

Lenovo ThinkSystem SR650 Server (Xeon SP Gen 1) Product Guide (withdrawn product)

Lenovo ThinkSystem SR650 is an ideal 2-socket 2U rack server for small businesses up to large enterprises that need industry-leading reliability, management, and security, as well as maximizing performance and flexibility for future growth. The SR650 server is designed to handle a wide range of workloads, such as databases, virtualization and cloud computing, virtual desktop infrastructure (VDI), enterprise applications, collaboration/email, and business analytics and big data.

Featuring the Intel Xeon Processor Scalable Family, the SR650 server offers scalable performance, storage capacity, and I/O expansion. The SR650 server supports up to two processors, up to 3 TB of 2666 MHz TruDDR4 memory, up to 24x 2.5-inch or 14x 3.5-inch drive bays with an extensive choice of NVMe PCIe SSDs, SAS/SATA SSDs, and SAS/SATA HDDs, and flexible I/O expansion options with the LOM slot, the dedicated storage controller slot, and up to 6x PCIe slots.

The SR650 server offers basic or advanced hardware RAID protection and a wide range of networking options, including selectable LOM, ML2, and PCIe network adapters. The next-generation Lenovo XClarity Controller, which is built into the SR650 server, provides advanced service processor control, monitoring, and alerting functions.

The following figure shows the ThinkSystem SR650 with 2.5-inch hot-swap drives.



Figure 1. Lenovo ThinkSystem SR650 with 2.5-inch drive bays

Did you know?

The SR650 server features a unique AnyBay design that allows a choice of drive interface types in the same drive bay: SAS drives, SATA drives, or U.2 NVMe PCIe drives.

The SR650 server offers onboard NVMe PCIe ports that allow direct connections to the U.2 NVMe PCIe SSDs, which frees up I/O slots and helps lower NVMe solution acquisition costs.

The SR650 server is designed to meet ASHRAE A4 standards (up to 45 °C [113 °F]) in select configurations, which enable customers to lower energy costs, while still maintaining world-class reliability.

Key features

Combining performance and flexibility, the SR650 server is a great choice for small and medium businesses up to the large enterprise. It can provide outstanding uptime to keep business-critical applications and cloud deployments running safely. Ease of use and comprehensive systems management tools help make deployment easier. Outstanding reliability, availability, and serviceability (RAS) and high-efficiency design improve your business environment and help save operational costs.

Scalability and performance

The SR650 server offers numerous features to boost performance, improve scalability, and reduce costs:

- Improves productivity by offering superior system performance with the Intel Xeon Processor Scalable Family with up to 28-core processors, up to 38.5 MB of last level cache (LLC), up to 2666 MHz memory speeds, and up to 10.4 GT/s Ultra Path Interconnect (UPI) links.
 - Support for up to two processors, 56 cores, and 112 threads allows to maximize the concurrent execution of multithreaded applications.
 - Intelligent and adaptive system performance with energy efficient Intel Turbo Boost 2.0 Technology allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor thermal design power (TDP).
 - Intel Hyper-Threading Technology boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
 - Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
 - Intel Advanced Vector Extensions 512 (AVX-512) enable acceleration of enterprise-class and high performance computing (HPC) workloads.
- Helps maximize system performance for data intensive applications with up to 2666 MHz memory speeds and up to 3 TB of memory capacity (with the processors that support 1.5 TB per socket).
- Offers flexible and scalable internal storage in a 2U rack form factor with up to 24x 2.5-inch and 2x 3.5-inch drives for performance-optimized configurations or up to 14x 3.5-inch drives for capacity-optimized configurations, providing a wide selection of SAS/SATA HDD/SSD and PCIe NVMe SSD types and capacities.
- Provides flexibility to use SAS, SATA, or NVMe PCIe drives in the same drive bays with a unique AnyBay design.
- Provides I/O scalability with the LOM slot, PCIe 3.0 slot for an internal storage controller, and up to six PCI Express (PCIe) 3.0 I/O expansion slots in a 2U rack form factor.
- Reduces I/O latency and increases overall system performance with Intel Integrated I/O Technology that embeds the PCI Express 3.0 controller into the Intel Xeon Processor Scalable Family.

Availability and serviceability

The SR650 server provides many features to simplify serviceability and increase system uptime:

- Offers protection in the event of a non-correctable memory failure with Single Device Data Correction (SDDC, also known as Chipkill, requires x4-based DIMMs), Adaptive Double Device Data Correction (ADDDC, also known as Redundant Bit Steering [RBS], requires x4-based DIMMs and Intel Xeon Gold or Platinum processors), memory mirroring, and memory rank sparing.
- Provides easy access to upgrades and serviceable parts (such as processors, memory DIMMs, and adapter cards) with tool-less cover removal.
- Offers data protection and greater system uptime with hot-swap drives supporting basic or advanced RAID redundancy.
- Provides availability for business-critical applications with redundant hot-swap power supplies and redundant hot-swap fans.
- Simplifies servicing, speeds up problem resolution, and helps improve system availability with light path diagnostics.
- Allows preventive actions in advance of possible failure, thereby increasing server uptime and application availability with Proactive Platform Alerts (including PFA and SMART alerts) for processors, voltage regulators, memory, internal storage (SAS/SATA HDDs and SSDs, NVMe SSDs, M.2 storage, flash storage adapters), fans, power supplies, RAID controllers, and server ambient and sub-component temperatures.

- Continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failure to minimize downtime with Built-in XClarity Controller (XCC).
- Provides quick access to system status, firmware, network, health, and alerts information via Virtual Operator Panel from the XClarity Mobile App running on the Android or iOS mobile device that is connected to the front USB port with XClarity Controller access.
- Speeds up troubleshooting tasks to reduce service time with diagnostics built into the XClarity Provisioning Manager.

Manageability and security

Powerful systems management features simplify local and remote management of the SR650 server and deliver enterprise-class data protection:

- Provides advanced service processor control, monitoring, and alerting functions with XClarity Controller, a next generation service processor.
- Improves Unified Extensible Firmware Interface (UEFI) system setup, configuration, updates, simplified error handling, and operating system deployment with the embedded XClarity Provisioning Manager.
- Offers XClarity Essentials software tools that can help you set up, use, and maintain the server.
- Increases uptime, reduces costs, and improves productivity through advanced server management capabilities with Lenovo XClarity Administrator that provides comprehensive hardware management.
- Provides on-the-go monitoring and management of devices in XClarity Administrator from anywhere with the Lenovo XClarity mobile app, which can help improve efficiency and reduce downtime risks.
- Centralizes infrastructure resource management with Lenovo XClarity Integrators for VMware vCenter and Microsoft System Center, extending XClarity Administrator features to virtualization management software tools and enabling users to deploy and manage infrastructure end-to-end.
- Offers advanced cryptographic functionality (such as digital signatures and remote attestation) with an integrated Trusted Platform Module (TPM) or optional Trusted Cryptographic Module (TCM) or Nationz TPM (available only in PRC).
- Keeps user data safe with Lenovo Business Vantage, a security software tool suite designed to work with the Trusted Cryptographic Module (available only in PRC).
- Offers enterprise-class data protection with advanced RAID and optional self-encrypting drives.
- Provides faster, stronger encryption with industry-standard AES NI support.
- Helps prevent certain classes of malicious buffer overflow attacks with Intel Execute Disable Bit functionality, when combined with a supporting operating system.
- Enhances security through hardware-based resistance to malicious software attacks with Intel Trusted Execution Technology, allowing an application to run in its own isolated space, protected from all other software running on a system.

Energy efficiency

The SR650 server offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Delivers impressive compute power per watt, featuring 80 PLUS Titanium and Platinum redundant power supplies.
- Enables customers to lower energy costs with design to meet ASHRAE A4 standards in select configurations.
- Reduces power drawn with Intel Intelligent Power Capability that powers individual processor elements on and off as needed.
- Helps reduce power consumption with variable speed fans.
- Helps achieve lower heat output and reduced cooling needs with Lenovo XClarity Energy Manager that provides advanced data center power notification, analysis, and policy-based management.

Components and connectors

The following figure shows the front of the SR650 server with up to 16x 2.5-inch drive bays.

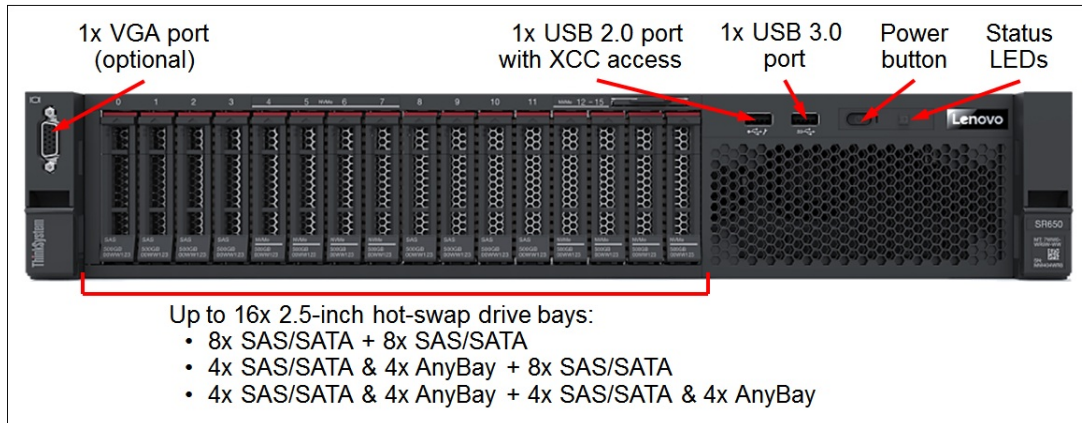


Figure 2. Front view of the SR650: Up to 16x 2.5-inch drive bays

The following figure shows the front of the SR650 server with up to 24x 2.5-inch drive bays.

