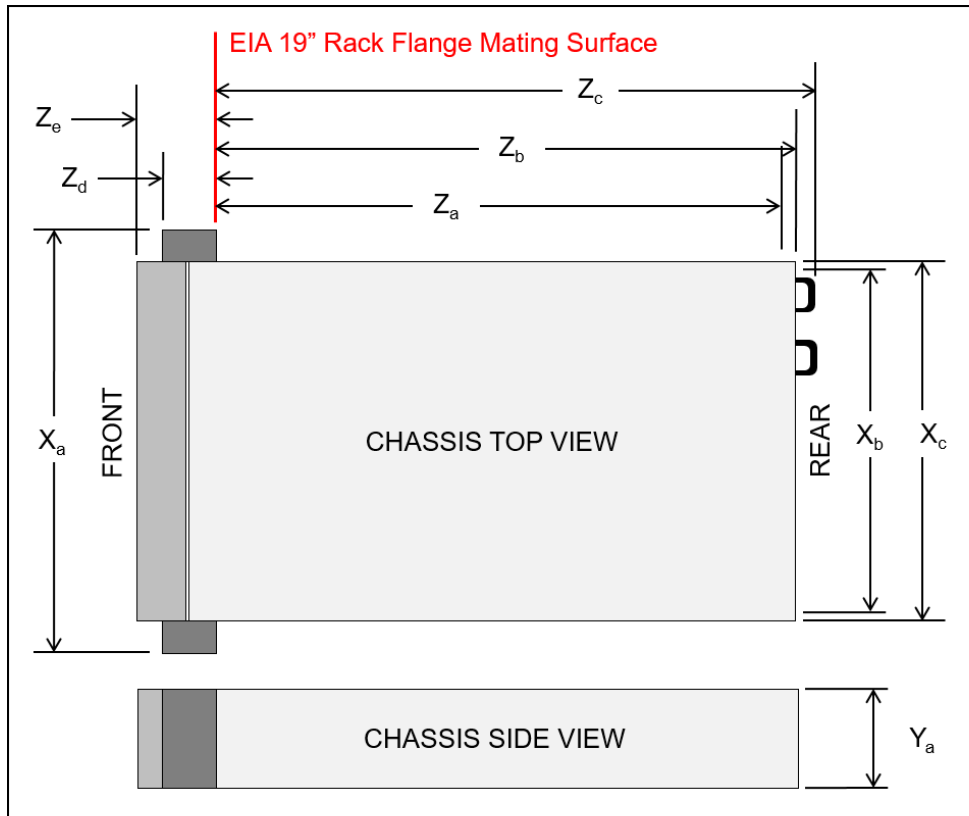
Figure 9. Server dimensions

The shipping dimensions (cardboard packaging) of the HS350X V3 are as follows:

- Width: 592 mm (23.3 inches)
- Height: 297 mm (11.7 inches)
- Depth: 1188 mm (46.8 inches)

The server has the following weight:

- Base configuration: 40.0 kg (88.2 lb)
- Maximum weight: 47.8 kg (105.4 lb)

Operating environment

HS350X V3 complies with ASHRAE Class A2 specifications.

- System performance may be affected when operating temperature is outside of AHSARE A2 specification.

Topics in this section:

- Ambient temperature requirements
- Acoustical noise emissions
- Particulate contamination

Ambient temperature requirements

The server is supported in the following environment:

- Air temperature:

- Operating:
  - ASHRAE class H1: 5–25°C (41–77°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 500 m (1640 ft) of altitude increase.

  - ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase.

  - ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase.

  - ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase.

  - Server off: 5–45°C (41–113°F)

  - Shipping or storage: -40–60°C (-40–140°F)

- Maximum altitude: 3050 m (10 000 ft)

- Relative humidity (non-condensing):
  - Operating:
    - ASHRAE Class H1: 8%–80%, maximum dew point: 17°C (62.6°F)

    - ASHRAE Class A2: 8%–80%, maximum dew point: 21°C (70°F)

    - ASHRAE Class A3: 8%–85%, maximum dew point: 24°C (75°F)

    - ASHRAE Class A4: 8%–90%, maximum dew point: 24°C (75°F)

  - Shipment or storage: 8%–90%

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- **Used configuration**
  - Six 6038 performance fans (100% duty)
  - One 350 W processor
  - Sixteen 64 GB RDIMMs
  - 24 SATA hard disk drives
  - Two 1600-watt power supply units
  - One Broadcom 9600-24i SATA/SAS HBA
  - Two Mellanox ConnectX-6 100Gb PCIe adapters
  - One Intel E810-CQDA2 OCP module

- **Sound power level (L$_{WAd}$)**
  - 8.60 Bel

- **Sound pressure level (L$_{pAm}$)**
  - 73.38 dBA

Notes:

- These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296.

