Lenovo ThinkSystem SD520 V4 Server
Product Guide

The Lenovo ThinkSystem SD520 V4 is a one-socket server in a 2U4N multi-node form factor based on the Intel Xeon 6700-series processor. Combining the efficiency and density of blades with the value and simplicity of rack-based servers, the SD520 V4 delivers a cost-efficient scale-out platform that is thermally designed to deliver maximum performance in the smallest footprint. The solution consists of a 2U ThinkSystem D3 V2 Chassis containing up to four front-access SD520 V4 servers (nodes).

The SD520 V4 is designed for high density and scale-out workloads in various customer segments including cloud service providers (CSP) and telecommunication industry customers.

The following figure shows four ThinkSystem SD520 V4 servers installed in a D3 V2 Chassis.

Figure 1. Four ThinkSystem SD520 V4 servers installed in a D3 V2 Chassis

360° View | Full 3D Tour

Did you know?

The SD520 V4 combines the efficiency and density of blades with the value and simplicity of rack-based servers. With high-performance features such as Intel Xeon 6 processors and planned support for Intel and NVIDIA GPUs to power through your most demanding workloads.

Key features

The Lenovo ThinkSystem SD520 V4 server supports one processor from the Intel Xeon 6700-series with E-cores. Up to four SD520 V4 servers can be installed in the D3 V2 Chassis. Each server has its own fans to ensure proper cooling for installed components, and its own networking to ensure maximum performance.

The front-accessible design optimized for best-in-class thermal capabilities provides a dense, flexible solution with a low TCO. The half-wide server is designed for data centers that require high performance but are constrained by floor space.

The ThinkSystem D3 V2 Chassis is an efficient, 2U rack mount enclosure with no built-in networking or switching capabilities; therefore, it requires no enclosure-level management. Sensibly designed to provide shared, high-efficiency power for housed servers, the D3 V2 Chassis is designed to scale with your business needs.

Scalability and performance

The SD520 V4 server offers numerous features to boost performance, improve scalability, and reduce costs:

- Each SD520 V4 server supports one Intel Xeon 6700-series processor, 8 TruDDR5 DIMMs, a PCIe 5.0 x16 slot plus an OCP 3.0 slot for high-speed I/O, and six 2.5-inch hot-swap drive bays, all in a half-wide 1U form factor.
- Up to 4 SD520 V4 servers are installed in the D3 V2 Chassis, occupying only 2U of rack space. It is a highly dense and scalable offering.
- Supports one Intel Xeon 6700-series processor with Efficient-cores (E-cores)
    - Up to 144 cores
    - Core speeds of up to 2.4 GHz
    - TDP ratings of up to 330 W
- Support for DDR5 memory DIMMs to maximize the performance of the memory subsystem:
    - Up to 8 DIMMs each with its own memory channel to the processor (1 DIMM per channel)
    - Memory operates at 6400 MHz
    - Using 64GB RDIMMs, the server supports up to 512GB of system memory
- Planned support for Compute Express Link (CXL) memory DIMMs in an E3.S 2T form factor. With CXL 2.0 for next-generation workloads, you can reduce compute latency in the data center and lower TCO. CXL is a protocol that runs across the standard PCIe physical layer and can support both standard PCIe devices as well as CXL devices on the same link. (planned for 1Q/2025)
- Each SD520 V4 server supports six 2.5-inch hot-swap SSDs, either SAS, SATA, or NVMe. NVMe drives each have a PCIe 5.0 x4 interface which maximizes I/O performance in terms of throughput, bandwidth, and latency.
- Supports up to four M.2 drives for convenient operating system boot or OS-based storage functions. Buit-in RAID-1 redundancy on two drives. Optional RAID-1 redundancy on the other two drives using Intel VROC RAID.
- The server has a dedicated industry-standard OCP 3.0 slot, with a PCIe 5.0 x16 interface, supporting a variety of Ethernet network adapters. A simple-swap mechanism with a thumbscrew and pull-tab enables tool-less installation and removal of the adapter. The adapter supports shared BMC network sideband connectivity (NC-SI) to enable out-of-band systems management.
- One PCIe 5.0 x16 low profile half-length slot is supported, providing support for a variety of high-speed network and storage adapters.
- 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 200GbE network connection.

Availability and serviceability

The SD520 V4 server and the D3 V2 Chassis provide many features to simplify serviceability and increase system uptime:

- Designed to run 24 hours a day, 7 days a week
- The server offers Single Device Data Correction (SDDC, also known as Chipkill), Adaptive Double-Device Data Correction (ADDDC, also known as Redundant Bit Steering or RBS), and memory mirroring for redundancy in the event of a non-correctable memory failure.
- The server offers hot-swap drives, supporting RAID-1 redundancy (using Intel VROC) for data protection and greater system uptime.
- Two of the four M.2 drives, are mounted on an M.2 adapter with built-in RAID-1 support. The other two M.2 drives are mounted in an onboard connector with RAID-1 support using Intel VROC.
- The D3 V2 Chassis supports three hot-swap power supplies which are N+1 redundant to provide availability for business-critical applications.
- Toolless access to upgrades and serviceable parts, such as fans, adapters, CPUs, and memory.
- Proactive Platform Alerts (including PFA and SMART alerts): Processors, voltage regulators, memory, internal storage (E3.S SSDs and M.2 storage), fans, power supplies, and server ambient and sub-component temperatures. Alerts can be surfaced through the XClarity Controller (XCC) to managers such as Lenovo XClarity Administrator, VMware vCenter, and Microsoft System Center. These proactive alerts let you take appropriate actions in advance of possible failure, thereby increasing server uptime and application availability.
- The built-in XClarity Controller continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failures to minimize downtime.
- Built-in diagnostics in UEFI, using Lenovo XClarity Provisioning Manager, speed up troubleshooting tasks to reduce service time.
- Lenovo XClarity Provisioning Manager supports diagnostics and can save service data to a USB key drive or remote CIFS share folder for troubleshooting and reduce service time.
- Auto restart in the event of a momentary loss of AC power (based on power policy setting in the XClarity Controller service processor)
- Offers a diagnostics port on the front of the server to allow you to attach an external diagnostics handset for enhanced systems management capabilities.
- Support for the XClarity Administrator Mobile app running on a supported smartphone or tablet and connected to the server through the service-enabled USB port, enables additional local systems management functions.
- Three-year or one-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

Powerful systems management features simplify local and remote management of the SD520 V4:

- The server includes XClarity Controller 3 (XCC3) to monitor server availability. Optional upgrade to XCC3 Premier to provide remote control (keyboard video mouse) functions, support for the mounting of remote media files (ISO and IMG image files), boot capture and power capping. XCC3 Premier also offers additional features such as Neighbor Groups, System Guard, a CNSA-compliant security mode, a FIPS 140-3-compliant mode, and enhanced NIST 800-193 support.
- Dedicated Ethernet port at the rear of the server for remote management (BMC management).
- Lenovo XClarity Administrator offers comprehensive hardware management tools that help to increase uptime, reduce costs and improve productivity through advanced server management capabilities.
- UEFI-based Lenovo XClarity Provisioning Manager, 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.

- Support for Lenovo XClarity Energy Manager, which captures real-time power and temperature data from the server and provides automated controls to lower energy costs.
- 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, Redfish REST API, serial console via IPMI
- 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 the E3.S and M.2 drives.
- Industry-standard Advanced Encryption Standard (AES) NI support for faster, stronger encryption.
- 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 SD520 V4 and the D3 V2 Chassis offer the following energy efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- ASHRAE A2 compliance for certain configurations to enable operation in 35°C datacenters
- Energy-efficient planar components help lower operational costs.
- High-efficiency power supplies with 80 PLUS Titanium certifications.
- Next Generation Lenovo Neptune™ Thermal Transfer Module for efficient air cooling of the CPUs.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed to reduce power draw.
- Optional Lenovo XClarity Energy Manager provide advanced data center power notification, analysis, and policy-based management to help achieve lower heat output and reduced cooling needs

Components and connectors

The following figure shows the front of the SD520 V4 server.

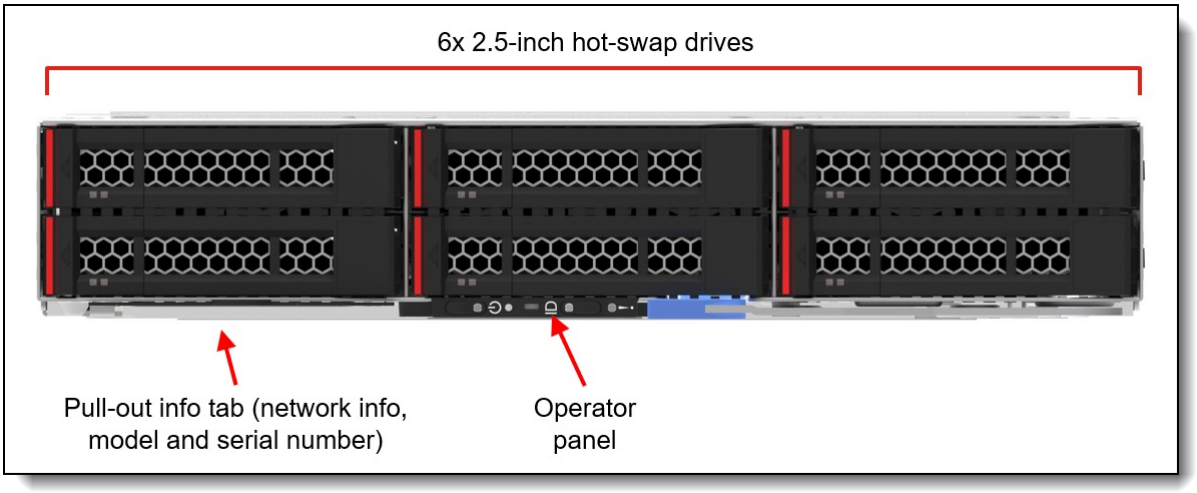

Figure 2. Front view of the SD520 V4 node

The following figure shows the rear of the SD520 V4 server.

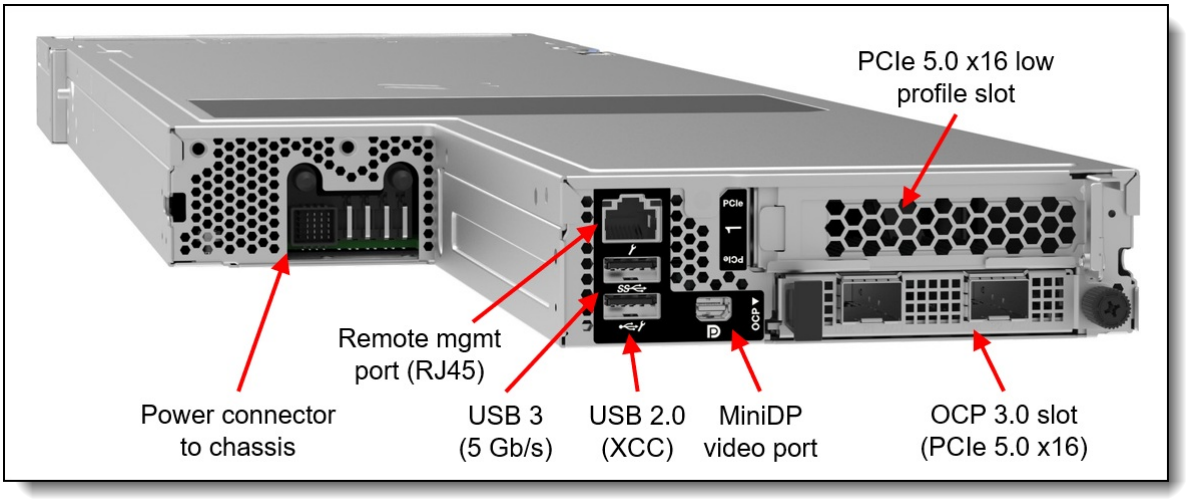

Figure 3. Rear view of the SD520 V4 node

The following figure shows the internals of the SD520 V4 server identifying key components.