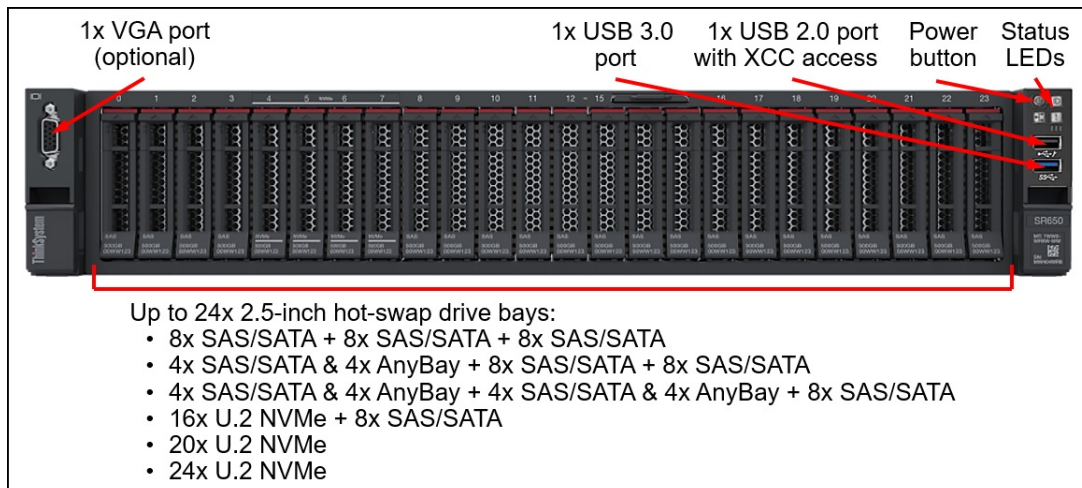


Figure 3. Front view of the SR650: Up to 24x 2.5-inch drive bays

The following figure shows the front of the SR650 server with 8x 3.5-inch drive bays.

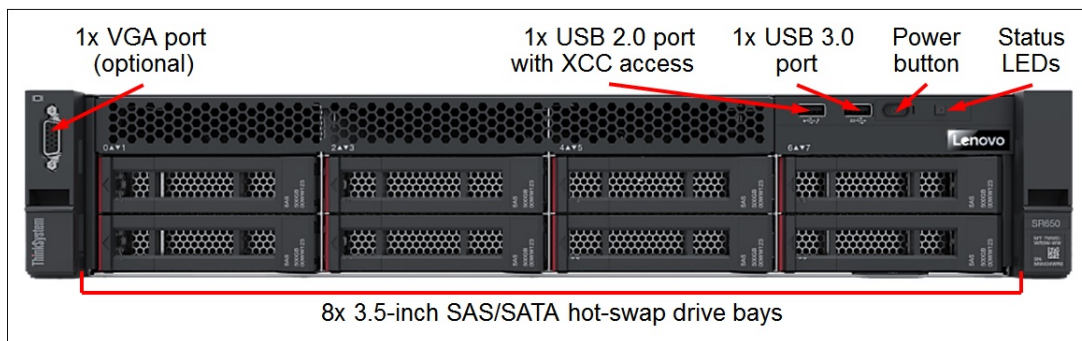


Figure 4. Front view of the SR650: 8x 3.5-inch drive bays

The following figure shows the front of the SR650 server with 12x 3.5-inch drive bays.

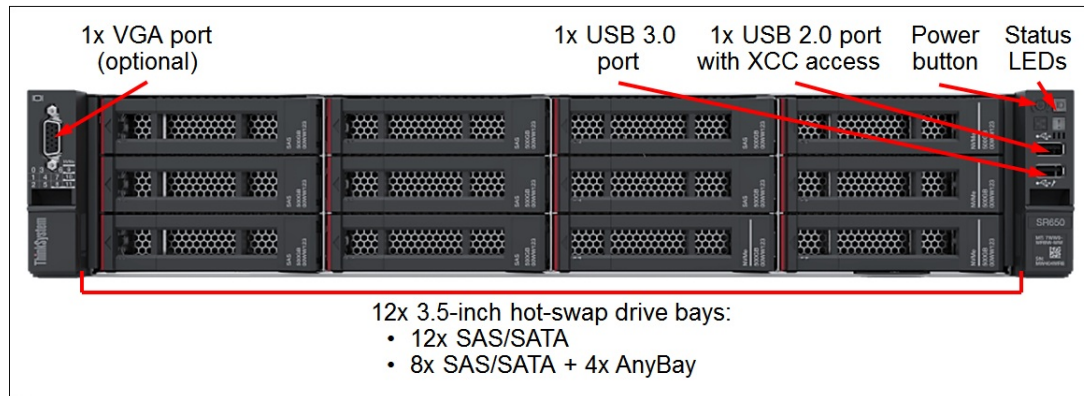


Figure 5. Front view of the SR650: 12x 3.5-inch drive bays

The front of the SR650 server includes the following components:

- Up to 16x 2.5-inch, or 24x 2.5-inch, or 8x 3.5-inch, or 12x 3.5-inch hot-swap drive bays.
- One VGA port (optional).
- One USB 3.0 port.
- One USB 2.0 port with XClarity Controller access.
- Power button.
- Status LEDs.

The following figure shows the rear of the SR650 server.

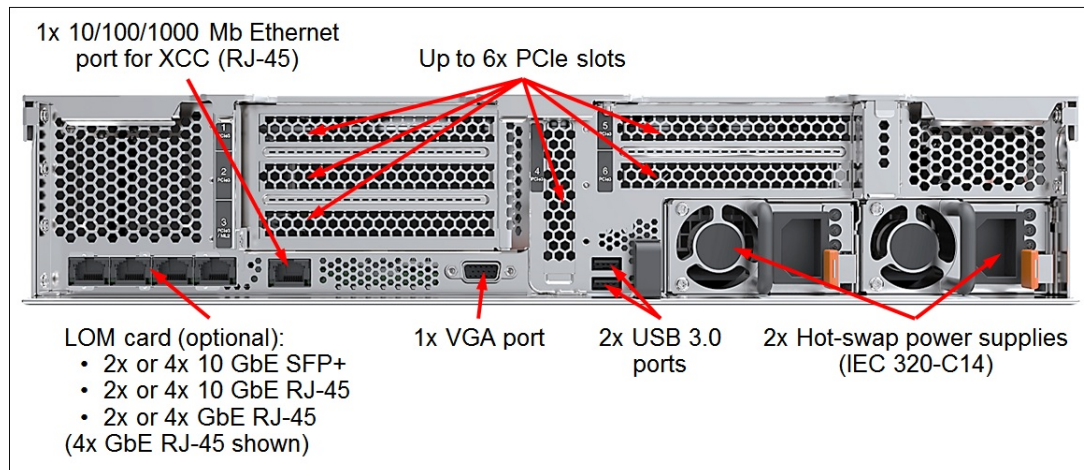


Figure 6. Rear view of the SR650

The rear of the SR650 server includes the following components:

- Up to six PCIe expansion slots (depending on the riser cards selected).
- One LOM card slot.
- One 1 GbE port for XClarity Controller.
- One VGA port.
- Two USB 3.0 ports.
- Up to two hot-swap power supplies.

The following figure shows the locations of key components inside the SR650 server.

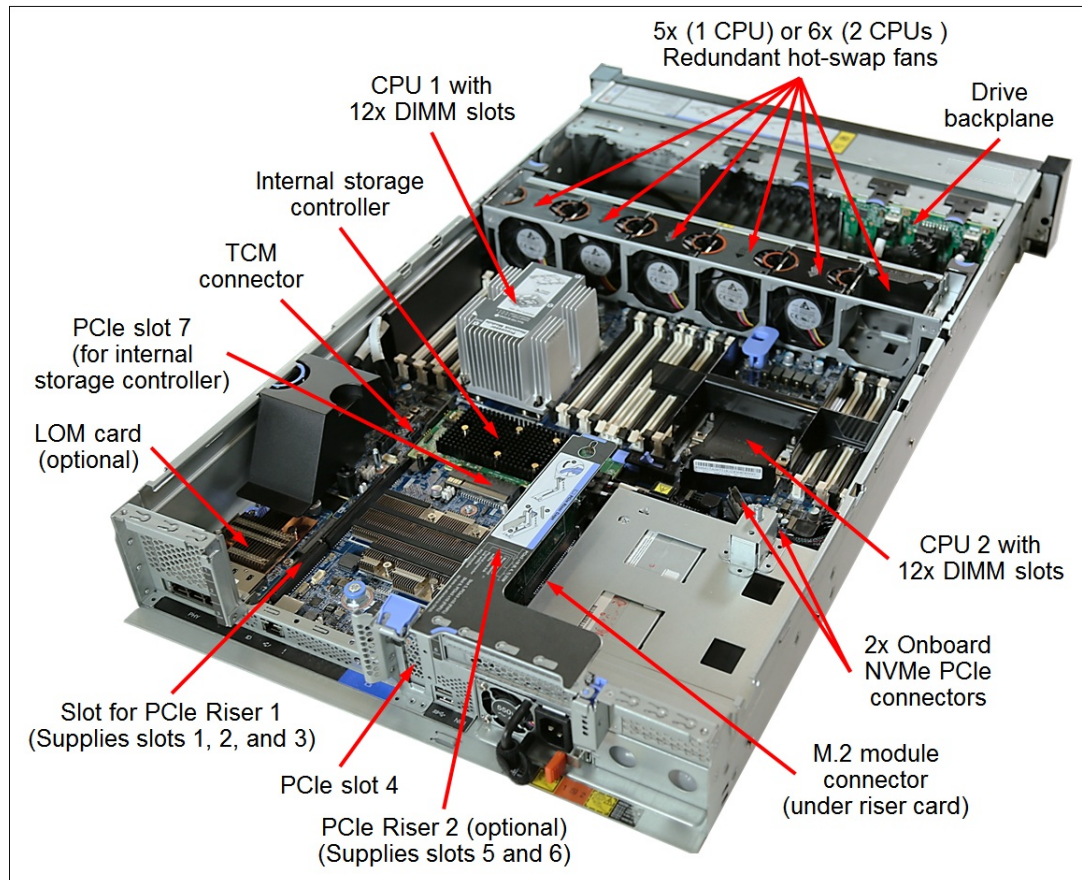


Figure 7. Internal view of the SR650

The following key components are located inside the SR650 server:

- Up to two processors.
- 24 DIMM slots (12 DIMM slots per processor).
- Drive backplanes.
- Two onboard NVMe PCIe connectors.
- One M.2 module connector.
- One LOM card connector.
- Two onboard PCIe slots 4 and 7.
- Two slots for PCIe riser cards.
- One TCM connector.
- Five (one processor) or six (two processors) hot-swap system fans.

System specifications

The following table lists the system specifications for the SR650 server.