- The declared sound levels may change depending on configuration/conditions.

- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Particulate contamination

Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might damage the system that might cause the system to malfunction or stop working altogether.

The following specifications indicate the limits of particulates that the system can tolerate:

- Reactive gases:
  - Severity level G1 as per ANSI/ISA 71.04-1985 [1]:
  - The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 μg/cm^2-hour weight gain).[2]

  - The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 μg/cm^2-hour weight gain).[3]

  - The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.

- Airborne particulates:
  - Data centers must meet the cleanliness level of ISO 14644-1 class 8.

    For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:

  - The room air might be continuously filtered with MERV 8 filters.

  - Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.

  - For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.

  - The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4]

  - Data centers must be free of zinc whiskers.[5]

For additional information, see the Specifications section of the documentation for the server, available from the Lenovo Documents site, https://pubs.lenovo.com/

Notes:

- [1] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

- [2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

- [3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

- [4] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

- [5] Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

Warranty and Support

The HS350X V3 has a 3-year warranty based on the machine type of the system:

- 7DE3 - 3 year warranty

The standard warranty terms are customer-replaceable unit (CRU) and onsite (for field-replaceable units FRUs only) with standard call center support during normal business hours and 9x5 Next Business Day Parts Delivered.

Lenovo's additional support services provide a sophisticated, unified support structure for your data center, with an experience consistently ranked number one in customer satisfaction worldwide. Available offerings include:

- **Premier Support**

  Premier Support provides a Lenovo-owned customer experience and delivers direct access to technicians skilled in hardware, software, and advanced troubleshooting, in addition to the following:

  - Direct technician-to-technician access through a dedicated phone line
  - 24x7x365 remote support
  - Single point of contact service
  - End to end case management
  - Third-party collaborative software support
  - Online case tools and live chat support
  - On-demand remote system analysis

- **Warranty Upgrade (Preconfigured Support)**

  Services are available to meet the on-site response time targets that match the criticality of your systems.

  - 3, 4, or 5 years of service coverage
  - 1-year or 2-year post-warranty extensions
  - **Foundation Service**: 9x5 service coverage with next business day onsite response. YourDrive YourData is an optional extra (see below).
  - **Essential Service:** 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select markets). Bundled with YourDrive YourData.
  - **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select markets). Bundled with YourDrive YourData.

- **Managed Services**

  Lenovo Managed Services provides continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of your data center using state-of-the-art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

  Quarterly reviews check error logs, verify firmware & OS device driver levels, and software as needed. We'll also maintain records of latest patches, critical updates, and firmware levels, to ensure you systems are providing business value through optimized performance.

- **Technical Account Management (TAM)**

  A Lenovo Technical Account Manager helps you optimize the operation of your data center based on a deep understanding of your business. You gain direct access to your Lenovo TAM, who serves as your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time. In addition, your TAM will help proactively make service recommendations and manage your service relationship with Lenovo to make certain your needs are met.

- **Enterprise Server Software Support**

  Enterprise Software Support is an additional support service providing customers with software support on Microsoft, Red Hat, SUSE, and VMware applications and systems. Around the clock availability for critical problems plus unlimited calls and incidents helps customers address challenges fast, without incremental costs. Support staff can answer troubleshooting and diagnostic questions, address product comparability and interoperability issues, isolate causes of problems, report defects to software vendors, and more.

- **YourDrive YourData**

  Lenovo's YourDrive YourData is a multi-drive retention offering that ensures your data is always under your control, regardless of the number of drives that are installed in your Lenovo server. In the unlikely event of a drive failure, you retain possession of your drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The YourDrive YourData service can be purchased in convenient bundles and is optional with Foundation Service. It is bundled with Essential Service and Advanced Service.

- **Health Check**

  Having a trusted partner who can perform regular and detailed health checks is central to maintaining efficiency and ensuring that your systems and business are always running at their best. Health Check supports Lenovo-branded server, storage, and networking devices, as well as select Lenovo-supported products from other vendors that are sold by Lenovo or a Lenovo-Authorized Reseller.

Examples of region-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at customer's own cost and labor and defective parts must be returned following the instructions supplied with the spare parts.