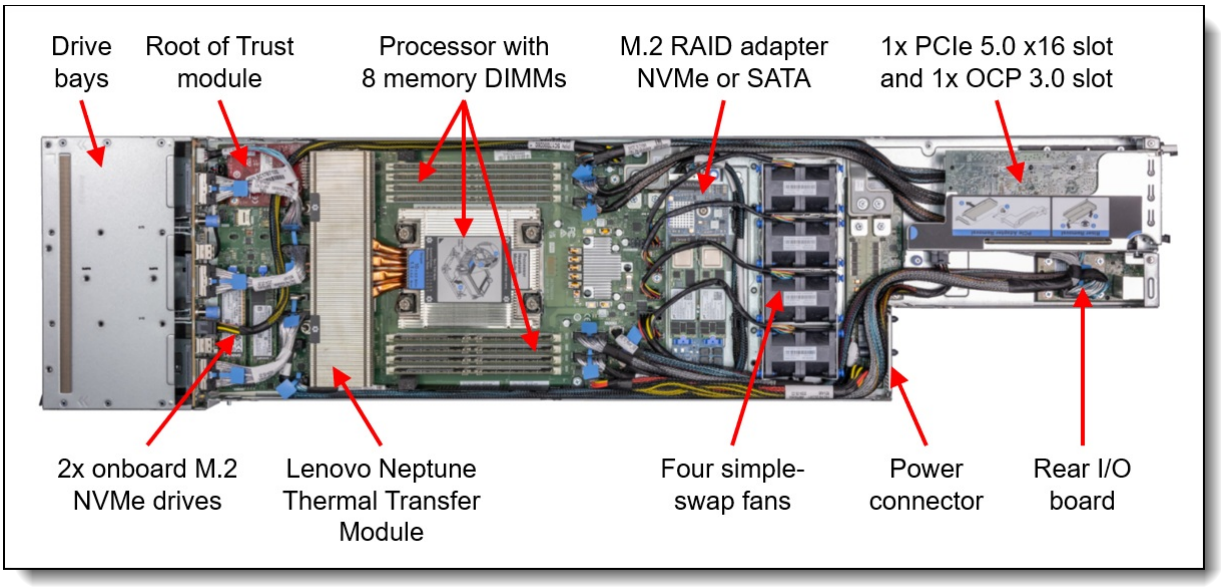

Figure 4. Internal view of the SD520 V4 compute node

The following figure shows the front of the D3 V2 Chassis. The front view shows the four SD520 V4 nodes. The nodes on the right of the chassis are installed upside down.

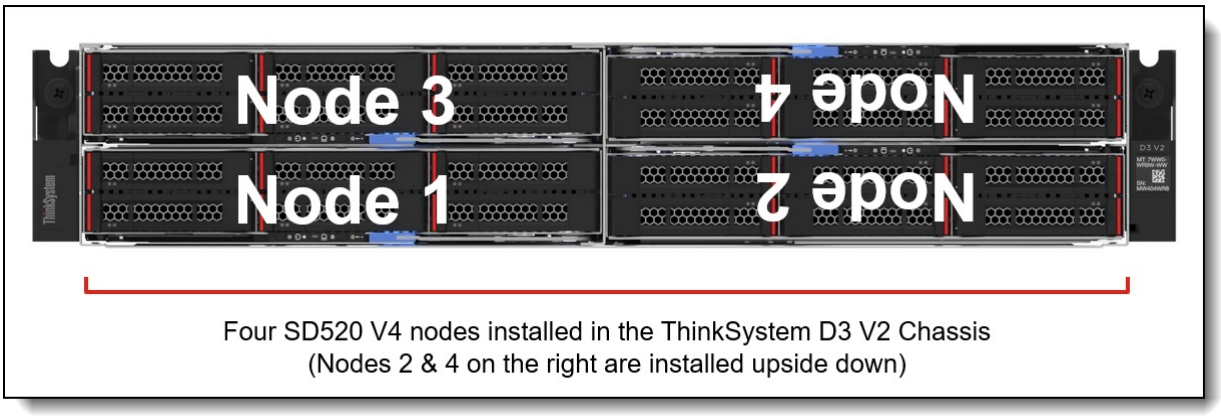

Figure 5. Front view of the ThinkSystem D3 V2 Chassis

The following figure shows the rear of the D3 V2 Chassis.

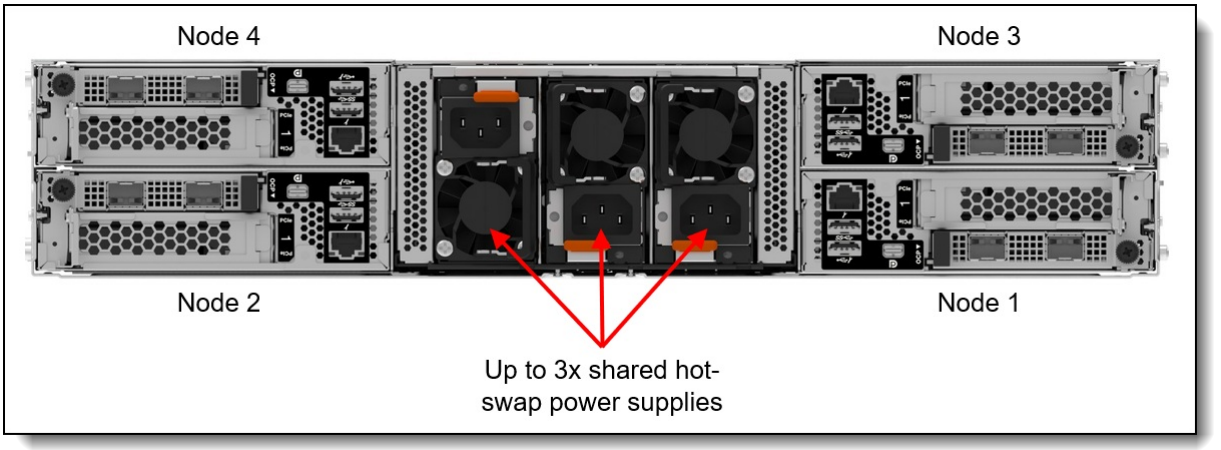

Figure 6. Rear view of the ThinkSystem D3 V2 Chassis

System architecture

The following figure shows the architectural block diagram of the SD520 V4, showing the major components and their connections.

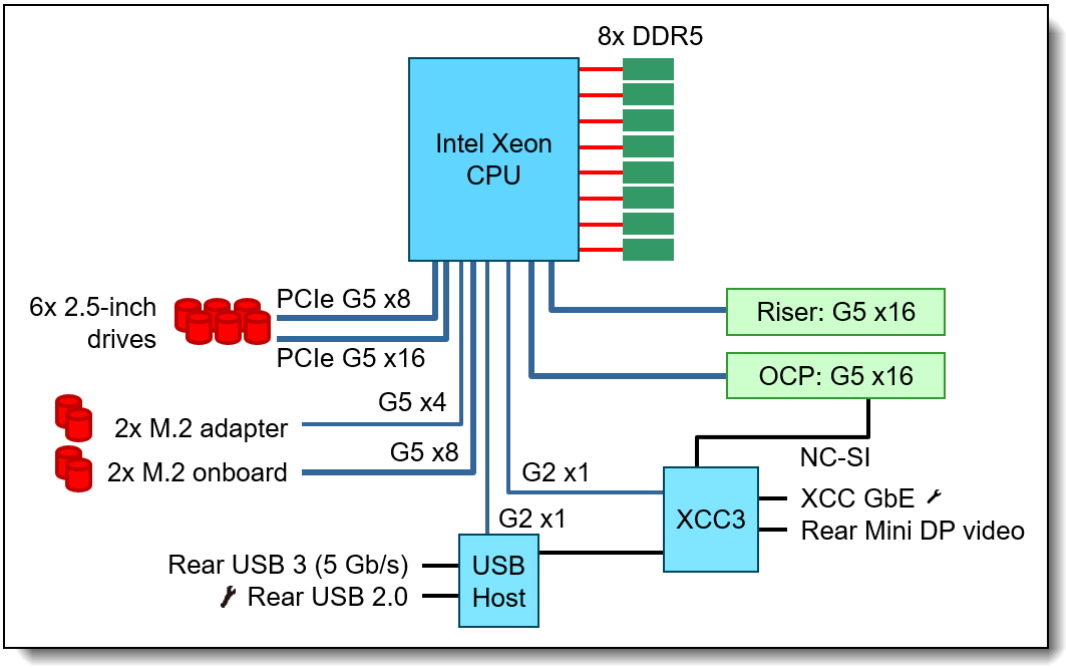

Figure 7. SD520 V4 system architectural block diagram

Standard specifications - SD520 V4 server

The following table lists the standard specifications of the SD520 V4.

Table 1. Standard specifications - ThinkSystem SD520 V4

Components	Specification
Machine type	7DFY - 3 year warranty 7DFZ - 1 year warranty
Form factor	Half-wide, 1U compute node.
Supported enclosure	ThinkSystem D3 V2 Chassis (7DGX/7DGW), 2U high; up to 4 servers per chassis. Also supported in the ThinkSystem D3 Chassis (7DD7/7DD0).
Processor	One Intel Xeon 6700-series processor (formerly codenamed "Sierra Forest"). Supports processors up to 144 cores, core speeds of up to 2.4 GHz, and TDP ratings of up to 330 W.
Chipset	None. Integrated into the processor.
Memory	8 DIMM slots, 1 DIMM per memory channel (8 memory channels). Lenovo TruDDR5 RDIMMs are supported. DIMMs operate at up to 6400 MHz.
Memory maximums	Up to 512GB by using 8x 64GB RDIMMs
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs), and memory mirroring.
Drive bays	• 6x 2.5-inch hot-swap drive bays supporting PCIe 5.0 x4 NVMe SSDs (SAS and SATA SSDs are planned for 1Q/2025) • 2x M.2 drives on an M.2 adapter with built-in RAID controller supporting NVMe drives (x1 interface) or SATA drives • 2x onboard M.2 slots supporting NVMe drives (x4 host interface)
Maximum internal storage	92.16TB using 6x 15.36TB NVMe SSDs
Storage controller	Onboard NVMe ports (Optional Intel VROC NVMe for RAID)
Optical drive bays	No internal bays; use an external USB drive.
Tape drive bays	No internal bays. Use an external USB 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. One port can optionally be shared with the XClarity Controller (XCC) management processor for Wake-on-LAN and NC-SI support.
PCIe slots	One PCIe 5.0 x16 slot with low profile form factor
GPU support	Supports 1x single-wide GPU (planned for 1Q/2025)
Ports	Front: None Rear: One MiniDP port for video, one USB 3.2 G1 (5 Gb/s) port, 1x USB 2.0 port (also for XCC local management), 1x RJ-45 1GbE systems management port for XCC remote management
Cooling	4x 40mm simple-swap dual-rotor fans with N+1 rotor-redundancy
Power supply	Supplied by the D3 V2 Chassis.
Hot-swap parts	Drives
Systems management	Operator panel with status LEDs. XClarity Controller 3 (XCC3) embedded management based on the ASPEED AST2600 baseboard management controller (BMC), XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XCC3 Premier to enable remote control functions and other features.

Components	Specification
Video	Embedded graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller 3 management controller. Rear Mini DisplayPort (MiniDP) video port. Maximum resolution of both ports is 1920x1200 at 60Hz.
Security	Power-on password, administrator's password, Trusted Platform Module (TPM), supporting TPM 2.0.
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi, Ubuntu Server. See the Operating system support section for specifics, including other operating systems that are Vendor Certified or Tested.
Limited warranty	Three-year 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.
Ambient temperature	Up to ASHRAE Class A2: 10°C - 35°C (50°F - 95°F)
Dimensions	Width: 222 mm (8.7 inches), height: 41 mm (1.6 inches), depth 908 mm (35.7 inches)
Weight	Maximum: 8.32 kg (18.34 lbs)

Standard specifications - D3 V2 Chassis

The SD520 V4 servers are supported in the ThinkSystem D3 V2 Chassis. The following table lists the standard specifications of the enclosure.

Tip: The SD520 V4 is also supported in the ThinkSystem D3 Chassis (7DD7/7DD0).

Table 2. Standard specifications: ThinkSystem D3 V2 Chassis

Components	Specification
Machine type	7DGW - 3 year warranty 7DGX - 1 year warranty
Form factor	2U rack-mounted chassis
Server support	Up to four SD520 V4 servers per chassis. Other multi-node servers are not supported.
Servers per rack	Up to 84x SD520 V4 servers in 21 chassis per 42U rack Up to 96x SD520 V4 servers in 24 chassis per 48U rack
Systems management	None. Management is provided by each node. An incoming remote management connection can be shared using a daisy chain connection.
Ports	None.
I/O architecture	None integrated. Use top-of-rack networking and storage switches.
Power supplies	Three hot-swap power supplies, supplying power to all nodes installed in the chassis. Power supplies are either 1300W, 2000W, or 2700W, with N+1 redundancy. Power supplies are the CRPS form factor and are either 80 PLUS Platinum or 80 PLUS Titanium certified. All power supplies installed must be identical part numbers. Power supplies require a 200-240 V ac, 50 or 60 Hz supply. Power supplies are installed at the rear of the enclosure.
Power cords	One AC power cord for each power supply, C13 or C19 depending on the power supplies selected
Cooling	None. Fans are located within each server node.
Enclosure LEDs	Each power supply has AC, DC and error LEDs.
Hot-swap parts	Power supplies

Components	Specification
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5/NBD coverage.
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	Height: 87 mm (3.43 inches), depth: 898 mm (35.36 inches), width: 448 mm (17.64 inches). See Physical and electrical specifications for details.
Weight	Empty (without servers and power supplies): 11.8 kg (26.1 lb) Maximum (4x 1U servers and 3x power supplies): 47.8 kg (105.4 lb)

SD520 V4 models

ThinkSystem SD520 V4 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 SD520 V4 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.
- AI and HPC base models are intended for Artificial Intelligence (AI) and High Performance Computing (HPC) configurations and solutions are enabled using the **AI & HPC Hardware - ThinkSystem Hardware** mode in DCSC. These configurations, along with Lenovo EveryScale Solutions, can also be built using System x and Cluster Solutions Configurator (x-config). **Tip**: Some HPC and AI models are not listed in DCSC and can only be configured in x-config.