Table 1. SR650 system specifications

Attribute	Specification
Machine types	7X05 - 1 year warranty 7X06 - 3 year warranty
Form factor	2U rack-mount.
Processor	Up to two Intel Xeon Bronze, Silver, Gold, or Platinum processors: <ul style="list-style-type: none"> Up to 28 cores (2.8 GHz core speeds) Up to 3.9 GHz core speeds (8 cores) Two UPI links up to 10.4 GT/s each Up to 38.5 MB cache Up to 2666 MHz memory speed
Chipset	Intel C624.
Memory	Up to 24 DIMM sockets (12 DIMMs per processor; six memory channels per processor with two DIMMs per channel). Support for RDIMMs, LRDIMMs, or 3DS RDIMMs. Memory types cannot be intermixed. Memory speed up to 2666 MHz.
Memory capacity	<ul style="list-style-type: none"> With RDIMMs: Up to 768 GB with 24x 32 GB RDIMMs and two processors. With LRDIMMs: Up to 1.5 TB with 24x 64 GB LRDIMMs and two processors. With 3DS RDIMMs: Up to 3 TB with 128 GB 3DS RDIMMs and two processors (requires processors that support 1.5 TB of memory per socket).
Memory protection	Error correction code (ECC), SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Intel Xeon Gold or Platinum processors), memory mirroring, memory rank sparing, patrol scrubbing, and demand scrubbing.
Drive bays	<ul style="list-style-type: none"> Up to 16 SFF (front) and 2 LFF (rear) hot-swap drive bays: <ul style="list-style-type: none"> 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 2x 3.5" SAS/SATA Up to 24 SFF (front) and 2 LFF (rear) hot-swap drive bays: <ul style="list-style-type: none"> 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay 16x 2.5" U.2 NVMe PCIe + 8x 2.5" SAS/SATA (factory-installed only) 20x 2.5" U.2 NVMe PCIe 24x 2.5" U.2 NVMe PCIe Up to 10 LFF SAS/SATA hot-swap drive bays: 8x 3.5" (front) + 2x 3.5" (rear) Up to 14 LFF hot-swap drive bays: <ul style="list-style-type: none"> 12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear) 8x 3.5" SAS/SATA & 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)

Attribute	Specification
Internal storage capacity	<ul style="list-style-type: none"> ● 2.5-inch drives: <ul style="list-style-type: none"> ○ 368.64TB using 24x 15.36TB 2.5-inch SAS SSDs ○ 368.64TB using 24x 15.36TB 2.5-inch NVMe SSDs ○ 57.6TB using 24x 2.4TB 2.5-inch HDDs ● 3.5-inch drives: <ul style="list-style-type: none"> ○ 252TB using 14x 18TB 3.5-inch HDDs ○ 107.52TB using 14x 7.68TB 3.5-inch SAS/SATA SSDs ○ 30.72TB using 4x 7.68TB 3.5-inch NVMe SSDs
Storage controller	<p>12 Gbps SAS/6 Gbps SATA RAID</p> <ul style="list-style-type: none"> ● RAID 0/1/10: RAID 530-16i ● RAID 0/1/10/5/50: <ul style="list-style-type: none"> ○ RAID 530-8i ○ RAID 730-8i 1GB Cache ● RAID 0/1/10/5/50/6/60: <ul style="list-style-type: none"> ○ RAID 730-8i 2GB Flash ○ RAID 930-8i 2GB Flash ○ RAID 930-16i 4GB or 8GB Flash ○ RAID 930-24i 4 GB Flash <p>12 Gbps SAS/6 Gbps SATA non-RAID: 430-8i or 16i HBA</p> <p>NVMe PCIe non-RAID</p> <ul style="list-style-type: none"> ● Onboard NVMe ● 810-4P NVMe Switch Adapter ● 1610-4P NVMe Switch Adapter ● 1610-8P NVMe Switch Adapter
Optical drive bays	None. Support for an external USB DVD RW Optical Disk Drive (See Optical drives).
Network interfaces	<ul style="list-style-type: none"> ● Onboard LOM slot for up to 4x 1/10 Gb Ethernet ports: <ul style="list-style-type: none"> ○ 2x or 4x 1 GbE RJ-45 ports (no 10/100 Mb support) ○ 2x or 4x 10 GbE RJ-45 ports (no 10/100 Mb support) ○ 2x or 4x 10 GbE SFP+ ports (no 10/100 Mb support) ● Optional Mezzanine LOM (ML2) slot for dual-port 10 GbE cards with SFP+ or RJ-45 connectors or single- or dual-port 25 GbE cards with SFP28 connectors. ● 1x RJ-45 10/100/1000 Mb Ethernet systems management port.
I/O expansion slots	<p>Up to seven slots. Slots 4 and 7 are the fixed slots on the system planar, and the remaining slots depend on the riser cards installed. The slots are as follows:</p> <ul style="list-style-type: none"> ● Slot 1: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, half-length (PCIe x16 slot can be single- or double-wide) ● Slot 2: PCIe 3.0 x8; full-height, half-length (not present if Slot 1 is PCIe x16 double-wide or Slot 3 is ML2 x16) ● Slot 3: PCIe 3.0 x8, or PCIe 3.0 x16, or ML2 x8, or ML2 x16; full-height, half-length ● Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar) ● Slot 5: PCIe 3.0 x16; full-height, half-length ● Slot 6: PCIe 3.0 x16; full-height, half-length ● Slot 7: PCIe 3.0 x8 (dedicated to an internal RAID controller) <p>Slots 5 and 6 require the second processor to be installed. Single-wide PCIe x16 Slot 1 requires the second processor to be installed.</p>
Ports	<ul style="list-style-type: none"> ● Front: 1x USB 3.0 port and 1x USB 2.0 port with XClarity Controller access. Optional 1x VGA port. ● Rear: 2x USB 3.0 ports and 1x VGA port. Optional 1x DB-9 serial port.
Cooling	Five (one processor) or six (two processors) hot-swap system fans with N+1 redundancy.
Power supply	Up to two redundant hot-swap 550 W, 750 W, or 1100 W (100 - 240 V), or 1600 W (200 - 240 V) High Efficiency Platinum AC power supplies, or 750 W (200 - 240 V) High Efficiency Titanium AC power supplies. HVDC support (PRC only).

Attribute	Specification
Video	Matrox G200 with 16 MB memory integrated into the XClarity Controller. Maximum resolution is 1920x1200 at 60 Hz with 32 bits per pixel.
Hot-swap parts	Drives, power supplies, and fans.
Systems management	XClarity Controller (XCC) Standard, Advanced, or Enterprise (Pilot 4 chip), proactive platform alerts, light path diagnostics, XClarity Provisioning Manager, XClarity Essentials, XClarity Administrator, XClarity Integrators for VMware vCenter and Microsoft System Center, XClarity Energy Manager, Capacity Planner.
Security features	Power-on password, administrator's password, secure firmware updates, Trusted Platform Module (TPM) 1.2 or 2.0 (configurable UEFI setting). Optional lockable front bezel. Optional Trusted Cryptographic Module (TCM) or Nationz TPM (available only in PRC). Optional Lenovo Business Vantage security software (available only in PRC).
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi. See the Operating systems section for specifics.
Warranty	One-year (Machine Type 7X05) or three-year (Machine Type 7X06) customer-replaceable unit (CRU) and onsite limited warranty with 9x5 Next Business Day Parts Delivered.
Service and support	Optional Lenovo Services upgrades: 2-hour or 4-hour response time, 6-hour or 24-hour committed service repair, warranty extension up to 5 years, 1-year or 2-year post-warranty extensions, YourDrive YourData, Enterprise Software Support, and Basic Hardware Installation Services.
Dimensions	Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 764 mm (30.1 in.). See Physical specifications for details.
Weight	Minimum configuration: 19 kg (41.9 lb), maximum: 32 kg (70.5 lb)

Processors

The SR650 server supports one or two Intel Xeon Bronze, Silver, Gold, or Platinum processors. The following table lists the specifications of the processors for the SR650 server.

Table 2. Processor specifications (HT = Hyper-Threading, TB = Turbo Boost, VT = Virtualization Technology)