Lenovo Service offerings are region-specific. Not all preconfigured support and upgrade options are available in every region. For information about Lenovo service upgrade offerings that are available in your region, refer to the following resources:

- Service part numbers in Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com/#/services
- Lenovo Services Availability Locator
  http://lenovolocator.com/

For service definitions, region-specific details, and service limitations, please refer to the following documents:

- Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) Servers and System Storage
  http://pcsupport.lenovo.com/us/en/solutions/ht503310
- Lenovo Data Center Services Agreement
  http://support.lenovo.com/us/en/solutions/ht116628

Services

Lenovo Services is a dedicated partner to your success. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

> **Note**: Some service options may not be available in all markets or regions. For more information, go to https://www.lenovo.com/services. For information about Lenovo service upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Here's a more in-depth look at what we can do for you:

- **Asset Recovery Services**

  Asset Recovery Services (ARS) helps customers recover the maximum value from their end-of-life equipment in a cost-effective and secure way. On top of simplifying the transition from old to new equipment, ARS mitigates environmental and data security risks associated with data center equipment disposal. Lenovo ARS is a cash-back solution for equipment based on its remaining market value, yielding maximum value from aging assets and lowering total cost of ownership for your customers. For more information, see the ARS page, https://lenovopress.com/lp1266-reduce-e-waste-and-grow-your-bottom-line-with-lenovo-ars.

- **Assessment Services**

  An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

  Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

- **Basic Hardware Installation**

  Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

- **Deployment Services**

  When investing in new IT infrastructures, you need to ensure your business will see quick time to value with little to no disruption. Lenovo deployments are designed by development and engineering teams who know our Products & Solutions better than anyone else, and our technicians own the process from delivery to completion. Lenovo will conduct remote preparation and planning, configure & integrate systems, validate systems, verify and update appliance firmware, train on administrative tasks, and provide post-deployment documentation. Customer's IT teams leverage our skills to enable IT staff to transform with higher level roles and tasks.

- **Integration, Migration, and Expansion Services**

  Move existing physical & virtual workloads easily, or determine technical requirements to support increased workloads while maximizing performance. Includes tuning, validation, and documenting ongoing run processes. Leverage migration assessment planning documents to perform necessary migrations.

External storage systems

Lenovo offers the ThinkSystem DE Series and ThinkSystem DM Series external storage systems for high-performance storage. See the DE Series and DM Series product guides for specific controller models, expansion enclosures and configuration options:

- ThinkSystem DE Series Storage
  https://lenovopress.com/storage/thinksystem/de-series#rt=product-guide
- ThinkSystem DM Series Storage
  https://lenovopress.com/storage/thinksystem/dm-series#rt=product-guide
- ThinkSystem DG Series Storage
  https://lenovopress.com/storage/thinksystem/dg-series#rt=product-guide

External backup units

The following table lists the external backup options that are offered by Lenovo that can be used in Lenovo FC SAN solutions.

Note: Information provided in this section is for ordering reference purposes only. End-to-end LTO Ultrium configuration support for a particular tape backup unit *must* be verified through the System Storage Interoperation Center (SSIC):
http://www.ibm.com/systems/support/storage/ssic

Table 24. External Fibre Channel backup options

Part number	Description
External tape backup libraries	
6741A1F	IBM TS4300 3U Tape Library-Base Unit
Fibre Channel backup drives for TS4300 Tape Library - Full Height	
01KP938	LTO 7 FH Fibre Channel Drive
01KP954	LTO 8 FH Fibre Channel Drive
02JH837	LTO 9 FH Fibre Channel Drive
Fibre Channel backup drives for TS4300 Tape Library - Full Height	
01KP936	LTO 7 HH Fibre Channel Drive
01KP952	LTO 8 HH Fibre Channel Drive
02JH835	LTO 9 HH Fibre Channel Drive

For more information, see the list of Product Guides in the Tape Autoloaders and Libraries category:
https://lenovopress.com/storage/tape/library

Fibre Channel SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches:
  https://lenovopress.com/storage/switches/rack#rt=product-guide

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo.