Controlled GPU models: The "Controlled GPU" base CTO models listed in the table are the only models that support high-performance GPUs and accelerators. These models are classified under US Government ECCN regulations and have limited market and customer availability. All other base models do not support high-performance GPUs.

Preconfigured server models may also be available for the SD520 V4, 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 SD520 V4 server.

Table 3. Base CTO models

Machine Type/Model General purpose	Machine Type/Model for AI and HPC	Description
7DFYCTO1WW	7DFYCTOLWW	ThinkSystem SD520 V4 - 3yr Warranty
7DFYCTOAWW		ThinkSystem SD520 V4 - 3yr Warranty with Controlled GPU
7DFZCTO1WW	7DFZCTOLWW	ThinkSystem SD520 V4 – 1-year warranty

The following table lists the base choices for CTO configurations of the SD520 V4.

Table 4. Base for CTO models

Feature code	Description
C27Y	ThinkSystem SD520 V4 Node with SFF drive bays

Enclosure models

Up to four SD520 V4 servers are supported in a D3 V2 Chassis.

The following table lists the base CTO models of the D3 V2 Chassis.

Table 5. Base CTO models for the D3 V2 Chassis

Machine Type/Model General purpose	Machine Type/Model for HPC and AI	Description
7DGWCTO1WW	7DGWCTOLWW	ThinkSystem D3 V2 Chassis - 3 year Warranty
7DGXCTO1WW	7DGXCTOLWW	ThinkSystem D3 V2 Chassis - 1 year Warranty

The following table lists the base choices for CTO configurations of the D3 V2 Chassis.

Table 4. Base for CTO models

Feature code	Description
C289	ThinkSystem D3 V2 2U Chassis

Processors

The SD520 V4 supports the Intel Xeon 6700 series processors. The server supports one processor.

Topics in this section:

- Processor options
- Processor features
- Thermal requirements by processor
- UEFI operating modes

Intel On Demand licensing: The Intel On Demand feature licensing for processor accelerators is not offered with Intel Xeon 6 processors.

Processor options

The following table lists the Intel Xeon 6700-series processors with E-cores that are currently supported by the SD520 V4.

Table 6. Intel Xeon 6 processor support

Part number	Feature code	SKU	Description	Maximum quantity
None	C2ZD	6710E	Intel Xeon 6710E 64C 205W 2.4GHz Processor	1
None	C2ZR	6731E	Intel Xeon 6731E 96C 250W 2.2GHz Processor	1
None	C2ZQ	6740E	Intel Xeon 6740E 96C 250W 2.4GHz Processor	1
None	C2ZF	6746E	Intel Xeon 6746E 112C 250W 2.0GHz Processor	1
None	C2ZE	6756E	Intel Xeon 6756E 128C 225W 1.8GHz Processor	1
None	C2ZG	6766E	Intel Xeon 6766E 144C 250W 1.9GHz Processor	1
None	C2ZP	6780E	Intel Xeon 6780E 144C 330W 2.2GHz Processor	1

* Processor 6731E is only supported in 1-socket configurations; CTO only, not field upgrades are supported

Processor features

Processors supported by the SD520 V4 include 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.

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.

The following table summarizes the key features of the Intel Xeon 6700-series processors with E-cores that are supported in the SD520 V4.

Table 7. Intel Xeon 6700-series processor features

CPU model	Cores/ threads*	Core speed (Base / TB max)	L3 cache	Mem. chan	Max memory speed	UPI 2.0 links & speed	PCIe lanes	TDP	Accelerators				SGX Enclave Size
									QAT	DLB	DSA	IAA	
6710E	64 / 64	2.4 / 3.2 GHz	94 MB	8	5600 MHz	4 / 16 GT/s	88	205W	4	4	2	2	512GB
6731E	96 / 96	2.2 / 3.1 GHz	96 MB	8	5600 MHz	None‡	88	250W	2	2	2	2	512GB
6740E	96 / 96	2.4 / 3.2 GHz	96 MB	8	6400 MHz	4 / 20 GT/s	88	250W	4	4	2	2	512GB
6746E	112 / 112	2 / 2.7 GHz	96 MB	8	5600 MHz	4 / 16 GT/s	88	250W	2	2	2	2	512GB
6756E	128 / 128	1.8 / 2.6 GHz	96 MB	8	6400 MHz	4 / 24 GT/s	88	225W	2	2	2	2	512GB
6766E	144 / 144	1.9 / 2.7 GHz	108 MB	8	6400 MHz	4 / 24 GT/s	88	250W	2	2	2	2	512GB
6780E	144 / 144	2.2 / 3 GHz	108 MB	8	6400 MHz	4 / 24 GT/s	88	330W	2	2	2	2	512GB

* E-core processors do not offer Hyper-Threading
‡ Intel Xeon 6731E does not have UPI links and is a single-socket processor

Thermal requirements by processor

Support for ambient temperatures of lower than 35°C (ASHRAE A2) may require a combination of the following:

- High-performance fans
- Selection of only 2x NVMes drives or a selection of no drive backplane
- Lower memory capacity
- Lower processor TDP

For details, see the Ambient temperature requirements section.

UEFI operating modes

The SD520 V4 offers preset operating modes that affect energy consumption and performance. These modes are a collection of predefined low-level UEFI settings that simplify the task of tuning the server to suit your business and workload requirements.

The following table lists the feature codes that allow you to specify the mode you wish to preset in the factory for CTO orders.

Table 8. UEFI operating mode presets in DCSC

Feature code	Description
C3JB	General Computing - Power Efficiency (default)
C3JA	General Computing - Peak Frequency
C3J9	General Computing - Max Performance
C3J8	High Performance Computing (HPC)

The preset modes for the SD520 V4 are as follows:

- **General Computing - Power Efficiency** (feature C3JB): This workload profile optimizes the performance per watt efficiency with a bias towards performance. This workload profile is analogous to “Efficiency – Favor Performance” operating mode on ThinkSystem V3 servers. This profile contains settings for ENERGY STAR® and ERP Lot9 compliance.
- **General Computing - Peak Frequency** (feature C3JA): This workload profile is defined by the requirement to drive the highest core frequencies out of a processor across a subset of cores available – not for all cores active. This workload profile benefits workloads requiring either high per core and / or overall CPU package frequency. These workloads may have variable resource demands, are relatively insensitive to overall platform latency, and are generally CPU clock constrained. Tuning a system for highest possible core frequency may mean allowing inactive cores to transfer in and out of sleep states (C-states), which allows active cores to run at higher frequency for different durations of time. Allowing cores to go into low power states allows for higher per core frequency but can introduce “jitter” in the systems clock frequency.
- **General Computing - Max Performance** (feature C3J9): This workload profile maximizes the absolute performance of the system without regard for power savings. Power savings features are disabled. This operating mode should be used when an application can sustain work across all cores simultaneously and is Non-uniform Memory Access (NUMA) aware.
- **High Performance Computing (HPC)** (feature C3J8): This profile is for customers running large-scale scientific and engineering workloads. These environments tend to be clustered environments where each node performs at maximum utilization for extended periods of time, and the application is Non-uniform Memory Access (NUMA) aware.

Memory

The SD520 V4 uses Lenovo TruDDR5 memory operating at up to 6400 MHz. The server supports 8 DIMMs, each connected to its own memory channel to the processor (1 DIMM per channel). The server currently supports up to 512GB of memory using 8x 64GB RDIMMs.

With 6th Gen Intel Xeon processors, DIMMs operate at up to 6400 MHz, up to the memory bus speed of the processor selected. See the Processor features section for specifics.

CXL memory support: Support for CXL memory is planned for 1Q/2025, both on the Intel Xeon 6700 E-core processors and future Intel Xeon 6 processors.

MCRDIMM memory support: Support for MCRDIMM memory (also known as MRDIMMs) is planned for 1Q/2025 however only with future Intel Xeon 6 processors, not with the Intel Xeon 6700 E-core processors.

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.

The following table lists the 6400 MHz memory options that are currently supported by the SD520 V4.

Table 9. Memory options

Part number	Feature code	Description	DRAM technology	Quantity supported
4X77A90966	C0TQ	ThinkSystem 64GB TruDDR5 6400MHz (2Rx4) RDIMM	16Gb	8

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:

- The SD520 V4 only supports a quantity of 8 DIMMs; Other quantities are not supported
- Planned memory support:
  - Intel Xeon 6700 E-core processors are planned to support CXL memory
  - Future Intel Xeon 6 processors are planned to support 3DS RDIMMs, MCRDIMMs and CXL memory

The following memory protection technologies are supported:

- ECC detection/correction
- Bounded Fault detection/correction
- SDDC (for 10x4-based memory DIMMs; look for "x4" in the DIMM description)
- ADDDC (for 10x4-based memory DIMMs)
- Memory mirroring

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.

Internal storage

The SD520 V4 offers six hot-swap drive bays as shown in the figure below. The bays support SAS, SATA, or PCIe 5.0 NVMe solid state drives, however currently only NVMe drives are supported. SAS and SATA drive support is planned for 1Q/2025.

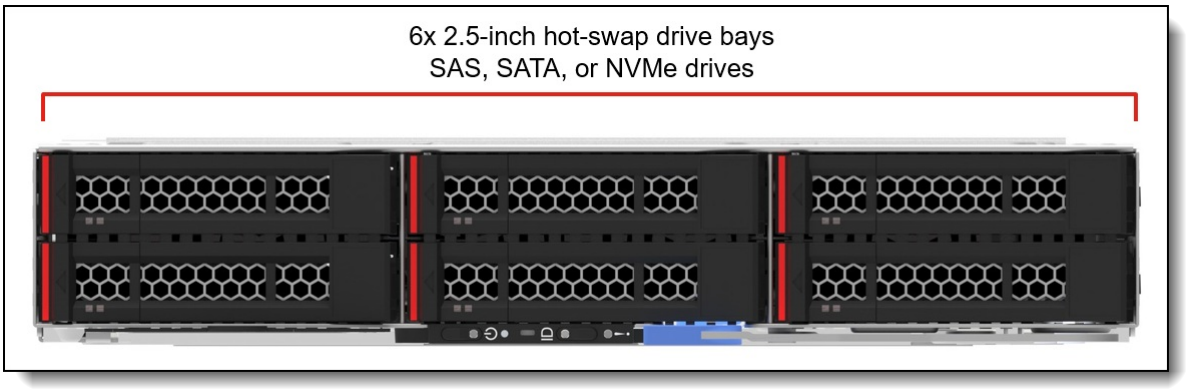

Figure 8. Drive bays in the SD520 V4

Topics in this section:

- Ordering information
- M.2 drives
- SED encryption key management with SKLM

Ordering information

The drive cage is optional in CTO orders and can be added as a field upgrade using the ordering information in the following table.

Table 10. Drive backplane

Part number	Feature code	Description and components in the part number
4TA7A99791	C28G	ThinkSystem SD520 V4 AnyBay 6-Drive Backplane Kit • AnyBay backplane • 3x NVMe cables • Power and sideband cables

M.2 drives

The SD520 V4 also supports up to four M.2 form-factor drives:

- Two M.2 drives mounted on the system board, supporting NVMe drives with a PCIe 5.0 x4 host interface; RAID support is optional and enabled using Intel VROC
- Optionally, two M.2 drives connected to an M.2 adapter, supporting SATA drives or NVMe drives with a PCIe 4.0 x1 host interface; RAID is supported via the M.2 adapter's onboard Broadcom RAID controller

The figure below shows the location of these M.2 slots.

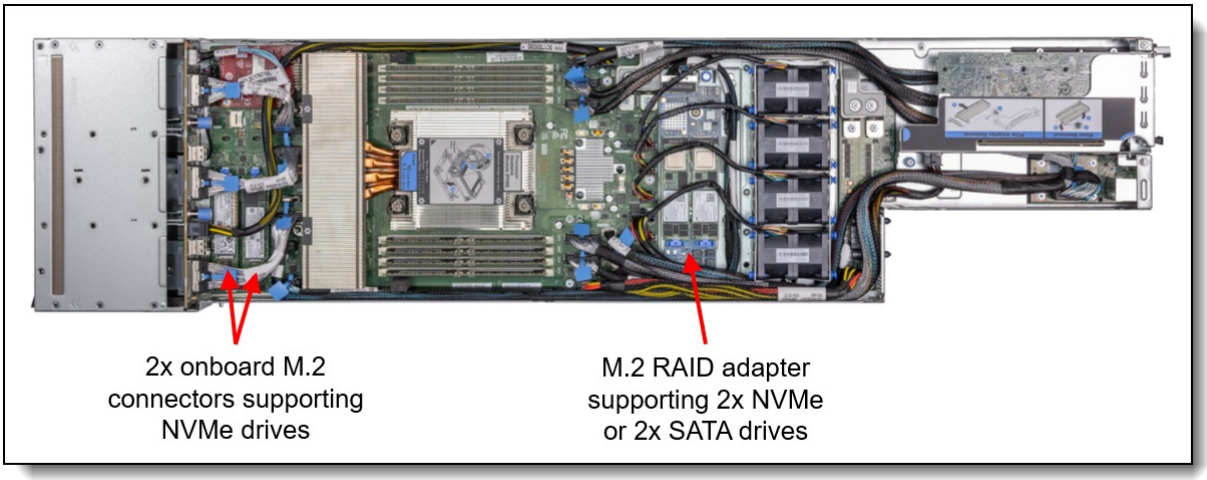

Figure 9. M.2 drives on the SD520 V4

Onboard M.2 (NVMe drives only)

For the onboard M.2 connectors, RAID is optional and is implemented using Intel VROC. Ordering information is in the following table. The onboard M.2 connectors only support NVMe drives. SATA M.2 is not supported.