CPU model	Core frequency (Base / TB Max)	Number of cores / threads	Cache	Max DDR4 frequency	Max memory per socket	UPI speed	TDP	HT	TB	VT-x	VT-d
Intel Xeon Bronze processors											
3104	1.7 / 1.7 GHz	6 / 6	8.25 MB	2133 MHz	768 GB	9.6 GT/s	85 W	No	No	Yes	Yes
3106	1.7 / 1.7 GHz	8 / 8	11 MB	2133 MHz	768 GB	9.6 GT/s	85 W	No	No	Yes	Yes
Intel Xeon Silver processors											
4108	1.8 / 3.0 GHz	8 / 16	11 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4109T	2.0 / 3.0 GHz	8 / 16	11 MB	2400 MHz	768 GB	9.6 GT/s	70 W	Yes	Yes	Yes	Yes
4110	2.1 / 3.0 GHz	8 / 16	11 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4112	2.6 / 3.0 GHz	4 / 8	8.25 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4114	2.2 / 3.0 GHz	10 / 20	13.75 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4114T	2.2 / 3.0 GHz	10 / 20	13.75 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4116	2.1 / 3.0 GHz	12 / 24	16.5 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
4116T	2.1 / 3.0 GHz	12 / 24	16.5 MB	2400 MHz	768 GB	9.6 GT/s	85 W	Yes	Yes	Yes	Yes
Intel Xeon Gold processors											
5115	2.4 / 3.2 GHz	10 / 20	13.75 MB	2400 MHz	768 GB	10.4 GT/s	85 W	Yes	Yes	Yes	Yes
5117	2.0 / 2.8 GHz	14 / 28	19.25 MB	2400 MHz	768 GB	10.4 GT/s	105W	Yes	Yes	Yes	Yes
5118	2.3 / 3.2 GHz	12 / 24	16.5 MB	2400 MHz	768 GB	10.4 GT/s	105 W	Yes	Yes	Yes	Yes
5119T	1.9 / 3.2 GHz	14 / 28	19.25 MB	2400 MHz	768 GB	10.4 GT/s	85 W	Yes	Yes	Yes	Yes
5120	2.2 / 3.2 GHz	14 / 28	19.25 MB	2400 MHz	768 GB	10.4 GT/s	105 W	Yes	Yes	Yes	Yes
5120T	2.2 / 3.2 GHz	14 / 28	19.25 MB	2400 MHz	768 GB	10.4 GT/s	105 W	Yes	Yes	Yes	Yes
5122	3.6 / 3.7 GHz	4 / 8	16.5 MB	2666 MHz	768 GB	10.4 GT/s	105 W	Yes	Yes	Yes	Yes
6126	2.6 / 3.7 GHz	12 / 24	19.25 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6126T	2.6 / 3.7 GHz	12 / 24	19.25 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6128	3.4 / 3.7 GHz	6 / 12	19.25 MB	2666 MHz	768 GB	10.4 GT/s	115 W	Yes	Yes	Yes	Yes
6130	2.1 / 3.7 GHz	16 / 32	22 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6130T	2.1 / 3.7 GHz	16 / 32	22 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6132	2.6 / 3.7 GHz	14 / 28	19.25 MB	2666 MHz	768 GB	10.4 GT/s	140 W	Yes	Yes	Yes	Yes
6134	3.2 / 3.7 GHz	8 / 16	24.75 MB	2666 MHz	768 GB	10.4 GT/s	130 W	Yes	Yes	Yes	Yes
6134M	3.2 / 3.7 GHz	8 / 16	24.75 MB	2666 MHz	1.5 TB	10.4 GT/s	130 W	Yes	Yes	Yes	Yes
6136	3.0 / 3.7 GHz	12 / 24	24.75 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
6137	3.9 / 4.1 GHz	8 / 16	24.75 MB	2666 MHz	768 GB	10.4 GT/s	205 W	Yes	Yes	Yes	Yes
6138	2.0 / 3.7 GHz	20 / 40	27.5 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6138T	2.0 / 3.7 GHz	20 / 40	27.5 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
6140	2.3 / 3.7 GHz	18 / 36	24.75 MB	2666 MHz	768 GB	10.4 GT/s	140 W	Yes	Yes	Yes	Yes
6140M	2.3 / 3.7 GHz	18 / 36	24.75 MB	2666 MHz	1.5 TB	10.4 GT/s	140 W	Yes	Yes	Yes	Yes
6142	2.6 / 3.7 GHz	16 / 32	22 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
6142M	2.6 / 3.7 GHz	16 / 32	22 MB	2666 MHz	1.5 TB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
6144	3.5 / 4.2 GHz	8 / 16	24.75 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
6146	3.2 / 4.2 GHz	12 / 24	24.75 MB	2666 MHz	768 GB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
6148	2.4 / 3.7 GHz	20 / 40	27.5 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes

CPU model	Core frequency (Base / TB Max)	Number of cores / threads	Cache	Max DDR4 frequency	Max memory per socket	UPI speed	TDP	HT	TB	VT-x	VT-d
6150	2.7 / 3.7 GHz	18 / 36	24.75 MB	2666 MHz	768 GB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
6152	2.1 / 3.7 GHz	22 / 44	30.25 MB	2666 MHz	768 GB	10.4 GT/s	140 W	Yes	Yes	Yes	Yes
6154	3.0 / 3.7 GHz	18 / 36	24.75 MB	2666 MHz	768 GB	10.4 GT/s	200 W	Yes	Yes	Yes	Yes
Intel Xeon Platinum processors											
8153	2.0 / 2.8 GHz	16 / 32	22 MB	2666 MHz	768 GB	10.4 GT/s	125 W	Yes	Yes	Yes	Yes
8156	3.6 / 3.7 GHz	4 / 8	16.5 MB	2666 MHz	768 GB	10.4 GT/s	105 W	Yes	Yes	Yes	Yes
8158	3.0 / 3.7 GHz	12 / 24	24.75 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
8160	2.1 / 3.7 GHz	24 / 48	33 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
8160M	2.1 / 3.7 GHz	24 / 48	33 MB	2666 MHz	1.5 TB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
8160T	2.1 / 3.7 GHz	24 / 48	33 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
8164	2.0 / 3.7 GHz	26 / 52	35.75 MB	2666 MHz	768 GB	10.4 GT/s	150 W	Yes	Yes	Yes	Yes
8168	2.7 / 3.7 GHz	24 / 48	33 MB	2666 MHz	768 GB	10.4 GT/s	205 W	Yes	Yes	Yes	Yes
8170	2.1 / 3.7 GHz	26 / 52	35.75 MB	2666 MHz	768 GB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
8170M	2.1 / 3.7 GHz	26 / 52	35.75 MB	2666 MHz	1.5 TB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
8176	2.1 / 3.8 GHz	28 / 56	38.5 MB	2666 MHz	768 GB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
8176M	2.1 / 3.8 GHz	28 / 56	38.5 MB	2666 MHz	1.5 TB	10.4 GT/s	165 W	Yes	Yes	Yes	Yes
8180	2.5 / 3.8 GHz	28 / 56	38.5 MB	2666 MHz	768 GB	10.4 GT/s	205 W	Yes	Yes	Yes	Yes
8180M	2.5 / 3.8 GHz	28 / 56	38.5 MB	2666 MHz	1.5 TB	10.4 GT/s	205 W	Yes	Yes	Yes	Yes

For the SR650 server models that come standard with one processor, the second processor can be ordered, if required (see the following table for ordering information). The second processor must be of the same model as the first processor. The second processor option includes a processor, a heatsink, and an additional system fan.

Table 3. Processor options

Description	Part number	Feature code*
Intel Xeon Bronze processors		
ThinkSystem SR650 Intel Xeon Bronze 3104 6C 85W 1.7GHz Processor Option Kit	7XG7A05572	AWEJ
ThinkSystem SR650 Intel Xeon Bronze 3106 8C 85W 1.7GHz Processor Option Kit	7XG7A05570	AWEH
Intel Xeon Silver processors		
ThinkSystem SR650 Intel Xeon Silver 4108 8C 85W 1.8GHz Processor Option Kit	7XG7A05571	AWEG
ThinkSystem SR650 Intel Xeon Silver 4109T 8C 70W 2.0GHz Processor Option Kit	7XG7A05574	AWET
ThinkSystem SR650 Intel Xeon Silver 4110 8C 85W 2.1GHz Processor Option Kit	7XG7A05575	AWEE
ThinkSystem SR650 Intel Xeon Silver 4112 4C 85W 2.6GHz Processor Option Kit	7XG7A05577	AWEF
ThinkSystem SR650 Intel Xeon Silver 4114 10C 85W 2.2GHz Processor Option Kit	7XG7A05578	AWEC
ThinkSystem SR650 Intel Xeon Silver 4114T 10C 85W 2.2GHz Processor Option Kit	7XG7A05579	AWES
ThinkSystem SR650 Intel Xeon Silver 4116 12C 85W 2.1GHz Processor Option Kit	7XG7A05576	AWER
ThinkSystem SR650 Intel Xeon Silver 4116T 12C 85W 2.1GHz Processor Option Kit	7XG7A05573	AWEA
Intel Xeon Gold processors		
ThinkSystem SR650 Intel Xeon Gold 5115 10C 85W 2.4GHz Processor Option Kit	7XG7A05596	AWDU
ThinkSystem SR650 Intel Xeon Gold 5117 14C 105W 2.0GHz Processor Option Kit	4XG7A09082	B137
ThinkSystem SR650 Intel Xeon Gold 5118 12C 105W 2.3GHz Processor Option Kit	7XG7A05580	AWEP
ThinkSystem SR650 Intel Xeon Gold 5119T 14C 85W 1.9GHz Processor Option Kit	7XG7A05581	AWEQ
ThinkSystem SR650 Intel Xeon Gold 5120 14C 105W 2.2GHz Processor Option Kit	7XG7A05583	AWE6
ThinkSystem SR650 Intel Xeon Gold 5120T 14C 105W 2.2GHz Processor Option Kit	7XG7A05582	AWE8