Table 25. Uninterruptible power supply units

Part number	Description
55941AX	RT1.5kVA 2U Rack or Tower UPS (100-125VAC)
55941KX	RT1.5kVA 2U Rack or Tower UPS (200-240VAC)
55942AX	RT2.2kVA 2U Rack or Tower UPS (100-125VAC)
55942KX	RT2.2kVA 2U Rack or Tower UPS (200-240VAC)
55943AX	RT3kVA 2U Rack or Tower UPS (100-125VAC)
55943KX	RT3kVA 2U Rack or Tower UPS (200-240VAC)
55945KX	RT5kVA 3U Rack or Tower UPS (200-240VAC)
55946KX	RT6kVA 3U Rack or Tower UPS (200-240VAC)
55948KX	RT8kVA 6U Rack or Tower UPS (200-240VAC)
55949KX	RT11kVA 6U Rack or Tower UPS (200-240VAC)
55948PX	RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55949PX	RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55943KT†	ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55943LT†	ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55946KT†	ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)
5594XKT†	ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)

† Only available in China and the Asia Pacific market.

For more information, see the list of Product Guides in the UPS category:
https://lenovopress.com/servers/options/ups

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo.

Table 26. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
00YJ776	ATZY	0U 36 C13/6 C19 24A 1 Phase PDU	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	N
0U Switched and Monitored PDUs															
00YJ783	AU04	0U 12 C13/12 C19 Switched and Monitored 48A 3 Phase PDU	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
00YJ781	AU03	0U 20 C13/4 C19 Switched and Monitored 24A 1 Phase PDU	N	N	Y	N	Y	N	Y	N	N	Y	Y	Y	N
1U Switched and Monitored PDUs															
4PU7A90808	C0D4	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A90809	C0DE	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 CE	N	N	N	N	N	N	Y	Y	N	N	N	N	N
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
4PU7A90810	C0DD	1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A90811	C0DC	1U 12 C19/C13 Switched and monitored 32A 3P WYE PDU V2	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A90812	C0DB	1U 12 C19/C13 Switched and monitored 60A 3P Delta PDU V2	N	N	N	N	N	N	N	N	N	Y	N	N	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
1U Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)															
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U C13 Enterprise PDUs (12x IEC 320 C13 outlets)															
39Y8941	6010	DPI C13 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U Front-end PDUs (3x IEC 320 C19 outlets)															
39Y8938	6002	DPI Single-phase 30A/120V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
39Y8939	6003	DPI Single-phase 30A/208V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8934	6005	DPI Single-phase 32A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8940	6004	DPI Single-phase 60A/208V Front-end PDU (US)	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N
39Y8935	6006	DPI Single-phase 63A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U NEMA PDUs (6x NEMA 5-15R outlets)															
39Y8905	5900	DPI 100-127V NEMA PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Line cords for 1U PDUs that ship without a line cord															
40K9611	6504	4.3m, 32A/380-415V, EPDU/IEC 309 3P+N+G 3ph wye (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	4.3m, 32A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9613	6503	4.3m, 63A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	4.3m, 30A/208V, EPDU to NEMA L6-30P (US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	4.3m, 60A/208V, EPDU to IEC 309 2P+G (US) Line Cord	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
40K9617	6505	4.3m, 32A/230V, Souriau UTG Female to AS/NZ 3112 (Aus/NZ) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9618	6506	4.3m, 32A/250V, Souriau UTG Female to KSC 8305 (S. Korea) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For more information, see the Lenovo Press documents in the PDU category:
https://lenovopress.com/servers/options/pdu

Rack cabinets

The following table lists the supported rack cabinets.

Table 27. Rack cabinets

Part number	Description
93072RX	25U Standard Rack (1000mm)
93072PX	25U Static S2 Standard Rack (1000mm)
7D6DA007WW	ThinkSystem 42U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6DA008WW	ThinkSystem 42U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
1410-O42	Lenovo EveryScale 42U Onyx Heavy Duty Rack Cabinet
1410-P42	Lenovo EveryScale 42U Pearl Heavy Duty Rack Cabinet
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93074RX	42U Standard Rack (1000mm)
7D6EA009WW	ThinkSystem 48U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA00AWW	ThinkSystem 48U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
1410-O48	Lenovo EveryScale 48U Onyx Heavy Duty Rack Cabinet
1410-P48	Lenovo EveryScale 48U Pearl Heavy Duty Rack Cabinet

For specifications about these racks, see the Lenovo Rack Cabinet Reference, available from:
https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference

For more information, see the list of Product Guides in the Rack cabinets category:
https://lenovopress.com/servers/options/racks

KVM console options

The following table lists the supported KVM consoles.

Table 28. KVM console

Part number	Description
4XF7A84188	ThinkSystem 18.5" LCD Console (with US English keyboard)

The following table lists the available KVM switches and the options that are supported with them.