Table 11. Intel VROC NVMe RAID for M.2 drives

Part number	Feature code	Description	Drive type	RAID levels
4L47A92670*	BZ4X	Intel VROC RAID1 Only for M.2	NVMe	RAID 1
4L47A83669*	BS7M	Intel VROC (VMD NVMe RAID) Standard for M.2	NVMe	RAID 0, 1

* The part numbers are for field upgrades and enable Intel VROC on all installed drives, not just M.2

Configuration notes:

- Only NVMe drives are supported
- M.2 drives with 2280 or 22110 form factors are supported
- The M.2 drives require a heatsink which is included with the supported drives

M.2 adapter (NVMe or SATA drives)

The supported M.2 adapter is listed in the following table.

Table 12. M.2 adapter

Part number	Feature code	Description	Drive type	RAID
4Y37A93746	C26V	ThinkSystem M.2 RAID B545i-2i SATA/NVMe Adapter	NVMe or SATA	RAID 0, 1 (Broadcom)

Configurations rules:

- If two drives are installed on the M.2 adapter, they can be either both SATA or both NVMe; mixing is not supported between these two drives
- M.2 drives with 2242, 2260, 2280 form factors are supported
- The M.2 adapter is installed in the same physical space as the supercap for the RAID 940-8i adapter. The M.2 adapter and RAID 940-8i adapter are therefore mutually exclusive.

For field upgrades to add the M.2 adapter, in addition to the M.2 adapter itself, you will also need to order the cable kit listed in the following table.

Table 13. M.2 kit for field upgrades to add M.2 adapter

Part number	Description and components
4X97A99795	ThinkSystem SD520 V4 M.2 RAID Cable Kit • Tray for the M.2 adapter • Cable

SED encryption key management with SKLM

The server supports self-encrypting drives (SEDs) as listed in the Internal drive options section. To effectively manage a large deployment of these drives in Lenovo servers, IBM Security Key Lifecycle Manager (SKLM) offers a centralized key management solution.

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

Table 14. 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

Controllers for internal storage

The SD520 V4 currently supports NVMe drives for maximum performance. Drives are directly connected to the processor using onboard PCIe 5.0 connectors. Each drive has a PCIe 5.0 x4 host interface.

SAS and SATA drive support is planned for 1Q/2025 with the use of a SAS/SATA RAID adapter or HBA.

The onboard NVMe support has the following features:

- Controller integrated into the Intel processor
- Each drive has PCIe 5.0 x4 host interface
- Supports JBOD - Intel and non-Intel NVMe SSDs - no license required
- Optionally supports RAID using Intel VROC NVMe RAID. See the Intel VROC section for ordering information.

The server also supports M.2 drives for additional storage or OS boot functions. See the M.2 drives section fc details.

Intel VROC onboard RAID

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

On the SD520 V4, Intel VROC provides RAID functions for the onboard NVMe controller (Intel VROC NVMe RAID).

VROC NVMe RAID offers RAID support for any NVMe drives directly connected to the ports on the server's system board or via adapters such as NVMe retimers or NVMe switch adapters. On the SD520 V4, RAID levels implemented are based on the VROC feature selected as indicated in the following table. 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.

Performance tip: For best performance with VROC NVMe RAID, the drives in an array should all be connected to the same processor. Spanning processors is possible however performance will be unpredictable and should be evaluated based on your workload.

The SD520 V4 supports the VROC NVMe RAID offerings listed in the following table.

Table 15. Intel VROC NVMe RAID ordering information and feature support

Part number	Feature code	Description	Intel NVMe SSDs	Non-Intel NVMe SSDs	RAID 0	RAID 1	RAID 10	RAID 5
4L47A92670	BZ4W	Intel VROC RAID1 Only	Yes	Yes	No	Yes	No	No
4L47A83669	BR9B	Intel VROC (VMD NVMe RAID) Standard	Yes	Yes	Yes	Yes	Yes	No
4L47A39164	B96G	Intel VROC (VMD NVMe RAID) Premium	Yes	Yes	Yes	Yes	Yes	Yes

Configuration notes:

- If a feature code is ordered in a CTO build, the VROC functionality is enabled in the factory. For field upgrades, order a part number and it will be fulfilled as a Feature on Demand (FoD) license which can then be activated via the XCC management processor user interface.

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

- **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. On ESXi, VROC is supported with both boot and data drives.

Internal drive options

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

2.5-inch hot-swap drives:

- 2.5-inch hot-swap PCIe 5.0 NVMe SSDs
- 2.5-inch hot-swap PCIe 4.0 NVMe SSDs

M.2 drives:

- M.2 SATA drives
- M.2 PCIe 4.0 NVMe drives

M.2 drive support: The SD520 V4 supports NVMe M.2 drives in either onboard M.2 connectors or installed in an M.2 adapter. For details, see the M.2 drives subsection. SATA M.2 drives are only supported installed in an M.2 adapter.

SED support: The tables include a column to indicate which drives support SED encryption. The encryption functionality can be disabled if needed. Note: Not all SED-enabled drives have "SED" in the description.

Table 16. 2.5-inch hot-swap PCIe 5.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch SSDs - U.2 PCIe 5.0 NVMe - Mixed Use/Mainstream (3-5 DWPD)				
4XB7A93097	C1WM	ThinkSystem 2.5" U.2 PM9D5a 800GB Mixed Use NVMe NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93098	C1WN	ThinkSystem 2.5" U.2 PM9D5a 1.6TB Mixed Use NVMe NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93099	C1WP	ThinkSystem 2.5" U.2 PM9D5a 3.2TB Mixed Use NVMe NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93100	C1WR	ThinkSystem 2.5" U.2 PM9D5a 6.4TB Mixed Use NVMe NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93101	C1WQ	ThinkSystem 2.5" U.2 PM9D5a 12.8TB Mixed Use NVMe NVMe PCIe 5.0 x4 HS SSD	Support	6
2.5-inch SSDs - U.2 PCIe 5.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A93066	C0GK	ThinkSystem 2.5" U.2 PM9D3a 960GB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93067	C0GL	ThinkSystem 2.5" U.2 PM9D3a 1.92TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93068	C0GN	ThinkSystem 2.5" U.2 PM9D3a 3.84TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93069	C0GP	ThinkSystem 2.5" U.2 PM9D3a 7.68TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Support	6
4XB7A93095	C1WL	ThinkSystem 2.5" U.2 PM9D3a 15.36TB Read Intensive NVMe PCIe 5.0 x4 HS SSD	Support	6

Table 17. 2.5-inch hot-swap PCIe 4.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD)				
4XB7A95054	C2BG	ThinkSystem 2.5" U.3 7500 MAX 800GB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95055	C2BV	ThinkSystem 2.5" U.3 7500 MAX 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95056	C2BW	ThinkSystem 2.5" U.3 7500 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95057	C2BF	ThinkSystem 2.5" U.3 7500 MAX 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95058	C2BX	ThinkSystem 2.5" U.3 7500 MAX 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Support	6
2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A95049	C2BY	ThinkSystem 2.5" U.3 7500 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95050	C2BR	ThinkSystem 2.5" U.3 7500 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95051	C2BS	ThinkSystem 2.5" U.3 7500 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95052	C2BT	ThinkSystem 2.5" U.3 7500 PRO 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Support	6
4XB7A95053	C2BU	ThinkSystem 2.5" U.3 7500 PRO 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Support	6

Table 18. M.2 SATA drives

Part number	Feature code	Description	SED support	Max Qty	M.2 onboard	M.2 adapter
M.2 SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DWPD)						
4XB7A89422	BYF7	ThinkSystem M.2 ER3 240GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported
4XB7A90049	BYF8	ThinkSystem M.2 ER3 480GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported
4XB7A90230	BYF9	ThinkSystem M.2 ER3 960GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported
4XB7A82286	BQ1Z	ThinkSystem M.2 5400 PRO 240GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported
4XB7A82287	BQ1Y	ThinkSystem M.2 5400 PRO 480GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported
4XB7A82288	BQ20	ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSD	Support	2	No	Supported

The following table lists the supported M.2 NVMe drives. Note that drives are supported either in the onboard M.2 connectors, or inserted in an M.2 adapter, as indicated in the table.

Table 19. M.2 PCIe 4.0 NVMe drives

Part number	Feature code	Description	SED support	Max Qty	M.2 onboard	M.2 adapter
4XB7A83139	BS46	ThinkSystem M.2 7450 PRO 480GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD (with Heatsink)	Support	2	Supported	No
4XB7A82674	BQUJ	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD (with Heatsink)	Support	2	Supported	No
4XB7A82675	BQUK	ThinkSystem M.2 7450 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD (with Heatsink)	Support	2	Supported	No
4XB7A82852	BRFZ	ThinkSystem M.2 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD (with Heatsink)	Support	2	Supported	No
4XB7A82636	BS2P	ThinkSystem M.2 7450 PRO 480GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	Support	2	No	Supported
4XB7A13999	BKSR	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	Support	2	No	Supported

Optical drive

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

Table 20. 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 options

The SD520 V4 has the following I/O slots for adapters:

- Optional riser slot 1: PCIe 5.0 x16 low-profile slot
- Optional OCP 3.0 slot: PCIe 5.0 x16

Both the OCP slot and Riser slot 1 are optional, and ordering information is listed in the following table.

Ordering information is listed in the following table.

Table 21. OCP slot and PCIe slot riser

Part number	Feature code	Description and components in the part number
4X97A99794	C4WF	ThinkSystem SD520 V4 Rear OCP Cable Kit • Cable with OCP connector
4TA7A99790	C4WB	ThinkSystem SD520 V4 PCIe Riser Kit • Riser cage and riser • PCIe cable • Power cable • PCIe slot cover

Network adapters

The server supports network adapters installed in the OCP and PCIe slots.

The following table lists the supported OCP adapters.

Table 22. OCP network adapters

Part number	Feature code	Description	Maximum supported
Gigabit Ethernet			
4XC7A08235	B5T1	ThinkSystem Broadcom 5719 1GbE RJ45 4-port OCP Ethernet Adapter	1
25 Gb Ethernet			
4XC7A62582	BE4T	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port OCP Ethernet Adapter	1

The following table lists the supported PCIe adapters.

Table 23. PCIe network adapters

Part number	Feature code	Description	Maximum supported
10 Gb Ethernet			
7ZT7A00496	AUKP	ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter	1
25 Gb Ethernet			
4XC7A08238	BK1H	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter	1
4XC7A62580	BE4U	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	1
100 Gb Ethernet			
4XC7A08248	B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	1

For more information, including the transceivers and cables that each adapter supports, see the list of Lenovo Press Product Guides in the Networking adapters category:
https://lenovopress.com/servers/options/ethernet

Fibre Channel host bus adapters

Support for Fibre Channel host bus adapters is planned for 1Q/2025.

SAS adapters for external storage

Support for SAS adapters for external storage is planned for 1Q/2025.

GPU adapters

Support for GPU adapters is planned for 1Q/2025.

Cooling

Each SD520 V4 has has 4 simple-swap 40mm dual-rotor N+1 redundant fans which are used to cool all components, and all configurations will have 4 fans. All fans are located at the rear of the enclosure as shown in in the Components and connectors section.

The following table lists the supported fans. High performance fans may be required depending on the configuration selected. For more information on fan requirements based on the configuration and ambient temperature, see the Ambient temperature requirements section.

Table 24. Fan selections

Feature code	Description
C4BL	ThinkSystem SD520 V4 Standard Fans
C4BM	ThinkSystem SD520 V4 High Performance Fans

In addition to the system fans, each power supply has its own integrated fan.

Power supplies

The D3 V2 Chassis supports three redundant hot-swap power supplies. The power supply choices are listed in the following table.