Description	Part number	Feature code*
ThinkSystem SR650 Intel Xeon Gold 5122 4C 105W 3.6GHz Processor Option Kit	7XG7A05591	AWED
ThinkSystem SR650 Intel Xeon Gold 6126 12C 125W 2.6GHz Processor Option Kit	7XG7A05590	AWEL
ThinkSystem SR650 Intel Xeon Gold 6126T 12C 125W 2.6GHz Processor Option Kit	7XG7A05589	AWE5
ThinkSystem SR650 Intel Xeon Gold 6128 6C 115W 3.4GHz Processor Option Kit	7XG7A05588	AWEB
ThinkSystem SR650 Intel Xeon Gold 6130 16C 125W 2.1GHz Processor Option Kit	7XG7A05587	AWEN
ThinkSystem SR650 Intel Xeon Gold 6130T 16C 125W 2.1GHz Processor Option Kit	7XG7A05586	AWE4
ThinkSystem SR650 Intel Xeon Gold 6132 14C 140W 2.6GHz Processor Option Kit	7XG7A05606	AWDY
ThinkSystem SR650 Intel Xeon Gold 6134 8C 130W 3.2GHz Processor Option Kit	7XG7A05605	AWE9
ThinkSystem SR650 Intel Xeon Gold 6134M 8C 130W 3.2GHz Processor Option Kit	4XG7A09067	B0X4
ThinkSystem SR650 Intel Xeon Gold 6136 12C 150W 3.0GHz Processor Option Kit	7XG7A05604	AWE3
ThinkSystem SR650 Intel Xeon Gold 6137 8C 205W 3.9GHz Processor	None**	B32F
ThinkSystem SR650 Intel Xeon Gold 6138 20C 125W 2.0GHz Processor Option Kit	7XG7A05585	AWDZ
ThinkSystem SR650 Intel Xeon Gold 6138T 20C 125W 2.0GHz Processor Option Kit	7XG7A05584	AWEM
ThinkSystem SR650 Intel Xeon Gold 6140 18C 140W 2.3GHz Processor Option Kit	7XG7A05603	AWE1
ThinkSystem SR650 Intel Xeon Gold 6140M 18C 140W 2.3GHz Processor Option Kit	7XG7A05602	AWE2
ThinkSystem SR650 Intel Xeon Gold 6142 16C 150W 2.6GHz Processor Option Kit	7XG7A05601	AWDW
ThinkSystem SR650 Intel Xeon Gold 6142M 16C 150W 2.6GHz Processor Option Kit	4XG7A09066	B0X3
ThinkSystem SR650 Intel Xeon Gold 6144 8C 150W 3.5GHz Processor Option Kit	7XG7A05600	AWE7
ThinkSystem SR650 Intel Xeon Gold 6146 12C 165W 3.2GHz Processor Option Kit	7XG7A05599	AWE0
ThinkSystem SR650 Intel Xeon Gold 6148 20C 150W 2.4GHz Processor Option Kit	7XG7A05598	AWDX
ThinkSystem SR650 Intel Xeon Gold 6150 18C 165W 2.7GHz Processor Option Kit	7XG7A05597	AWDT
ThinkSystem SR650 Intel Xeon Gold 6152 22C 140W 2.1GHz Processor Option Kit	7XG7A05595	AWDV
ThinkSystem SR650 Intel Xeon Gold 6154 18C 200W 3.0GHz Processor Option Kit	7XG7A05594	AWDN
Intel Xeon Platinum processors		
ThinkSystem SR650 Intel Xeon Platinum 8153 16C 125W 2.0GHz Processor Option Kit	7XG7A05593	AWDR
ThinkSystem SR650 Intel Xeon Platinum 8156 4C 105W 3.6GHz Processor Option Kit	7XG7A05592	AWDL
ThinkSystem SR650 Intel Xeon Platinum 8158 12C 150W 3.0GHz Processor Option Kit	7XG7A05617	AWDS
ThinkSystem SR650 Intel Xeon Platinum 8160 24C 150W 2.1GHz Processor Option Kit	7XG7A05616	AWDP
ThinkSystem SR650 Intel Xeon Platinum 8160M 24C 150W 2.1GHz Processor Option Kit	7XG7A05615	AWDQ
ThinkSystem SR650 Intel Xeon Platinum 8160T 24C 150W 2.1GHz Processor Option Kit	7XG7A05614	AWEK
ThinkSystem SR650 Intel Xeon Platinum 8164 26C 150W 2.0GHz Processor Option Kit	7XG7A05613	AWDM
ThinkSystem SR650 Intel Xeon Platinum 8168 24C 205W 2.7GHz Processor Option Kit	7XG7A05612	AWDJ
ThinkSystem SR650 Intel Xeon Platinum 8170 26C 165W 2.1GHz Processor Option Kit	7XG7A05611	AWDK
ThinkSystem SR650 Intel Xeon Platinum 8170M 26C 165W 2.1GHz Processor Option Kit	4XG7A09065	B0X2
ThinkSystem SR650 Intel Xeon Platinum 8176 28C 165W 2.1GHz Processor Option Kit	7XG7A05610	AWDH
ThinkSystem SR650 Intel Xeon Platinum 8176M 28C 165W 2.1GHz Processor Option Kit	7XG7A05609	AWDG
ThinkSystem SR650 Intel Xeon Platinum 8180 28C 205W 2.5GHz Processor Option Kit	7XG7A05608	AWDF
ThinkSystem SR650 Intel Xeon Platinum 8180M 28C 205W 2.5GHz Processor Option Kit	7XG7A05607	AWDE

* For CTO configurations, the feature code represents a processor, and fans and heatsinks are derived by the configuration tool.

** CTO only.

Configuration note: If processors with 200 W or 205 W TDP are used, or if Gold 6126T, 6144, or 6146, or Platinum 8160T processors are used, the following conditions must be met:

- 24x 2.5" chassis only.
- Ambient temperature and drive bay configurations:
 - Up to 35 °C (95 °F):
 - Except Gold 6137: 8x 2.5" SAS/SATA drive bays (drive backplane in the middle).
 - Up to 30 °C (86 °F):
 - Gold 6137 only: 8x 2.5" SAS/SATA drive bays (drive backplane in the middle).
 - Except Gold 6137:
 - 4x 2.5" SAS/SATA and 4x 2.5" AnyBay (up to 4 NVMe SSDs).
 - 8x 2.5" SAS/SATA and 8x 2.5" AnyBay (up to 8 NVMe SSDs).
- No rear HDD kit installed.
- No PCIe flash adapters installed.
- No GPUs installed.
- The server performance might be impacted in case of a fan failure.

Memory

The SR650 server supports up to 12 TruDDR4 memory DIMMs with one processor and up to 24 DIMMs when two processors are installed. Each processor has six memory channels, and there are two DIMMs per channel.

Lenovo TruDDR4 memory uses the highest-quality components sourced from Tier 1 DRAM suppliers and only memory that meets strict requirements is selected. It is compatibility tested and tuned on every ThinkSystem server to maximize performance and reliability.

TruDDR4 memory has a unique signature programmed into the DIMM, which enables Lenovo servers to verify whether the memory installed is qualified and supported. Lenovo qualified and supported TruDDR4 memory is covered by Lenovo warranty, and service and support provided worldwide.

The following rules apply when selecting the memory configuration:

- The server supports RDIMMs, LRDIMMs, or 3DS RDIMMs.
- Mixing different types of memory (RDIMMs, LRDIMMs, and 3DS RDIMMs) is not supported.
- Mixing x4 and x8 RDIMMs and RDIMMs of different capacity is supported.
- All DIMMs in the server operate at the same speed up to 2666 MHz, which is determined by the maximum memory speed supported by the specific processor.
Note: Maximum memory speed can be achieved when Max performance mode is enabled in UEFI.
- The following maximum memory capacities supported by the server:
 - RDIMMs: 768 GB (384 GB per processor).
 - LRDIMMs: 1.5 TB (768 GB per processor).
 - 3DS RDIMMs: 3 TB (1.5 GB per processor) (requires processors that support 1.5 TB of memory per socket).

The following memory protection technologies are supported:

- ECC
- SDDC (for x4-based memory DIMMs)
- ADDDC (for x4-based memory DIMMs; Gold and Platinum processors only)
- Memory mirroring
- Memory rank sparing
- Patrol scrubbing
- Demand scrubbing

Single Device Data Correction (SDDC) works only in the independent channel mode (the default operational mode) and supports only x4-based memory DIMMs.

Adaptive Double Device Data Correction (ADDDC) works with x4-based memory DIMMs and requires two DIMM ranks per channel, Intel Xeon Gold or Platinum processors, and the Closed Page memory access mode.

If memory mirroring is used, then DIMMs must be installed in pairs (a minimum of one pair per each processor), and both DIMMs in a pair must be identical in type and size.

If memory rank sparing is used, then a minimum of one quad-rank DIMM or two single-rank or dual-rank DIMMs must be installed per populated channel (the DIMMs do not need being identical). In rank sparing mode, one rank of a DIMM in each populated channel is reserved as spare memory. The size of a rank varies depending on the DIMMs installed.

SDDC, memory mirroring, and memory rank sparing modes are mutually exclusive. Only one operational memory mode can be enabled on the server, and it is a system-wide setting.

The following table lists memory options available for the SR650 server.

Table 4. Memory options

Description	Part number	Feature code	Maximum quantity*
RDIMMs - 2666 MHz			
ThinkSystem 8GB TruDDR4 2666 MHz (1Rx8 1.2V) RDIMM	7X77A01301	AUU1	12 / 24
ThinkSystem 16GB TruDDR4 2666 MHz (1Rx4 1.2V) RDIMM	7X77A01302	AUNB	12 / 24
ThinkSystem 16GB TruDDR4 2666 MHz (2Rx8 1.2V) RDIMM	7X77A01303	AUNC	12 / 24
ThinkSystem 32GB TruDDR4 2666 MHz (2Rx4 1.2V) RDIMM	7X77A01304	AUND	12 / 24
LRDIMMs - 2666 MHz			
ThinkSystem 64GB TruDDR4 2666 MHz (4Rx4 1.2V) LRDIMM	7X77A01305	AUNE	12 / 24
3DS RDIMMs - 2666 MHz			
ThinkSystem 128GB TruDDR4 2666 MHz (8Rx4 1.2V) 3DS RDIMM	7X77A01307	AUNF	12 / 24

* The maximum quantity shown is with one processor / two processors

Internal storage

The SR650 server supports the following internal drive bay configurations:

1. Up to 16 SFF (front) and 2 LFF (rear) hot-swap drive bays:
 - a. 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA
 - b. 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA
 - c. 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 2x 3.5" SAS/SATA
2. Up to 24 SFF (front) and 2 LFF (rear) hot-swap drive bays:
 - a. 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA
 - b. 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA
 - c. 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 8x 2.5" SAS/SATA + 2x 3.5" SAS/SATA
 - d. 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay + 4x 2.5" SAS/SATA & 4x 2.5" AnyBay
 - e. 16x 2.5" U.2 NVMe PCIe + 8x 2.5" SAS/SATA (factory-installed only)
 - f. 20x 2.5" U.2 NVMe PCIe
 - g. 24x 2.5" U.2 NVMe PCIe
3. Up to 10 LFF SAS/SATA hot-swap drive bays: 8x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)
4. Up to 14 LFF hot-swap drive bays:
 - a. 12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)
 - b. 8x 3.5" SAS/SATA & 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)

In addition, the SR650 server models can be configured with one or two internal M.2 SATA SSDs. The server also supports configurations without drive bays.

The following figures show the internal drive bay configurations.