Table 30. KVM switches and options

Part number	Description
KVM Console switches	
1754D2X	Global 4x2x32 Console Manager (GCM32)
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)
1754A1X	Local 1x8 Console Manager (LCM8)
Cables for GCM and LCM Console switches	
46M5383	Virtual Media Conversion Option Gen2 (VCO2)
46M5382	Serial Conversion Option (SCO)

For more information, see the list of Product Guides in the KVM Switches and Consoles category:
http://lenovopress.com/servers/options/kvm

Seller training courses

The following sales training courses are offered for employees and partners (login required). Courses are listed in date order.

1. **Partner Technical Webinar - Premier, HS350X and LSST**
   2024-03-04 | 60 minutes | Employees and Partners

   in this 60-minute replay, we covered 3 topics. Syed Hussaini, Lenovo SSG Product Management reviewed Premier Support. Herb Ducey, Lenovo Data Management Product Manager reviewed the new HS350X Storage Server. And Dan Beins, Lenovo Storage Architect reviewed and demo'd the Lenovo Storage Sizing Tool (LSST).

   Published: 2024-03-04
   Length: 60 minutes
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning
   Course code: 030124

2. **Storage Portfolio HS350X V3 Update**
   2024-02-15 | 10 minutes | Employees and Partners

   This Quick Hit covers a new product in the Lenovo storage portfolio, the Lenovo ThinkSystem HS350X V3 storage server.
   After completing this Quick Hit, the learner will be able to describe the HS350X V3 storage server, list the main features of this product , and recognize when the HS350X V3 should be recommended to customers.

   Published: 2024-02-15
   Length: 10 minutes
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning
   Course code: SXSW1201r16a

3. **Family Portfolio: Storage**
   2024-02-02 | 15 minutes | Employees and Partners

   This course covers products in the Lenovo storage portfolio, from storage servers to direct-access storage through storage systems.
   After completing this course about the Storage family, the learner will be able to identify products within the family, describe the features of this product family, and recognize when a specific product should be selected.

   Published: 2024-02-02
   Length: 15 minutes
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning
   Course code: SXSW1201r16

Lenovo Financial Services

Lenovo Financial Services reinforces Lenovo's commitment to deliver pioneering products and services that are recognized for their quality, excellence, and trustworthiness. Lenovo Financial Services offers financing solutions and services that complement your technology solution anywhere in the world.

We are dedicated to delivering a positive finance experience for customers like you who want to maximize your purchase power by obtaining the technology you need today, protect against technology obsolescence, and preserve your capital for other uses.

We work with businesses, non-profit organizations, governments and educational institutions to finance their entire technology solution. We focus on making it easy to do business with us. Our highly experienced team of finance professionals operates in a work culture that emphasizes the importance of providing outstanding customer service. Our systems, processes and flexible policies support our goal of providing customers with a positive experience.

We finance your entire solution. Unlike others, we allow you to bundle everything you need from hardware and software to service contracts, installation costs, training fees, and sales tax. If you decide weeks or months later to add to your solution, we can consolidate everything into a single invoice.

Our Premier Client services provide large accounts with special handling services to ensure these complex transactions are serviced properly. As a premier client, you have a dedicated finance specialist who manages your account through its life, from first invoice through asset return or purchase. This specialist develops an in-depth understanding of your invoice and payment requirements. For you, this dedication provides a high-quality, easy, and positive financing experience.

For your region-specific offers, please ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/

Related publications and links

For more information, see these resources:

- ThinkSystem Lenovo products page:
- https://www.lenovo.com/us/en/servers-storage/
- ThinkSystem HS350X V3 datasheet
  https://lenovopress.lenovo.com/datasheet/ds0173-lenovo-thinksystem-hs350x-v3
- ThinkSystem HS350X V3 drivers and support
  https://datacentersupport.lenovo.com/us/en
- Lenovo ThinkSystem HS350X V3 product publications:
  https://pubs.lenovo.com/
    - User Guide, which includes:
        - System Configuration Guide
        - Hardware Maintenance Guide
    - Rack Installation Guides
    - Messages and Codes Reference
    - UEFI Manual for ThinkSystem Servers
- ServerProven hardware compatibility:
  https://serverproven.lenovo.com/

Related product families

Product families related to this document are the following:

- 2-Socket Rack Servers
- Software-Defined Storage
- ThinkSystem HS350X V3 Storage Server
- ThinkSystem HS350X V3 Storage Server

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