Supported power supply configurations are the following, depending on the installed components:

- 3x power supplies: 2+1 without over-subscription (1 power supply is redundant)
- 3x power supplies: 2+1 with over-subscription (1 power supply is redundant; over-subscription requires a CRPS Premium power supply)
- 2x power supplies: 1+1 without over-subscription (1 power supply is redundant)
- 2x power supplies: 1+1 with over-subscription (1 power supply is redundant; over-subscription requires a CRPS Premium power supply)
- 1x power supply: No redundancy, without over-subscription (only supported with certain power supplies - see the Quantity column in the table)

Power management is managed by the XCC service processor in one of the servers installed in the chassis (referred to as the "master node"). Management tasks include power supply sensor and fault reading, power policy, throttling in the event of a power supply failure, and power supply firmware updates. If the master node goes offline, another node in the chassis will automatically take on this role.

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 25. Power supply options

Part number	Feature code	Description	Qty	Capacity (230V)	Capacity (115V)	Voltage	Connector
Titanium AC power supplies - CRPS Premium							
4P57A88689	C0U3	ThinkSystem 2000W 230V/115V Titanium CRPS Premium Hot-Swap Power Supply	2,3	2000W	1000W	230V/115V	C14
4P57A88622	C0UC	ThinkSystem 2700W 230V Titanium CRPS Premium Hot-Swap Power Supply	1,2,3	2700W	No support	230V	C20
Titanium AC power supplies - CRPS							
4P57A87628	C2Y9	ThinkSystem 1300W 230V/115V Titanium CRPS Hot-Swap Power Supply v2.4	2,3	1300W	1000W	230V/115V	C14
Platinum AC power supplies - CRPS							
4P57A89308	C0UA	ThinkSystem 2700W 230V Platinum CRPS Hot-Swap Power Supply v1.3	2,3	2700W	No support	230V	C20
4P57A88628	C0UB	ThinkSystem 2700W 230V Platinum CRPS Hot-Swap Power Supply v1.4	2,3	2700W	No support	230V	C20

The 230V/115V AC power supplies support both low-range (100-127V 50/60 Hz) and high-range (200-240V 50/60 Hz) power. For China customers, all power supplies support 240V DC.

Configuration rules:

- All power supplies used in a chassis must be identical part numbers.
- Power supply options do not include a line cord. Configure-to-order models can be configured with or without power cords.

The D3 V2 Chassis supports both CRPS and CRPS Premium power supplies. CRPS Premium power supplies offer the following additional features:

- Over-subscription
- More accurate power metering
- Virtual reseat
- Enhanced fault detection
- System cooling assist (fan override)
- Fault LEDs
- VPD support

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: When Zero-output mode (also known as Standby mode or Cold Redundancy mode) is configured in XCC and the server power load is sufficiently 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. Zero-output mode can be enabled or disabled in the XClarity Controller web interface, Server Configuration > Power Policy. If you select Disable, then both power supplies will be in the Active state.

Power cords

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

Table 26. Power cords

Part number	Feature code	Description
Rack cables		
00Y3043	A4VP	1.0m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08367	B0N5	1.0m, 13A/100-250V, C13 to C14 Jumper Cord
39Y7937	6201	1.5m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08368	B0N6	1.5m, 13A/100-250V, C13 to C14 Jumper Cord
4L67A08365	B0N4	2.0m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
4L67A08369	6570	2.0m, 13A/100-250V, C13 to C14 Jumper Cord
4L67A08366	6311	2.8m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08370	6400	2.8m, 13A/100-250V, C13 to C14 Jumper Cord
39Y7932	6263	4.3m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08371	6583	4.3m, 13A/100-250V, C13 to C14 Jumper Cord
Line cords		
39Y7930	6222	2.8m, 10A/250V, C13 to IRAM 2073 (Argentina) Line Cord
81Y2384	6492	4.3m, 10A/250V, C13 to IRAM 2073 (Argentina) Line Cord
39Y7924	6211	2.8m, 10A/250V, C13 to AS/NZS 3112 (Australia/NZ) Line Cord
81Y2383	6574	4.3m, 10A/250V, C13 to AS/NZS 3112 (Australia/NZ) Line Cord
69Y1988	6532	2.8m, 10A/250V, C13 to NBR 14136 (Brazil) Line Cord
81Y2387	6404	4.3m, 10A/250V, C13 to NBR 14136 (Brazil) Line Cord
39Y7928	6210	2.8m, 10A/220V, C13 to GB 2099.1 (China) Line Cord
81Y2378	6580	4.3m, 10A/250V, C13 to GB 2099.1 (China) Line Cord
39Y7918	6213	2.8m, 10A/250V, C13 to DK2-5a (Denmark) Line Cord

Part number	Feature code	Description
81Y2382	6575	4.3m, 10A/250V, C13 to DK2-5a (Denmark) Line Cord
39Y7917	6212	2.8m, 10A/250V, C13 to CEE 7/7 (Europe) Line Cord
81Y2376	6572	4.3m, 10A/250V, C13 to CEE 7/7 (Europe) Line Cord
39Y7927	6269	2.8m, 10A/250V, C13 to IS 6538 (India) Line Cord
81Y2386	6567	4.3m, 10A/250V, C13 to IS 6538 (India) Line Cord
39Y7920	6218	2.8m, 10A/250V, C13 to SI 32 (Israel) Line Cord
81Y2381	6579	4.3m, 10A/250V, C13 to SI 32 (Israel) Line Cord
39Y7921	6217	2.8m, 10A/250V, C13 to CEI 23-16 (Italy) Line Cord
81Y2380	6493	4.3m, 10A/250V, C13 to CEI 23-16 (Italy) Line Cord
4L67A08362	6495	4.3m, 12A/200V, C13 to JIS C-8303 (Japan) Line Cord
39Y7922	6214	2.8m, 10A/250V, C13 to SABS 164-1 (South Africa) Line Cord
81Y2379	6576	4.3m, 10A/250V, C13 to SANS 164-1 (South Africa) Line Cord
39Y7925	6219	2.8m, 12A/220V, C13 to KSC 8305 (S. Korea) Line Cord
81Y2385	6494	4.3m, 12A/250V, C13 to KSC 8305 (S. Korea) Line Cord
39Y7919	6216	2.8m, 10A/250V, C13 to SEV 1011-S24507 (Swiss) Line Cord
81Y2390	6578	4.3m, 10A/250V, C13 to SEV 1011-S24507 (Swiss) Line Cord
81Y2375	6317	2.8m, 10A/250V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2389	6531	4.3m, 10A/250V, C13 to CNS 10917 (Taiwan) Line Cord
39Y7923	6215	2.8m, 10A/250V, C13 to BS 1363/A (UK) Line Cord
81Y2377	6577	4.3m, 10A/250V, C13 to BS 1363/A (UK) Line Cord
46M2592	A1RF	2.8m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord
4L67A08361	6373	4.3m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord

Power cords (C19 connectors)

Line cords and rack power cables with C19 connectors can be ordered as listed in the following table.

Table 27. Power cords (C19 connectors)

Part number	Feature code	Description
Rack cables		
4L67A86677	BPJ0	0.5m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable
4L67A86678	B4L0	1.0m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable
4L67A86679	B4L1	1.5m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable
4L67A86680	B4L2	2.0m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable
39Y7916	6252	2.5m, 16A/100-240V, C19 to IEC 320-C20 Rack Power Cable
4L67A86681	B4L3	4.3m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable
Line cords		
40K9777	6276	4.3m, 220-240V, C19 to IRAM 2073 (Argentina) Line cord
40K9773	6284	4.3m, 220-240V, C19 to AS/NZS 3112 (Aus/NZ) Line cord
40K9775	6277	4.3m, 250V, C19 to NBR 14136 (Brazil) Line Cord
40K9774	6288	4.3m, 220-240V, C19 to GB2099.1 (China) Line cord
40K9769	6283	4.3m, 16A/230V, C19 to IEC 309-P+N+G (Den/Sws) Line Cord
40K9766	6279	4.3m, 220-240V, C19 to CEE7-VII (European) Line cord

Part number	Feature code	Description
40K9776	6285	4.3m, 220-240V, C19 to IS6538 (India) Line cord
40K9771	6282	4.3m, 220-240V, C19 to SI 32 (Israel) Line cord
40K9768	6281	4.3m, 220-240V, C19 to CEI 23-16 (Italy) Line cord
40K9770	6280	4.3m, 220-240V, C19 to SABS 164 (South Africa) Line cord
41Y9231	6289	4.3m, 15A/250V, C19 to KSC 8305 (S. Korea) Line Cord
81Y2391	6549	4.3m, 16A/230V, C19 to SEV 1011 (Sws) Line Cord
41Y9230	6287	4.3m, 16A/250V, C19 to CNS 10917-3 (Taiwan) Line Cord
40K9767	6278	4.3m, 220-240V, C19 to BS 1363/A w/13A fuse (UK) Line Cord
40K9772	6275	4.3m, 16A/208V, C19 to NEMA L6-20P (US) Line Cord
00D7197	A1NV	4.3m, 15A/250V, C19 to NEMA 6-15P (US) Line Cord

Systems management

The SD520 V4 contains an integrated service processor, XClarity Controller 3 (XCC3), which provides advanced control, monitoring, and alerting functions. The XCC3 is based on the AST2600 baseboard management controller (BMC) using a dual-core ARM Cortex A7 32-bit RISC service processor running at 1.2 GHz.

Topics in this section:

- Local management
- System status with XClarity Mobile
- Remote management
- MicroSD for XCC local storage
- XCC3 Premier
- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Administrator
- Lenovo XClarity Integrators
- Lenovo XClarity Essentials
- Lenovo XClarity Energy Manager
- Lenovo Capacity Planner

Local management

The SD520 V4 offers a front operator panel with key LED status indicators:

- Power button with power status LED (green)
- System Error LED (yellow)
- System ID LED (blue)
- NMI button

These are shown in the following figure.

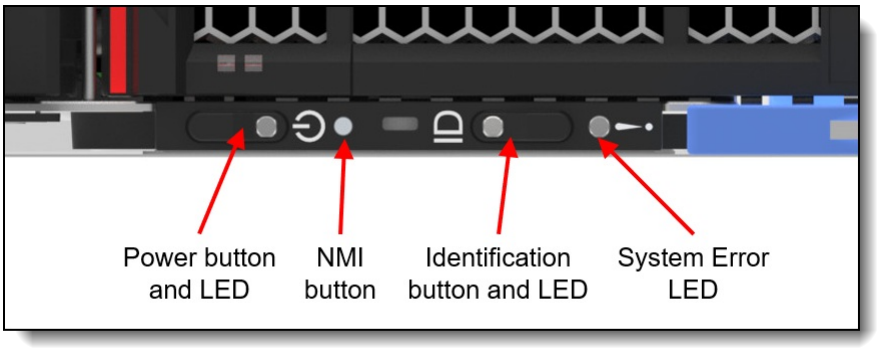

Figure 10. Operator panel

Light path diagnostics

The server offers light path diagnostics. If an environmental condition exceeds a threshold or if a system component fails, XCC lights LEDs inside the server to help you diagnose the problem and find the failing part. The server has fault LEDs next to the following components:

- Each drive bay
- Each power supply

Information pull-out tab

The front of the server also houses an information pull-out tab (also known as the network access tag). See Figure 2 for the location. A label on the tab shows the network information (MAC address and other data) to remotely access the service processor.

System status with XClarity Mobile

The XClarity Mobile app includes a tethering function where you can connect your Android or iOS device to the server via USB to see the status of the server.

The steps to connect the mobile device are as follows:

1. Enable USB Management on the server, by holding down the ID button for 3 seconds (or pressing the dedicated USB management button if one is present)
2. Connect the mobile device via a USB cable to the server's USB port with the management symbol 
3. In iOS or Android settings, enable Personal Hotspot or USB Tethering
4. Launch the Lenovo XClarity Mobile app

Once connected you can see the following information:

- Server status including error logs (read only, no login required)
- Server management functions (XClarity login credentials required)

Remote management

The server offers a dedicated RJ45 port at the rear of the server for remote management via the XClarity Controller management processor. The port supports 10/100/1000 Mbps speeds.

Remote server management is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3 (no SET commands; no SNMP v1)
- Common Information Model (CIM-XML)
- Representational State Transfer (REST) support
- Redfish support (DMTF compliant)
- Web browser - HTML 5-based browser interface (Java and ActiveX not required) using a responsive design (content optimized for device being used - laptop, tablet, phone) with NLS support

The OCP adapter slot also supports NC-SI to enable out-of-band systems management.

IPMI via the Ethernet port (IPMI over LAN) is supported, however it is disabled by default. For CTO orders you can specify whether you want to the feature enabled or disabled in the factory, using the feature codes listed in the following table.

Table 28. IPMI-over-LAN settings

Feature code	Description
B7XZ	Disable IPMI-over-LAN (default)
B7Y0	Enable IPMI-over-LAN

MicroSD for XCC local storage

The server includes a MicroSD card port to enable the use of a MicroSD card for additional storage for use with the XCC controller. XCC can use the storage as a Remote Disc on Card (RDOC) device (up to 4GB of storage). It can also be used to store firmware updates (including N-1 firmware history) for ease of deployment.