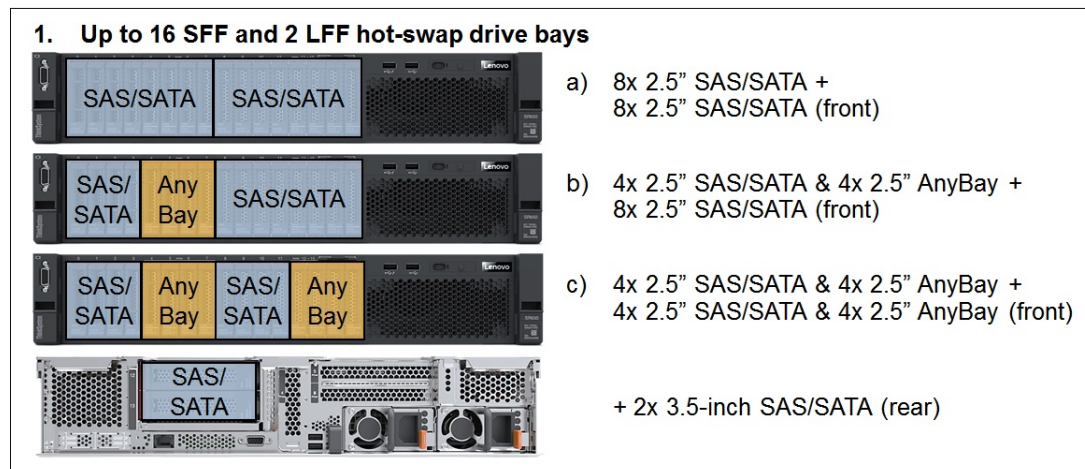


Figure 8. Drive bay configurations: 16x 2.5" chassis

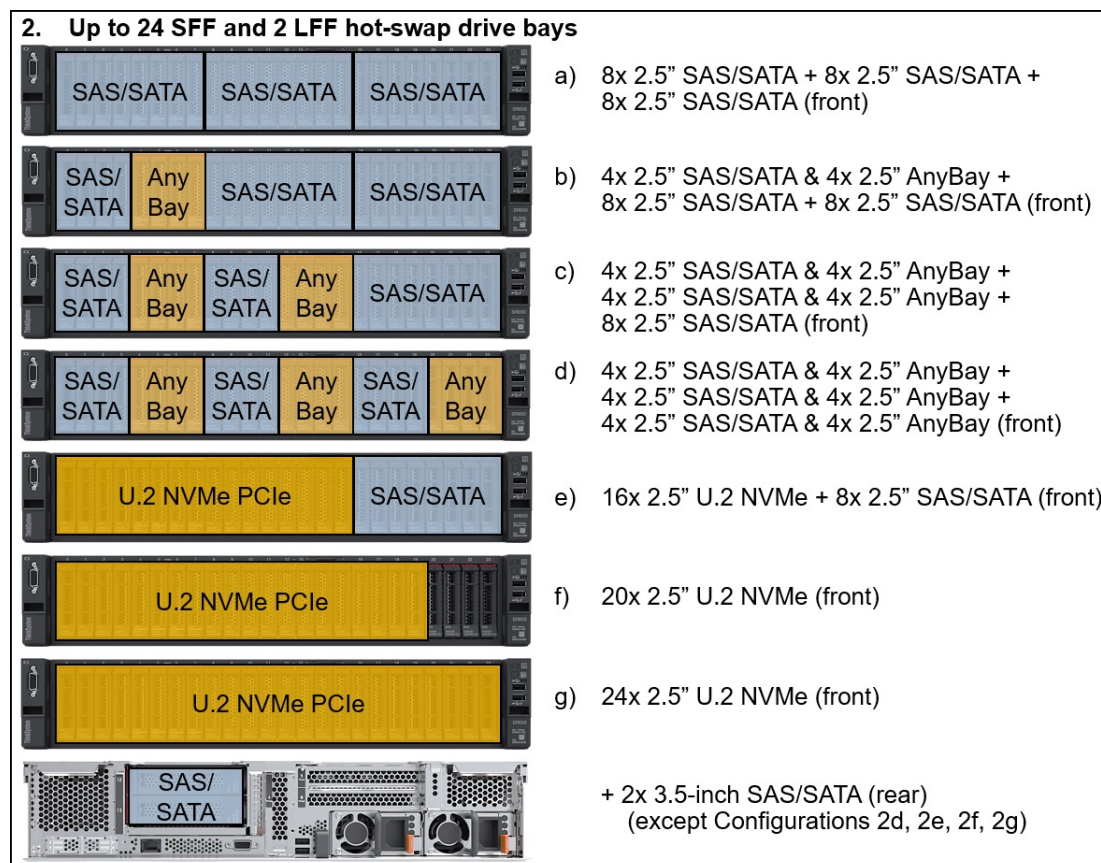


Figure 9. Drive bay configurations: 24x 2.5" chassis

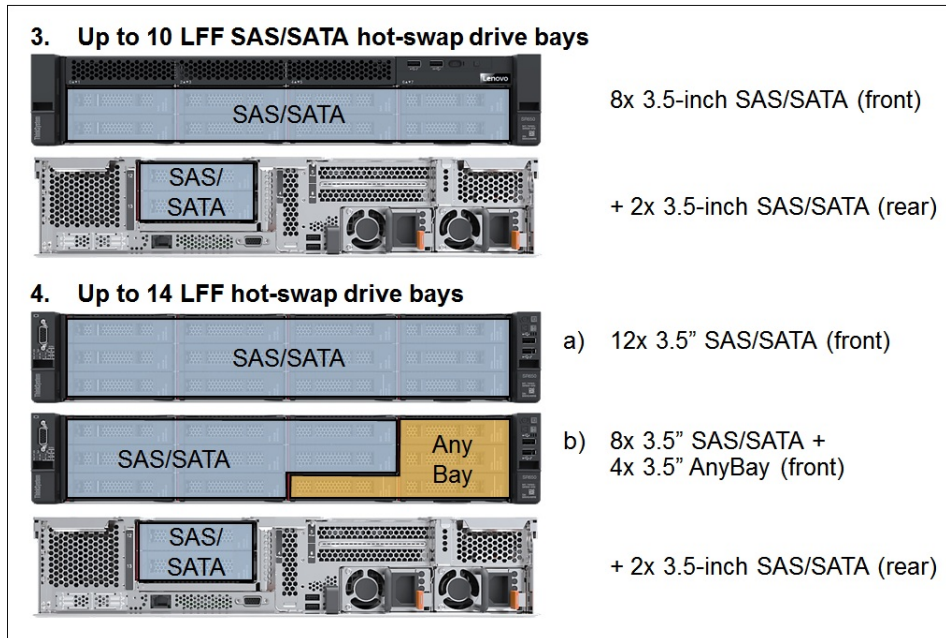


Figure 10. Drive bay configurations: 12x 3.5" chassis

The following table lists the internal storage options for the SR650 server.

Table 5. Internal storage options

Description	Part number	Feature code	Maximum quantity
Factory-installed backplane kits			
ThinkSystem 2U/Twr 2.5" SATA/SAS 8-Bay Backplane	None*	AURA	3
ThinkSystem 2U/Twr 2.5" AnyBay 8-Bay Backplane	None*	AUR5	3
ThinkSystem 2U 3.5" SATA/SAS 8-Bay Backplane	None*	AUR6	1
ThinkSystem 2U 3.5" SATA/SAS 12-Bay Backplane	None*	AUR9	1
ThinkSystem 2U 3.5" AnyBay 12-Bay Backplane	None*	AUR8	1
ThinkSystem 2U 2.5" NVMe 8-Bay Backplane	None*	B4PC	3
ThinkSystem SR590/SR650 3.5" Rear HDD/SSD Kit	7XH7A06253	AURZ	1
ThinkSystem SR590/SR650 Rear HDD Kit Without Fan (PRC only)	4XB7A64318	BF6V	1
Backplane kit field upgrade options			
SR550/SR650 2.5" SATA/SAS 8-Bay Backplane Upgrade Kit	7XH7A06254	None**	3
SR650 2.5" AnyBay 8-Bay Backplane Upgrade Kit	7XH7A06251	None**	3
SR550/SR590/SR650 3.5" SATA/SAS 8-Bay Backplane Upgrade Kit	4XH7A08770	None**	1
SR550/SR590/SR650 3.5" SATA/SAS 12-Bay Backplane Upgrade Kit	4XH7A08771	None**	1
SR590/SR650 3.5" AnyBay 12-Bay Backplane Upgrade Kit	4XH7A08785	None**	1
ThinkSystem SR650 U.2 NVMe 20-Bay Backplane Upgrade Kit	4XH7A09819	None**	1
ThinkSystem SR650 U.2 NVMe 24-Bay Backplane Upgrade Kit	4XH7A08810	None**	1
ThinkSystem SR590/SR650 3.5" Rear HDD/SSD Kit	7XH7A06253	AURZ	1
ThinkSystem SR590/SR650 Rear HDD Kit Without Fan (PRC only)	4XB7A64318	BFK0	1
M.2 enablement kits			
ThinkSystem M.2 Enablement Kit	7Y37A01092	AUMU	1
ThinkSystem M.2 with Mirroring Enablement Kit	7Y37A01093	AUMV	1

* These backplane kits can be factory-installed in standard or custom (CTO or Special Bid) models, and they might not have an option part number assigned.

** Field upgrade only.

Configuration notes:

- 24x 2.5-inch front drives are supported only on storage dense models that use the 24x 2.5" chassis (feature code AUVV).
- The 2.5" SATA/SAS 8-Bay Backplane Kit (7XH7A06254) adds 8x 2.5" SAS/SATA hot-swap drive bays to the previously configured models that are based on the 16x 2.5" chassis (feature code AUVX) or 24x 2.5" chassis (feature code AUVV) and support drive bay expansion capabilities (including models without drive bays).
- The 2.5" AnyBay 8-Bay Backplane Kit (7XH7A06251) adds 4x 2.5" SAS/SATA & 4x 2.5" AnyBay hot-swap drive bays to the previously configured models that are based on the 16x 2.5" chassis (feature code AUVX) or 24x 2.5" chassis (feature code AUVV) and support drive bay expansion capabilities (including models without drive bays).
- Up to 3x 2.5" AnyBay 8-Bay Backplane Kits are supported in the server with the processors of up to 165 W TDP. Up to 2x 2.5" AnyBay 8-Bay Backplane Kits are supported in the server with the processors of more than 165 W TDP. If 3x 2.5" AnyBay 8-Bay Backplane Kits are installed in the server, the Rear HDD kit cannot be installed.
- Models without any drive bays that are based on the 12x 3.5" chassis (feature code AUVW) include the Right EIA Latch with FIO (USB ports, status LEDs, and a power button). These models support adding drive bays by using the 3.5" 8-bay backplane kit (4XH7A08770), 3.5" 12-bay backplane kit (4XH7A08771), or 3.5" AnyBay 12-bay backplane kit (4XH7A08785).
- The SAS/SATA and AnyBay backplane upgrade kits include drive backplanes and required SAS cables, NVMe cables, power cables, and drive bay fillers; storage controllers are not included.
- Previously configured models that are based on the 24x 2.5" chassis (feature code AUVV) can be upgraded to 20 or 24 U.2 NVMe PCIe drive bays by using the U.2 NVMe 20-Bay Backplane Upgrade Kit (4XH7A09819) or U.2 NVMe 24-Bay Backplane Upgrade Kit (4XH7A08810), respectively. Both kits include drive backplanes and required NVMe cables, power cables, drive bay fillers, and NVMe switch adapters. The U.2 NVMe 24-Bay Backplane Upgrade Kit also includes the x16/x8/x16 Riser Card 1 (4XH7A09902).
- For models with 16/20/24x 2.5" U.2 NVMe PCIe drive bays (either factory-installed or upgraded in the field), the following conditions must be met:
 - Two processors with up to 165 W TDP installed.
 - No GPU adapters installed.
 - No PCIe flash adapters installed.
 - No PCIe adapters with more than 25 W TDP installed.
 - 1100 W or 1600 W power supplies installed.
 - Ambient temperature of up to 30 °C (86 °F).
 - The server performance might be impacted in case of a system fan failure.

Note: For additional configuration details, refer to the [Controllers for internal storage](#) and [I/O expansion](#) sections.

- For customers in China, the ThinkSystem SR590/SR650 Rear HDD Kit Without Fan feature lets add rear drives without additional fans under the following conditions:
 - Processor TDP cannot exceed 125 W
 - Ambient temperature up to 30 °C (86 °F)
 - The acoustic noise may increase
- The 3.5" Rear HDD/SSD Kit is connected to a separate port on the internal storage controller.
- The 3.5" Rear HDD/SSD Kit is installed in place of the PCIe Riser Card 1; PCIe slots 1, 2, and 3 are not present.
- Lenovo AnyBay allows a choice of drive interface types in the same drive bay: SAS drives, SATA drives, or NVMe PCIe drives.
- U.2 NVMe PCIe SSDs in the 8/16/24-drive bay configurations that contain *four AnyBay drive bays* require either the second processor (enables the onboard NVMe controller) or the 1610-4P NVMe Switch Adapter to be installed.

Note: In the 8/16/24-drive bay configurations that contain *four AnyBay drive bays*, the 1610-4P NVMe Switch Adapter is supported only in the configurations with one processor.

- Models with 12x 3.5-inch drive bays (8x SAS/SATA + 4x AnyBay) and an 8-port SAS RAID controller or HBA support only NVMe drives in the AnyBay drive bays.
- The M.2 Enablement Kit (7Y37A01092) supports up to one M.2 SATA SSD which is connected to the SATA port on the Intel Platform Controller Hub (PCH).
- The M.2 with Mirroring Enablement Kit (7Y37A01093) is connected to the Intel PCH via the PCIe link, and the kit supports up to two M.2 SATA SSDs that can be configured in a RAID-1 or RAID-0 drive group, or they can operate as separate drives.

The following tables list supported internal storage configurations with the SAS/SATA and AnyBay backplanes.

Internal storage configurations tables convention: The numbers in brackets (x or x+y or x+y+z) in the Storage controller column specify the quantity of drive bays connected to each of the controllers.

Table 6. Internal storage configurations: Up to 16 SFF front drive bays without rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity			Storage controller type and quantity
	8x2.5" SATA/SAS	8x2.5" Any Bay	2x3.5" Rear HDD	
16x 2.5" chassis (Feature code AUJX) or 24x 2.5" chassis (Feature code AUJY)				
8x 2.5" SAS/SATA (front)	1	0	0	1x RAID 530-8i/16i (8)
				1x RAID 730-8i 1GB or 2GB (8)
				1x RAID 930-8i/16i/24i (8)
				1x 430-8i/16i HBA (8)
4x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front)	0	1	0	1x RAID 730-8i 2GB/RAID 930-8i/16i/24i (8) + 1x Onboard/1610-4P NVMe (4)
				1x 430-8i/16i HBA (8) + 1x Onboard/1610-4P NVMe (4)
16x 2.5" SAS/SATA (front)	2	0	0	1x RAID 530-16i (16)
				1x RAID 930-16i/24i (16)
				1x RAID 530-8i/730-8i 1GB (8) + 1x 430-8i HBA (8)
				2x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8+8)
				2x 430-8i HBA (8+8)
12x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front)	1	1	0	1x RAID 930-16i/24i (16) + 1x Onboard/1610-4P NVMe (4)
				1x RAID 530-16i (16) + 1x Onboard/1610-4P NVMe (4)
				1x 430-16i HBA (16) + 1x Onboard/1610-4P NVMe (4)
8x 2.5" SAS/SATA (front) + 8x 2.5" AnyBay (front)	0	2	0	1x RAID 530-16i (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				1x RAID 930-16i/24i (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				1x 430-16i HBA (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				2x RAID 730-8i 2GB/930-8i (8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				2x 430-8i HBA (8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)

Table 7. Internal storage configurations: Up to 16 SFF front and 2 LFF rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity			Storage controller type and quantity
	8x2.5" SATA/SAS	8x2.5" Any Bay	2x3.5" Rear HDD	
16x 2.5" chassis (Feature code AUVX) or 24x 2.5" chassis (Feature code AUVV)				
8x 2.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	1	0	1	1x RAID 530-16i (10)
				1x RAID 930-16i/24i (10)
				1x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8) + 1x 430-8i HBA (2)
				1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530-8i (2)
				1x 430-8i HBA (8) + 1x RAID 530-8i (2)
				1x 430-16i HBA (10)
				2x RAID 530-8i (8+2)
				2x 430-8i HBA (8+2)
4x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	0	1	1	1x RAID 730-8i 2GB/930-8i (8) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x RAID 530-16i (10) + 1x Onboard/1610-4P NVMe (4)
				1x RAID 930-16i/24i (10) + 1x Onboard/1610-4P NVMe (4)
				1x 430-8i HBA (8) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x 430-16i HBA (10) + 1x Onboard/1610-4P NVMe (4)
16x 2.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	2	0	1	1x RAID 530/930-16i (16) + 1x RAID 530-8i/430-8i HBA (2)
				1x RAID 930-24i (18)
				1x 430-16i HBA (16) + 1x RAID 530-8i/430-8i HBA (2)
				2x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8+8) + 1x 430-8i HBA (2)
				2x RAID 730-8i 2GB/930-8i (8+8) + 1x RAID 530-8i (2)
				2x 430-8i HBA (8+8) + 1x RAID 530-8i (2)
				3x RAID 530-8i (8+8+2)
3x 430-8i HBA (8+8+2)				
12x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	1	1	1	1x RAID 530/930-16i (16) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x 430-16i HBA (16) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x RAID 930-24i (18) + 1x Onboard/1610-4P NVMe (4)
8x 2.5" SAS/SATA (front) + 8x 2.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	0	2	1	1x RAID 530/930-16i (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x 430-16i HBA (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				1x RAID 930-24i (18) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				2x RAID 730-8i 2GB/930-8i (8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				2x 430-8i HBA (8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)

Table 8. Internal storage configurations: Up to 24 SFF front drive bays without rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity				Storage controller type and quantity
	8x2.5" SATA/SAS	8x2.5" Any Bay	8x2.5" NVMe	2x3.5" Rear HDD	
24x 2.5" chassis (Feature code AUVV)					
24x 2.5" SAS/SATA (front)	3	0	0	0	1x RAID 930-24i (24)
					1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530/930-16i (16)
					3x RAID 730-8i 2GB/930-8i (8+8+8)
					1x 430-8i HBA (8) + 1x 430-16i HBA (16)
					3x 430-8i HBA (8+8+8)
20x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front)	2	1	0	0	1x RAID 930-24i (24) + 1x Onboard/1610-4P NVMe (4)
					1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530/930-16i (16) + 1x Onboard/1610-4P NVMe (4)
					3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x Onboard/1610-4P NVMe (4)
16x 2.5" SAS/SATA (front) + 8x 2.5" AnyBay (front)	1	2	0	0	1x RAID 930-24i (24) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
					3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
					1x 430-8i HBA (8) + 1x 430-16i HBA (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
12x 2.5" SAS/SATA (front) + 12x 2.5" AnyBay (front)	0	3	0	0	1x RAID 930-24i (24) + 1x Onboard NVMe (4) + 2x 1610-4P NVMe (4+4)
					3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x Onboard NVMe (4) + 2x 1610-4P NVMe (4+4)
					1x 430-8i HBA (8) + 1x 430-16i HBA (8+8) + 1x Onboard NVMe (4) + 2x 1610-4P NVMe (4+4)
					3x 430-8i HBA (8+8+8) + 1x Onboard NVMe (4) + 2x 1610-4P NVMe (4+4)
16x 2.5" U.2 NVMe (front)	0	0	2	0	2x 810-4P NVMe (4+4) + 2x 1610-4P NVMe (4+4)
16x 2.5" U.2 NVMe (front) + 8x 2.5" SAS/SATA (front)	1	0	2	0	2x 810-4P NVMe (4+4) + 2x 1610-4P NVMe (4+4) + 1x RAID 530-8i/730-8i 1GB
					2x 810-4P NVMe (4+4) + 2x 1610-4P NVMe (4+4) + 1x RAID 730-8i 2GB/930-8i
					2x 810-4P NVMe (4+4) + 2x 1610-4P NVMe (4+4) + 1x 430-8i HBA
20x 2.5" U.2 NVMe (front)	0	0	3	0	1x Onboard NVMe (4) + 2x 810-4P NVMe (4+4) + 3x 1610-4P NVMe (4+4+4)
24x 2.5" U.2 NVMe (front)	0	0	3	0	4x 810-4P NVMe (4+4+4+4) + 1x 1610-8P NVMe (8)

Table 9. Internal storage configurations: Up to 24 SFF front and 2 LFF rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity			Storage controller type and quantity
	8x2.5" SATA/SAS	8x2.5" Any Bay	2x3.5" Rear HDD	
24x 2.5" chassis (Feature code AUVV)				
24x 2.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	3	0	1	1x RAID 930-24i (24) + 1x RAID 530-8i/430-8i HBA (2)
				1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530/930-16i (16) + 1x RAID 530-8i (2)
				1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 930-16i (16) + 1x 430-8i HBA (2)
				1x 430-8i HBA (8) + 1x 430-16i HBA (16) + 1x RAID 530-8i (2)
				2x RAID 530/930-16i (16+10)
				2x 430-16i HBA (16+10)
				2x 430-8i HBA (8+2) + 1x 430-16i HBA (16)
				3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x RAID 530-8i (2)
				3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x 430-8i HBA (2)
				3x 430-8i HBA (8+8+8) + 1x RAID 530-8i (2)
20x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	2	1	1	1x RAID 930-24i (24) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i (2)
				1x RAID 930-24i (24) + 1x Onboard/1610-4P NVMe (4) + 1x 430-8i HBA (2)
				1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530/930-16i (16) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i (2)
				1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530/930-16i (16) + 1x Onboard/1610-4P NVMe (4) + 1x 430-8i HBA (2)
				2x RAID 530/930-16i (16+10) + 1x Onboard/1610-4P NVMe (4)
				2x 430-16i HBA (16+10) + 1x Onboard/1610-4P NVMe (4)
				3x RAID 730-8i 2GB/930-8i (8+8+8) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
				3x 430-8i HBA (8+8+8) + 1x Onboard/1610-4P NVMe (4) + 1x RAID 530-8i/430-8i HBA (2)
16x 2.5" SAS/SATA (front) + 8x 2.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	1	2	1	1x RAID 930-24i (24) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i (2)
				1x 430-8i HBA (8) + 1x 430-16i HBA (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4) + 1x RAID 530-8i (2)
				2x RAID 530/930-16i (16+10) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				2x 430-8i HBA (8+2) + 1x 430-16i HBA (16) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
				2x 430-16i HBA (16+10) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)