Tip: Without a MicroSD card installed, the XCC controller will have 100MB of available RDOC storage.

Ordering information for the supported Micro SD cards is listed in the following table.

Table 29. Media for use with the MicroSD card port

Part number	Feature code	Description
4X77A92672	C0BC	ThinkSystem MicroSD 64GB Class 10 Flash Memory Card

XCC3 Premier

The XCC3 service processor in the SD520 V4 supports an upgrade to the Premier level of features. XCC3 Premier in ThinkSystem V4 servers is equivalent to the XCC2 Premium offering in ThinkSystem V3 servers.

XCC3 Premier adds the following functions:

- Enterprise Strict Security mode - Enforces CNSA 1.0 level security
- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- International keyboard mapping support
- Redirecting serial console via SSH
- Component replacement log (Maintenance History log)
- Access restriction (IP address blocking)
- Displaying graphics for real-time and historical power usage data and temperature
- Mapping the ISO and image files located on the local client as virtual drives for use by the server
- Mounting the remote ISO and image files via HTTPS, SFTP, CIFS, and NFS
- Power capping
- License for XClarity Energy Manager

The following additional XCC3 Premier features are planned for 1Q/2025

- System Guard - Monitor hardware inventory for unexpected component changes, and simply log the event or prevent booting
- Neighbor Group - Enables administrators to manage and synchronize configurations and firmware level across multiple servers
- Syslog alerting
- Lenovo SED security key management
- Boot video capture and crash video capture
- Virtual console collaboration - Ability for up to 6 remote users to be log into the remote session simultaneously
- Remote console Java client
- System utilization data and graphic view
- Single sign on with Lenovo XClarity Administrator
- Update firmware from a repository

Ordering information is listed in the following table. XCC3 Premier is a software license upgrade - no additional hardware is required.

Table 30. XCC3 Premier license upgrade

Part number	Feature code	Description
7S0X000XWW	SCY0	Lenovo XClarity Controller 3 (XCC3) Premier

With XCC3 Premier, for CTO orders, you can request that System Guard be enabled in the factory and the first configuration snapshot be recorded. To add this to an order, select feature code listed in the following table. The selection is made in the Security tab of the DCSC configurator.

Table 31. Enable System Guard in the factory (CTO orders)

Feature code	Description
BUT2	Install System Guard

For more information about System Guard, see https://pubs.lenovo.com/xcc2/NN1ia_c_systemguard

Lenovo XClarity Provisioning Manager

Lenovo XClarity Provisioning Manager (LXPM) is a UEFI-based application embedded in ThinkSystem servers and accessible via the F1 key during system boot.

LXPM provides the following functions:

- Graphical UEFI Setup
- System inventory information and VPD update
- System firmware updates (UEFI and XCC)
- RAID setup wizard
- OS installation wizard (including unattended OS installation)
- Diagnostics functions

Lenovo XClarity Administrator

Lenovo XClarity Administrator is a centralized resource management solution designed to reduce complexity, speed response, and enhance the availability of Lenovo systems and solutions. It provides agent-free hardware management for ThinkSystem servers, in addition to ThinkServer, System x, and Flex System servers. The administration dashboard is based on HTML 5 and allows fast location of resources so tasks can be run quickly.

Because Lenovo XClarity Administrator does not require any agent software to be installed on the managed endpoints, there are no CPU cycles spent on agent execution, and no memory is used, which means that up to 1GB of RAM and 1 - 2% CPU usage is saved, compared to a typical managed system where an agent is required.

Lenovo XClarity Administrator is an optional software component for the SD520 V4. The software can be downloaded and used at no charge to discover and monitor the SD520 V4 and to manage firmware upgrades.

If software support is required for Lenovo XClarity Administrator, or premium features such as configuration management and operating system deployment are required, Lenovo XClarity Pro software subscription should be ordered. Lenovo XClarity Pro is licensed on a per managed system basis, that is, each managed Lenovo system requires a license.

The following table lists the Lenovo XClarity software license options.

Table 32. Lenovo XClarity Pro ordering information

Part number	Feature code	Description
00MT201	1339	Lenovo XClarity Pro, per Managed Endpoint w/1 Yr SW S&S
00MT202	1340	Lenovo XClarity Pro, per Managed Endpoint w/3 Yr SW S&S
00MT203	1341	Lenovo XClarity Pro, per Managed Endpoint w/5 Yr SW S&S
7S0X000HWW	SAYV	Lenovo XClarity Pro, per Managed Endpoint w/6 Yr SW S&S
7S0X000JWW	SAYW	Lenovo XClarity Pro, per Managed Endpoint w/7 Yr SW S&S

Lenovo XClarity Administrator offers the following standard features that are available at no charge:

- Auto-discovery and monitoring of Lenovo systems
- Firmware updates and compliance enforcement
- External alerts and notifications via SNMP traps, syslog remote logging, and e-mail
- Secure connections to managed endpoints
- NIST 800-131A or FIPS 140-2 compliant cryptographic standards between the management solution and managed endpoints
- Integration into existing higher-level management systems such as cloud automation and orchestration tools through REST APIs, providing extensive external visibility and control over hardware resources
- An intuitive, easy-to-use GUI
- Scripting with Windows PowerShell, providing command-line visibility and control over hardware resources

Lenovo XClarity Administrator offers the following premium features that require an optional Pro license:

- Pattern-based configuration management that allows to define configurations once and apply repeatedly without errors when deploying new servers or redeploying existing servers without disrupting the fabric
- Bare-metal deployment of operating systems and hypervisors to streamline infrastructure provisioning

For more information, refer to the Lenovo XClarity Administrator Product Guide:
http://lenovopress.com/tips1200

Lenovo XClarity Integrators

Lenovo also offers software plug-in modules, Lenovo XClarity Integrators, to manage physical infrastructure from leading external virtualization management software tools including those from Microsoft and VMware.

These integrators are offered at no charge, however if software support is required, a Lenovo XClarity Pro software subscription license should be ordered.

Lenovo XClarity Integrators offer the following additional features:

- Ability to discover, manage, and monitor Lenovo server hardware from VMware vCenter or Microsoft System Center
- Deployment of firmware updates and configuration patterns to Lenovo x86 rack servers and Flex System from the virtualization management tool
- Non-disruptive server maintenance in clustered environments that reduces workload downtime by dynamically migrating workloads from affected hosts during rolling server updates or reboots
- Greater service level uptime and assurance in clustered environments during unplanned hardware events by dynamically triggering workload migration from impacted hosts when impending hardware failures are predicted

For more information about all the available Lenovo XClarity Integrators, see the Lenovo XClarity Administrator Product Guide: https://lenovopress.com/tips1200-lenovo-xclarity-administrator

Lenovo XClarity Essentials

Lenovo offers the following XClarity Essentials software tools that can help you set up, use, and maintain the server at no additional cost:

- Lenovo Essentials OneCLI

  OneCLI is a collection of server management tools that uses a command line interface program to manage firmware, hardware, and operating systems. It provides functions to collect full system health information (including health status), configure system settings, and update system firmware and drivers.

- Lenovo Essentials UpdateXpress

  The UpdateXpress tool is a standalone GUI application for firmware and device driver updates that enables you to maintain your server firmware and device drivers up-to-date and help you avoid unnecessary server outages. The tool acquires and deploys individual updates and UpdateXpress System Packs (UXSPs) which are integration-tested bundles.

- Lenovo Essentials Bootable Media Creator

  The Bootable Media Creator (BOMC) tool is used to create bootable media for offline firmware update.

For more information and downloads, visit the Lenovo XClarity Essentials web page:
http://support.lenovo.com/us/en/documents/LNVO-center

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager (LXEM) is a power and temperature management solution for data centers. It is an agent-free, web-based console that enables you to monitor and manage power consumption and temperature in your data center through the management console. It enables server density and data center capacity to be increased through the use of power capping.

LXEM is a licensed product. A single-node LXEM license is included with the XClarity Controller Premier upgrade as described in the XCC3 Premier section. If your server does not have the XCC Premier upgrade, Energy Manager licenses can be ordered as shown in the following table.

Table 33. Lenovo XClarity Energy Manager

Part number	Description
4L40E51621	Lenovo XClarity Energy Manager Node License (1 license needed per server)

For more information about XClarity Energy Manager, see the following resources:

- Lenovo Support page:
  https://datacentersupport.lenovo.com/us/en/solutions/lnvo-lxem
- User Guide for XClarity Energy Manager:
  https://pubs.lenovo.com/lxem/

Lenovo Capacity Planner

Lenovo Capacity Planner is a power consumption evaluation tool that enhances data center planning by enabling IT administrators and pre-sales professionals to understand various power characteristics of racks, servers, and other devices. Capacity Planner can dynamically calculate the power consumption, current, British Thermal Unit (BTU), and volt-ampere (VA) rating at the rack level, improving the planning efficiency for large scale deployments.

For more information, refer to the Capacity Planner web page:
http://datacentersupport.lenovo.com/us/en/solutions/lnvo-lcp

Security

Topics in this section:

- Security features
- Platform Firmware Resiliency - Lenovo ThinkShield
- Security standards

Security features

The SD520 V4 server offers the following electronic security features:

- Secure Boot function of the Intel Xeon processor
- Support for Platform Firmware Resiliency (PFR) hardware Root of Trust (RoT) - see the Platform Firmware Resiliency section
- Firmware signature processes compliant with FIPS and NIST requirements
- System Guard (part of XCC3 Premier) - Proactive monitoring of hardware inventory for unexpected component changes
- Administrator and power-on password
- Integrated Trusted Platform Module (TPM) supporting TPM 2.0
- For China users, optional Nationz TPM 2.0 module
- Self-encrypting drives (SEDs) with support for enterprise key managers - see the SED encryption key management section

The server is NIST SP 800-147B compliant.

The following table lists the security options for the SD520 V4.

Table 34. Security features

Part number	Feature code	Description
CTO only	C1YL	ThinkSystem V4 PRC NationZ TPM 2.0 Module

Platform Firmware Resiliency - Lenovo ThinkShield

Lenovo's ThinkShield Security is a transparent and comprehensive approach to security that extends to all dimensions of our data center products: from development, to supply chain, and through the entire product lifecycle.

The ThinkSystem SD520 V4 includes Platform Firmware Resiliency (PFR) hardware Root of Trust (RoT) which enables the system to be NIST SP800-193 compliant. This offering further enhances key platform subsystem protections against unauthorized firmware updates and corruption, to restore firmware to an integral state, and to closely monitor firmware for possible compromise from cyber-attacks.

PFR operates upon the following server components:

- UEFI image – the low-level server firmware that connects the operating system to the server hardware
- XCC image – the management “engine” software that controls and reports on the server status separate from the server operating system

- FPGA image – the code that runs the server's lowest level hardware controller on the motherboard

The Lenovo Platform Root of Trust Hardware performs the following three main functions:

- Detection – Measures the firmware and updates for authenticity
- Recovery – Recovers a corrupted image to a known-safe image
- Protection – Monitors the system to ensure the known-good firmware is not maliciously written

These enhanced protection capabilities are implemented using a dedicated, discrete security processor whose implementation has been rigorously validated by leading third-party security firms. Security evaluation results and design details are available for customer review – providing unprecedented transparency and assurance.

The SD520 V4 includes support for Secure Boot, a UEFI firmware security feature developed by the UEFI Consortium that ensures only immutable and signed software are loaded during the boot time. The use of Secure Boot helps prevent malicious code from being loaded and helps prevent attacks, such as the installation of rootkits. Lenovo offers the capability to enable secure boot in the factory, to ensure end-to-end protection. Alternatively, Secure Boot can be left disabled in the factory, allowing the customer to enable it themselves at a later point, if desired.

The following table lists the relevant feature code(s).

Table 35. Secure Boot options

Part number	Feature code	Description	Purpose
CTO only	BPKQ	TPM 2.0 with Secure Boot	Configure the system in the factory with Secure Boot enabled.
CTO only	BPKR	TPM 2.0	Configure the system without Secure Boot enabled. Customers can enable Secure Boot later if desired.

Tip: If Secure Boot is not enabled in the factory, it can be enabled later by the customer. However once Secure Boot is enabled, it cannot be disabled.

Security standards

The SD520 V4 supports the following security standards and capabilities:

- **Industry Standard Security Capabilities**
  - Intel CPU Enablement
    - Intel Trust Domain Extensions (Intel TDX)
    - Intel Crypto Acceleration
    - Intel QuickAssist Software Acceleration
    - Intel Platform Firmware Resilience Support
    - Intel Control-Flow Enforcement Technology
    - Intel Total Memory Encryption - Multi Key
    - Intel Total Memory Encryption
    - Intel AES New Instructions (AES-NI)
    - Intel OS Guard
    - Execute Disable Bit (XD)
    - Intel Boot Guard
    - Mode-based Execute Control (MBEC)
    - Intel Virtualization Technology (VT-x)
    - Intel Virtualization Technology for Directed I/O (VT-d)
  - Microsoft Windows Security Enablement
    - Credential Guard

        - Device Guard
        - Host Guardian Service
    - TCG (Trusted Computing Group) TPM (Trusted Platform Module) 2.0
    - UEFI (Unified Extensible Firmware Interface) Forum Secure Boot
- **Hardware Root of Trust and Security**
    - Independent security subsystem providing platform-wide NIST SP800-193 compliant Platform Firmware Resilience (PFR)
    - Management domain RoT supplemented by the Secure Boot features of XCC
- **Platform Security**
    - Boot and run-time firmware integrity monitoring with rollback to known-good firmware (e.g., "self-healing")
    - Non-volatile storage bus security monitoring and filtering
    - Resilient firmware implementation, such as to detect and defeat unauthorized flash writes or SMM (System Management Mode) memory incursions
    - Patented IPMI KCS channel privileged access authorization (USPTO Patent# 11,256,810)
    - Host and management domain authorization, including integration with CyberArk for enterprise password management
    - KMIP (Key Management Interoperability Protocol) compliant, including support for IBM SKLM and Thales KeySecure
    - Reduced "out of box" attack surface
    - Configurable network services

  For more information on platform security, see the paper "How to Harden the Security of your ThinkSystem Server and Management Applications" available from https://lenovopress.com/lp1260-how-to-harden-the-security-of-your-thinksystem-server.
- **Standards Compliance and/or Support**
    - NIST SP800-131A rev 2 "Transitioning the Use of Cryptographic Algorithms and Key Lengths"
    - NIST SP800-147B "BIOS Protection Guidelines for Servers"
    - NIST SP800-193 "Platform Firmware Resiliency Guidelines"
    - ISO/IEC 11889 "Trusted Platform Module Library"
    - Common Criteria TCG Protection Profile for "PC Client Specific TPM 2.0"
    - European Union Commission Regulation 2019/424 ("ErP Lot 9") "Ecodesign Requirements for Servers and Data Storage Products" Secure Data Deletion
    - Optional FIPS 140-2 validated Self-Encrypting Disks (SEDs) with external KMIP-based key management
- **Product and Supply Chain Security**
    - Suppliers validated through Lenovo's Trusted Supplier Program
    - Developed in accordance with Lenovo's Secure Development Lifecycle (LSDL)
    - Continuous firmware security validation through automated testing, including static code analysis, dynamic network and web vulnerability testing, software composition analysis, and subsystem-specific testing, such as UEFI security configuration validation
    - Ongoing security reviews by US-based security experts, with attestation letters available from our third-party security partners
    - Digitally signed firmware, stored and built on US-based infrastructure and signed on US-based Hardware Security Modules (HSMs)
    - TAA (Trade Agreements Act) compliant manufacturing, by default in Mexico for North American markets with additional US and EU manufacturing options

- US 2019 NDAA (National Defense Authorization Act) Section 889 compliant

Rack installation

The D3 V2 Chassis can be installed in a 19-inch rack cabinet. Ordering information for the rail kit is listed in the following table.

Table 36. Rail installation kit

Part number	Feature code	Description
4M17A61253	BAFD	ThinkSystem DA240 Static Rail Kit

The rail kit has the specifications listed in the following table.

Table 37. Rail kit specifications

Feature	ThinkSystem DA240 Static Rail Kit
Part number	4M17A61253
Rail type	Static (fixed, no slide)
Toolless installation	Yes
Cable Management Arm (CMA) support	No support
In-rack server maintenance	No
1U PDU support	Yes
0U PDU support	Limited*
Rack type	Lenovo and IBM 4-post, IEC standard-compliant
Mounting holes	Square or round
Mounting flange thickness	2 mm - 3.3 mm (0.08 - 0.13 in.)
Supported rack range	559 mm - 914 mm (22 - 36 in.)
Rail length***	600 mm (23.6 in.)

* For 0U PDU support, the rack must be at least 1100 mm (43.31 in.) deep.
*** Measured when mounted on the rack, from the front surface of the front mounting flange to the rearmost point of the rail.

Supported rack cabinets are listed in the Rack cabinets section.

Operating system support

The server supports the following operating systems:

- Microsoft Windows Server 2022
- Red Hat Enterprise Linux 9.4
- SUSE Linux Enterprise Server 15 SP6
- Ubuntu 22.04 LTS 64-bit
- Ubuntu 24.04 LTS 64-bit

For a complete list of supported, certified and tested operating systems, plus additional details and links to relevant web sites, see the Operating System Interoperability Guide:
https://lenovopress.com/osig#servers=sd520-v4-7dfz-7dfy

Physical and electrical specifications

Up to four SD520 V4 are installed in the D3 V2 Chassis. Each SD520 V4 has the following dimensions:

- Width: 222 mm (8.7 inches)
- Height: 41 mm (1.6 inches)
- Depth: 908 mm (35.7 inches)

The D3 Chassis 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: 448 mm (17.6 inches)
- Height: 87 mm (3.4 inches)
- Depth: 900 mm (35.4 inches)

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

Table 38. Detailed dimensions

Dimension	Description
488 mm	X_a = Width, to the outsides of the front EIA flanges
448 mm	X_b = Width, to the rack rail mating surfaces
448 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
852 mm	Z_a = Depth, from the rack flange mating surface to the rearmost I/O port surface
852 mm	Z_b = Depth, from the rack flange mating surface to the rearmost feature of the chassis body
883 mm	Z_c = Depth, from the rack flange mating surface to the rearmost feature such as power supply handle
48 mm	Z_d = Depth, from the forwardmost feature on front of EIA flange to the rack flange mating surface
58 mm	Z_e = Depth, from the front of security bezel (if applicable) or forwardmost feature to the rack flange mating surface

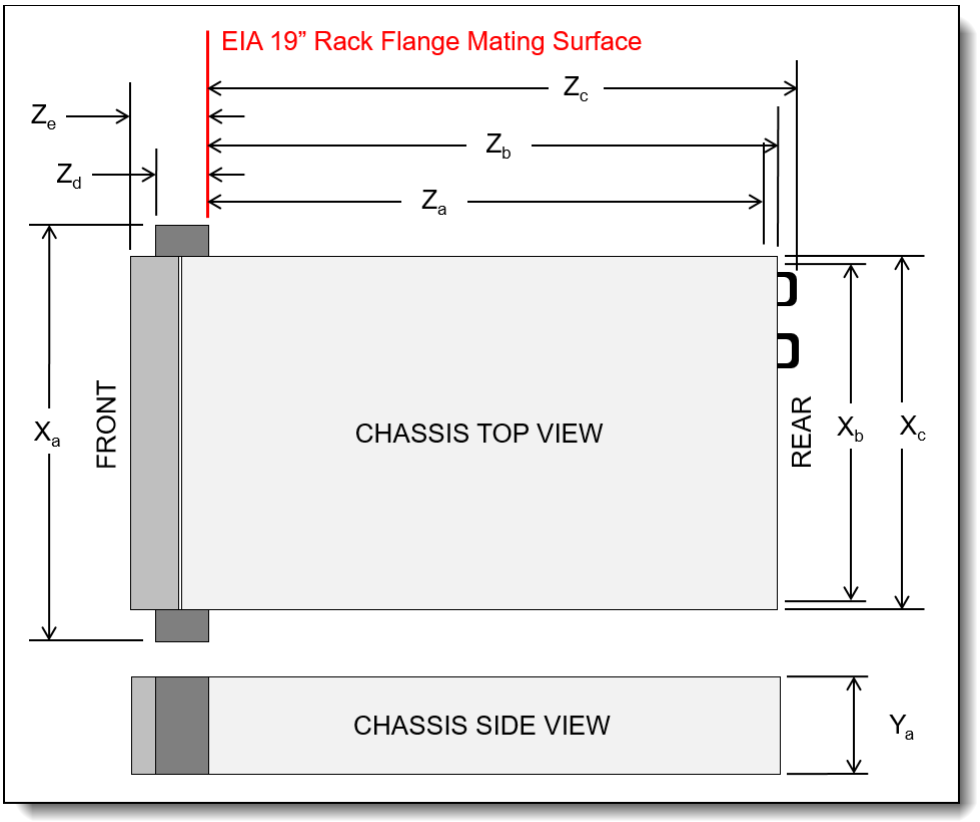

Figure 11. Server dimensions

The shipping (cardboard packaging) dimensions of the SD520 V4 are as follows:

- Width: 343 mm (13.5 inches)
- Height: 158 mm (6.2 inches)
- Depth: 1067 mm (42.0 inches)

The shipping (cardboard packaging) dimensions of the D3 V2 Chassis are as follows:

- Width: 596 mm (23.5 inches)
- Height: 298 mm (11.7 inches)
- Depth: 1180 mm (46.5 inches)

The SD520 V4 has the following weight:

- Maximum: 8.32 kg (18.34 lbs)

The D3 V2 Chassis has the following weight:

- Empty (without servers and power supplies): 11.8 kg (26.1 lb)
- Maximum (4x 1U servers and 3x power supplies): 47.8 kg (105.4 lbs)

The enclosure has the following electrical specifications for AC input power supplies:

- Input voltage:
  - 200 to 240 (nominal) Vac, 50 Hz or 60 Hz
  - 180 to 300 Vdc (China only)
- Inlet current:
  - 1300W power supply: 7.3 A
  - 1600W power supply: 9.0 A
  - 2700W power supply: 15.4 A

Operating environment

The SD520 V4 and D3 V2 Chassis comply with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class H1 specifications.

Depending on the hardware configuration, the SD520 V4 server also complies with ASHRAE Class H1 specification. System performance may be impacted when operating temperature is outside ASHRAE H1 specification.

Topics in this section:

Ambient temperature requirements

Adjust ambient temperature when specific components are installed.

Note:

- To avoid throttling, make sure to adopt passive Direct Attach cables when network adapters with 100GbE or higher speed are installed.
- If PCIe adapter with up to 2 ports is installed, the configuration only supports OCP module with up to 4 ports.
- If PCIe adapter with up to 4 ports is installed, the configuration only supports OCP module with up to 2 ports.

35°C ambient temperature

Keep the ambient temperature to 35°C or lower with the following system configuration:

Table 39. System configuration for 35°C

Processor	Heat sink and Fan	Storage configuration	Slot capability	Memory capability
205W to 250W	• Performance heat sink • Ultra fans	• One front IO board (no 2.5-inch drives) • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
200W	• Standard heat sink • High performance or ultra fans			

30°C ambient temperature

Keep the ambient temperature to 30°C or lower with the following system configuration:

Table 40. System configuration for 30°C

Processor	Heat sink and Fan	Storage configuration	Slot capability	Memory capability
205W to 250W	• Performance heat sink • Ultra fans	• Six 2.5-inch drives • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
205W to 250W	• Performance heat sink • High performance or ultra fans	• Two 2.5-inch drives • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
200W	• Standard heat sink • High performance or ultra fans			
205W to 250W	• Performance heat sink • High performance fans	• One front IO board (no 2.5-inch drives) • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
270W to 350W	• Performance heat sink • Ultra fans			

25°C ambient temperature

Keep the ambient temperature to 25°C or lower with the following system configuration:

Table 41. System configuration for 25°C

Processor	Heat sink and Fan	Storage configuration	Slot capability	Memory capability
270W to 350W	• Performance heat sink • Ultra fans	• Six 2.5-inch drives • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
205W to 250W	• Performance heat sink • High performance or ultra fans			
200W	• Standard heat sink • High performance or ultra fans			
270W to 350W	• Performance heat sink • High performance or ultra fans	• Two 2.5-inch drives • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)
270W to 350W	• Performance heat sink • High performance fans	• One front IO board (no 2.5-inch drives) • Two M.2 boot drives	• One PCIe or GPU adapter • One OCP module	64GB (6400MHz)

Temperature and humidity

The server is supported in the following environment:

- Air temperature:
  - Operating
    - ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
    - ASHRAE Class H1: 5°C to 25°C (41°F to 77°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
  - Server off: 5°C to 45°C (41°F to 113°F)
  - Shipment/storage: -40°C to 60°C (-40°F to 140°F)
- Maximum altitude: 3,050 m (10,000 ft)
- Relative Humidity (non-condensing):
  - Operating
    - ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
    - ASHRAE Class H1: 8% to 80%; maximum dew point: 17°C (62.6°F)
  - Shipment/storage: 8% to 90%

Acoustical noise emissions

The server has the following Acoustic Performance at 25°C ambient temperature:

- Sound power level (L_{WAd})
  - Idling: 6.9 Bel (Typical), 7.3 Bel (Maximum)
  - Operating 1: 6.9 Bel (Typical), 7.4 Bel (Maximum)
  - Operating 2: 7.0 Bel (Typical), 8.6 Bel (Maximum)
- Sound pressure level (L_{pAm}):
  - Idling: 55.9 dBA (Typical), 60.2 dBA (Maximum)
  - Operating 1: 55.9 dBA (Typical), 61.6 dBA (Maximum)
  - Operating 2: 56.6 dBA (Typical), 73.4 dBA (Maximum)

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- Idle mode is the steady state in which the server is powered on but not operating any intended function. Operating mode 1 is 50% of CPU TDP. Operating Mode 2 is 100% of CPU TDP.
- The declared acoustic sound levels are based on the below-specified configurations with four nodes installed in the chassis, which may change depending on configuration/conditions.
  - Typical: 4x 205-watt processors, 32x 64GB 6400 RDIMMs, 4x U.2 NVMe SSDs, 4x 10Gb PCIe adapters, and 2x 2000-watt PSUs
  - Maximum: 4x 350-watt processors, 32x 64GB 6400 RDIMMs, 24x U.2 NVMe SSDs, 4x 1Gb OCP modules, 4x GPU adapters, and 3x 2700-watt PSUs
- 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:
  - The copper reactivity level shall be less than 200 Angstroms per month (Å/month)
  - The silver reactivity level shall be less than 200 Å/month
- Airborne particulates:
  - The room air should be continuously filtered with MERV 8 filters.
  - Air entering a data center should be filtered with MERV 11 or preferably MERV 13 filters.
  - The deliquescent relative humidity of the particulate contamination should be more than 60% RH
  - Environment must be free of zinc whiskers

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

Warranty and Support

The SD520 V4 and D3 V2 Chassis have a 1 year or 3 year warranty, based on the machine type:

- ThinkSystem SD520 V4 (7DFY) - 3 year warranty
- ThinkSystem SD520 V4 (7DFZ) - 1 year warranty
- ThinkSystem D3 V2 Chassis (7DGW) - 3 year warranty
- ThinkSystem D3 V2 Chassis (7DGX) - 1 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.

Regulatory compliance

The SD520 V4 conforms to the following standards:

- ANSI/UL 62368-1
- IEC 62368-1 (CB Certificate and CB Test Report)
- CSA C22.2 No. 62368-1
- Argentina IEC 60950-1
- Mexico NOM-019
- Germany GS
- TUV-GS (EN62368-1, and EK1-ITB2000)
- Brazil INMETRO
- Ukraine UkrCEPRO
- Morocco CMIM Certification (CM)
- Russia, Belorussia and Kazakhstan, TP EAC 037/2016 (for RoHS)
- Russia, Belorussia and Kazakhstan, EAC: TP TC 004/2011 (for Safety); TP TC 020/2011 (for EMC)
- CE, UKCA Mark (EN55032 Class A, EN62368-1, EN55035, EN61000-3-11, EN61000-3-12, (EU) 2019/424, and EN IEC 63000 (RoHS))
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 7, Class A
- CISPR 32, Class A, CISPR 35
- Korea KS C 9832 Class A, KS C 9835
- Japan VCCI, Class A
- Taiwan BSMI CNS15936, Class A; Section 5 of CNS15663
- Australia/New Zealand AS/NZS CISPR 32, Class A; AS/NZS 62368.1
- SGS, VOC Emission
- Energy Star 4.0
- EPEAT (NSF/ ANSI 426) Bronze
- Japanese Energy-Saving Act
- EU2019/424 Energy Related Product (ErP Lot9)
- TCO Certified
- China CELP certificate, HJ 2507-2011

Uninterruptible power supply units

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

Table 42. Uninterruptible power supply units

Part number	Description
Rack-mounted or tower UPS units - 100-125VAC	
7DD5A001WW	RT1.5kVA 2U Rack or Tower UPS-G2 (100-125VAC)
7DD5A003WW	RT3kVA 2U Rack or Tower UPS-G2 (100-125VAC)
Rack-mounted or tower UPS units - 200-240VAC	
7DD5A002WW	RT1.5kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A005WW	RT3kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A007WW	RT5kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A008WW	RT6kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A00AWW	RT11kVA 6U Rack or Tower UPS-G2 (200-240VAC)

† 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 43. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
4PU7A93176	C0QH	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93169	C0DA	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93177	C0QJ	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93170	C0D9	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
0U Switched and Monitored PDUs															
4PU7A93181	C0QN	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU v2 (60A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93174	C0D5	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU (60A derated)	N	Y	N	Y	N	N	Y	Y	N	N	N	Y	N
4PU7A93178	C0QK	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93171	C0D8	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93182	C0QP	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93175	C0CS	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93180	C0QM	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93173	C0D6	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93179	C0QL	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU v2 (30A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93172	C0D7	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU(30A derated)	N	Y	N	Y	N	N	Y	Y	N	N	N	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	Y	Y	N	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

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
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	Y	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
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 44. Rack cabinets

Model	Description
7D6DA007WW	ThinkSystem 42U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6DA008WW	ThinkSystem 42U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA009WW	ThinkSystem 48U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA00AWW	ThinkSystem 48U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
1410O42	Lenovo EveryScale 42U Onyx Heavy Duty Rack Cabinet
1410P42	Lenovo EveryScale 42U Pearl Heavy Duty Rack Cabinet
1410O48	Lenovo EveryScale 48U Onyx Heavy Duty Rack Cabinet
1410P48	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 switches and consoles

The following table lists the supported KVM consoles.

Table 45. 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 47. KVM switches and options

Part number	Description
KVM Console switches	
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

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

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 - OneIQ**
   2024-07-15 | 60 minutes | Employees and Partners

   In this 60-minute replay, Peter Grant, Field CTO for OneIQ, reviewed and demo'd the capabilities of OneIQ including collecting data and analyzing. Additionally, Peter and the team discussed how specific partners (those with NA Channel SA coverage) will get direct access to OneIQ and other partners can get access to OneIQ via Distribution or the NA LETS team.

   Published: 2024-07-15
   Length: 60 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: 071224

2. **FY25Q1 Intel Xeon 6 Update**
   2024-06-04 | 5 minutes | Employees and Partners

   Lenovo is announcing two new servers based on the Intel® Xeon® 6 family of processors. The new Intel® Xeon® 6 family of processors builds on the previous processor generations, adding new features and improving others.
   This Quick Hit introduces the new processor family and the Lenovo ThinkSystem SR630 V4 and SD520 V4 servers that use it.

   Published: 2024-06-04
   Length: 5 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: SXXW2535a

3. **SAP Webinar for Lenovo Sellers: Lenovo Portfolio Update for SAP Landscapes**
   2024-06-04 | 60 minutes | Employees Only

   Join Mark Kelly, Advisory IT Architect with the Lenovo Global SAP Center of Competence as he discusses:
   • Challenges in the SAP environment
   • Lenovo On-premise Solutions for SAP
   • Lenovo support resources for SAP solutions

   Published: 2024-06-04
   Length: 60 minutes

   Start the training:
   Employee link: Grow@Lenovo

   Course code: DSAPF101

4. **Lenovo Data Center Product Portfolio**
   2024-05-29 | 20 minutes | Employees and Partners

   This course introduces the Lenovo data center portfolio, and covers servers, storage, storage networking, and software-defined infrastructure products. After completing this course about Lenovo data center products, you will be able to identify product types within each data center family, describe Lenovo innovations that this product family or category uses, and recognize when a specific product should be selected.

   Published: 2024-05-29
   Length: 20 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: SXXW1110r7

5. **VTT Cloud Architecture: NVIDIA Using Cloud for GPUs and AI**
   2024-05-22 | 60 minutes | Employees Only

   Join JD Dupont, NVIDIA Head of Americas Sales, Lenovo partnership and Veer Mehta, NVIDIA Solution Architect on an interactive discussion about cloud to edge, designing cloud Solutions with NVIDIA GPUs and minimizing private\hybrid cloud OPEX with GPUs. Discover how you can use what is done at big public cloud providers for your customers. We will also walk through use cases and see a demo you can use to help your customers.

   Published: 2024-05-22
   Length: 60 minutes

   Start the training:
   Employee link: Grow@Lenovo

   Course code: DVCLD212

6. **Partner Technical Webinar - ISG Portfolio Update**
   2024-04-15 | 60 minutes | Employees and Partners

   In this 60-minute replay, Mark Bica, NA ISG Server Product Manager reviewed the Lenovo ISG portfolio. He covered new editions such as the SR680a \ SR685a, dense servers, and options that are strategic for any workload.

   Published: 2024-04-15
   Length: 60 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: 041224

7. **Partner Technical Webinar – StorMagic**
   2024-03-19 | 60 minutes | Employees and Partners

   March 08, 2024 – In this 60-minute replay, Stuart Campbell and Wes Ganeko of StorMagic joined us and provided an overview of StorMagic on Lenovo. They also demonstrated the interface while sharing some interesting use cases.

   Published: 2024-03-19
   Length: 60 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: 030824

8. **Intel Transparent Supply Chain on Lenovo Servers**
   2024-01-29 | 12 minutes | Employees and Partners

   This course introduces the Intel Transparent Supply Chain (TSC) program, explains how the program works, and discusses the benefits of the Intel TSC program to customers. Adding the Intel TSC feature to an order is explained.

   Course objectives:
   • Describe the Intel® Transparent Supply Chain program
   • Explain how the Intel® Transparent Supply Chain program works
   • Discuss the benefits of the Intel® Transparent Supply Chain program to Lenovo customers
   • Explain how to add Intel® Transparent Supply Chain program feature to an order

   Published: 2024-01-29
   Length: 12 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: SXXW1230

9. **Family Portfolio: Storage Controller Options**
   2024-01-23 | 25 minutes | Employees and Partners

   This course covers the storage controller options available for use in Lenovo servers. The classes of storage controller are discussed, along with a discussion of where they are used, and which to choose.

   After completing this course, you will be able to:
   • Describe the classes of storage controllers
   • Discuss where each controller class is used
   • Describe the available options in each controller class

   Published: 2024-01-23
   Length: 25 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: SXXW1111

10. **Lenovo-Intel Sustainable Solutions QH**
    2024-01-22 | 10 minutes | Employees and Partners

    This Quick Hit explains how Lenovo and Intel are committed to sustainability, and introduces the Lenovo-Intel joint sustainability campaign. You will learn how to use this campaign to show customers what that level of commitment entails, how to use the campaign's unsolicited proposal approach, and how to use the campaign as a conversation starter which may lead to increased sales.

    Published: 2024-01-22
    Length: 10 minutes

    Start the training:
    Employee link: Grow@Lenovo
    Partner link: Lenovo Partner Learning

    Course code: SXXW2524a

11. **FY24Q3 Intel Servers Update**
2023-12-11 | 15 minutes | Employees and Partners

This update is designed to help you discuss the features and customer benefits of Lenovo servers that use the 5th Gen Intel® Xeon® processors. Lenovo has also introduced a new server, the ThinkSystem SD650-N V3, which expands the supercomputer server family. Reasons to call your customer and talk about refreshing their infrastructure are also included as a guideline.

Published: 2023-12-11
Length: 15 minutes

Start the training:
Employee link: Grow@Lenovo
Partner link: Lenovo Partner Learning

Course code: SXXW2522a

12. **Partner Technical Webinar - Data Center Limits and ISG TAA Compliance**
2023-05-16 | 60 minutes | Employees and Partners

In this 60-minute replay, we had two topics. First Vinod Kamath, Lenovo Distinguished Engineer for Data Center Cooling presented on the Systems Configuration and Data Center Ambient Limits. Second, Shama Patari, Lenovo Trade Council, and Glenn Johnson, Lenovo Principal Engineer for Supply Chain presented on ISG TAA Compliance.

Published: 2023-05-16
Length: 60 minutes

Start the training:
Employee link: Grow@Lenovo
Partner link: Lenovo Partner Learning

Course code: 051223

13. **Lenovo Sustainable Computing**
2022-09-16 | 4 minutes | Employees and Partners

This Quick Hit describes the Lenovo sustainable computing program, and the many ways in which Lenovo strives to respect and protect the environment.

Published: 2022-09-16
Length: 4 minutes

Start the training:
Employee link: Grow@Lenovo
Partner link: Lenovo Partner Learning

Course code: SXXW2504a

Related publications and links

For more information, see these resources:

- ThinkSystem SD520 V4 product page
  https://www.lenovo.com/us/en/p/servers-storage/servers/multi-node/lenovo-thinksystem-sd520-v4/len21ts0037
- ThinkSystem SD520 V4 datasheet
  https://lenovopress.lenovo.com/datasheet/ds0184-lenovo-thinksystem-sd520-v4
- ThinkSystem SD520 V4 drivers and support
  http://datacentersupport.lenovo.com/products/servers/thinksystem/sd520v4/7dg9/downloads
- Lenovo ThinkSystem SD520 V4 product publications:
  https://pubs.lenovo.com/sd520-v4/
  - User Guide, which includes:
    - System Configuration Guide
    - Hardware Maintenance Guide
  - Rack Installation Guides
  - Messages and Codes Reference
  - UEFI Manual for ThinkSystem Servers
- User Guides for options:
  https://serveroption.lenovo.com
- ServerProven hardware compatibility:
  http://serverproven.lenovo.com

Related product families

Product families related to this document are the following:

- Multi-Node Servers
- ThinkSystem SD520 V4 Server

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