Table 10. Internal storage configurations: Up to 12 LFF front and 2 LFF rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity				Storage controller type and quantity
	8x3.5" SATA/SAS	12x3.5" SATA/SAS	12x3.5" Any Bay	2x3.5" Rear HDD	
12x 3.5" chassis (Feature code AUVW)					
8x 3.5" SAS/SATA (front)	1	0	0	0	1x RAID 530/930-16i (8)
					1x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8)
					1x 430-8i HBA (8)
8x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	1	0	0	1	1x RAID 530/930-16i (10)
					1x 430-16i HBA (10)
					1x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8) + 1x 430-8i HBA (2)
					1x RAID 730-8i 2GB/930-8i (8) + 1x RAID 530-8i (2)
					1x RAID 530/930-16i (8) + 1x RAID 530-8i (2)
					1x 430-8i HBA (8) + 1x RAID 530-8i (2)
					2x RAID 530-8i (8+2)
					2x 430-8i HBA (8+2)
12x 3.5" SAS/SATA (front)	0	1	0	0	1x RAID 530/930-16i (12)
					1x 430-16i HBA (12)
8x 3.5" SAS/SATA (front) + 4x 3.5" AnyBay (front)	0	0	1	0	1x RAID 530/930-16i (12) + 1x Onboard/1610-4P NVMe (4)
					1x 430-16i HBA (12) + 1x Onboard/1610-4P NVMe (4)
8x 3.5" SAS/SATA (front) + 4x 3.5" AnyBay (NVMe only) (front)*	0	0	1	0	1x RAID 530-8i/730-8i 1GB or 2GB/930-8i (8) + 1x Onboard/1610-4P NVMe (4)
					1x 430-8i HBA (8) + 1x Onboard/1610-4P NVMe (4)
12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	0	1	0	1	1x RAID 530/930-16i (14)
					1x 430-16i HBA (14)
					1x RAID 530/930-16i (12) + 1x RAID 530-8i (2)
					1x 430-16i HBA (12) + 1x RAID 530-8i (2)
8x 3.5" SAS/SATA (front) + 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	0	0	1	1	1x RAID 530/930-16i (14) + 1x Onboard/1610-4P NVMe (4)
					1x 430-16i HBA (14) + 1x Onboard/1610-4P NVMe (4)

* Four NVMe SSDs are required in the 3.5" AnyBay configuration with an 8-port storage controller.

In addition to the configurations described above, the SR650 server also supports internal storage configurations with the 3.5" AnyBay 12-Bay Backplane w/Expander to enable support for up to 12 SAS or SATA drives with the 8-port RAID 530/730/930-8i controllers.

Configuration availability: Internal storage configurations with the 3.5" AnyBay 12-Bay Backplane w/Expander and 8-port RAID 530/730/930-8i controllers are available in PRC only.

The following table lists the 3.5" AnyBay 12-Bay Backplane w/Expander for the SR650 server.

Table 11. 3.5" AnyBay 12-Bay Backplane w/Expander

Description	Part number	Feature code	Maximum quantity
ThinkSystem SR650 3.5" AnyBay 12-Bay Backplane w/Expander	None*	BD3Q	1

* The backplane kit can be factory-installed in standard or custom (CTO or Special Bid) models, and it does not have an option part number assigned.

Configuration notes:

- The 3.5" AnyBay 12-Bay Backplane w/Expander provides 8x 3.5" SAS/SATA (front) + 4x 3.5" AnyBay (front) drive bays.
- The following 8-port RAID adapters are supported in the configurations with the 3.5" AnyBay 12-Bay Backplane w/Expander:
 - RAID 530-8i
 - RAID 730-8i 1GB
 - RAID 730-8i 2GB
 - RAID 930-8i 2GB
- The onboard NVMe interface provides 4x PCIe 3.0 x4 ports for JBOD (non-RAID) connectivity to NVMe PCIe SSDs in the AnyBay drive bays.
- The 3.5" Rear HDD/SSD Kit is not supported with the 3.5" AnyBay 12-Bay Backplane w/Expander.

Controllers for internal storage

The following table lists the storage controllers and options for internal storage of the SR650 server.

Table 12. RAID controllers and HBAs for internal storage

Description	Part number	Feature code	Maximum quantity	I/O slots supported
12 Gb SAS/SATA RAID controllers				
ThinkSystem RAID 530-8i PCIe 12Gb Adapter	7Y37A01082	AUNG	2	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 530-16i PCIe 12Gb Adapter	4Y37A09727	B6CE	2	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 730-8i 1GB Cache PCIe 12Gb Adapter	7Y37A01083	AUNH	3	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 730-8i 2GB Flash PCIe 12Gb Adapter	4Y37A09722	B4RQ	3	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter	7Y37A01084	AUNJ	3	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter	7Y37A01085	AUNK	2	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter	4Y37A09721	B31E	2	7, 4, 2, 3, 1, 5, 6
ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter	7Y37A01086	AUV1	1	1, 2, 3, 5, 6
12 Gb SAS/SATA non-RAID HBAs				
ThinkSystem 430-8i SAS/SATA 12Gb HBA	7Y37A01088	AUNL	3	7, 4, 2, 3, 1, 5, 6
ThinkSystem 430-16i SAS/SATA 12Gb HBA	7Y37A01089	AUNM	2	7, 4, 2, 3, 1, 5, 6
NVMe PCIe interfaces (non-RAID)				
Onboard NVMe interface (4-port)	None	None	1	-
ThinkSystem 810-4P NVMe Switch Adapter	None [^]	B22D	4	2, 4, 6, 7
ThinkSystem 1610-4P NVMe Switch Adapter	7Y37A01081	AUV2	3	1, 5, 6
ThinkSystem 1610-8P NVMe Switch Adapter	None [*]	B4PA	1	1

[^] The 810-4P NVMe adapter can be factory-installed, or it is included in the 20-drive and 24-drive U.2 NVMe upgrade kits for field upgrades.

^{*} The 1610-8P NVMe adapter can be factory-installed, or it is included in the 24-drive NVMe upgrade kit for field upgrades.

Configuration notes:

- Low profile SAS RAID controllers and HBAs for internal storage are supported in the PCIe x8 slots on the system board and full-height PCIe x8 and x16 slots supplied by the riser card 1. Full-height SAS RAID controllers for internal storage (RAID 930-24i) are supported in the full-height PCIe x8 and x16 slots supplied by the riser card 1.
- If the RAID 930-24i controller is used in the configurations with 24 front drives and 2 rear drives, the RAID 930-24i controller that connects the front drive bays must be installed in the PCIe slot 5, and the RAID 530-8i controller or 430-8i HBA that connects the rear drive bays must be installed in the onboard PCIe slot 7.
- Either RAID 530-8i or RAID 730-8i 1GB controllers can be used in the server, but not both types.
- The RAID 730-8i 2GB controller cannot be used in the server configurations with the RAID 930-8i or RAID 730-8i 1GB controllers.
- The RAID 730-8i 1GB controller does not support the 3.5" Rear HDD Kit.
- In the configurations with 2.5-inch AnyBay drive bays, the 1610-4P NVMe Switch Adapter is supported in the full-height PCIe x16 slots supplied by the riser cards 1 and 2.
 - In the configurations with one processor, the 1610-4P NVMe Switch Adapter provides 4x PCIe 3.0 x4 ports for JBOD (non-RAID) connectivity to U.2 NVMe PCIe SSDs in four AnyBay drive bays, and it is supported in the PCIe x16 slot 1 supplied by the x16/x8 Riser Card 1 (the 1610-4P NVMe Switch Adapter has a PCIe 3.0 x16 host interface).
 - In the configurations with two processors, the onboard NVMe interface and up to two 1610-4P NVMe Switch Adapters provide 4x PCIe 3.0 x4 ports each for JBOD (non-RAID) connectivity to U.2 NVMe PCIe SSDs in the AnyBay drive bays. Two 1610-4P NVMe Switch Adapters are supported in the PCIe x16 slots 1 and 5 or 1 and 6 only.

- Configurations with 16x 2.5-inch U.2 NVMe PCIe drive bays use the following interfaces and adapters for balanced JBOD (non-RAID) connectivity to up to 16x U.2 NVMe PCIe SSDs (up to eight SSDs per processor) without oversubscription:
 - The onboard NVMe interface (Processor 2) that provides four PCIe 3.0 x4 ports for connections to four SSDs without oversubscription.
 - Two 810-4P NVMe Switch adapters installed in the PCIe x8 Slots 4 and 7 (Processor 1) that provide two PCIe 3.0 x4 ports each for connections to four SSDs (two SSDs per 810-4P) without oversubscription.
 - Two 1610-4P NVMe Switch adapters installed in the PCIe x16 Slot 1 (Processor 1) and PCIe x16 Slot 6 (Processor 2) that provide four PCIe 3.0 x4 ports each for connections to eight SSDs (four SSDs per 1610-4P) without oversubscription.
 - If the additional 8-bay SAS/SATA backplane is installed, it is connected to a supported internal storage controller installed in the PCIe x8 slot 3.
- Configurations with 20x 2.5-inch U.2 NVMe PCIe drive bays use the following interfaces and adapters for JBOD (non-RAID) connectivity to up to 20x U.2 NVMe PCIe SSDs (up to eight SSDs per Processor 1, and up to 12 SSDs per Processor 2) without oversubscription:
 - The onboard NVMe interface (Processor 2) that provides four PCIe 3.0 x4 ports for connections to four SSDs without oversubscription.
 - Two 810-4P NVMe Switch adapters installed in the PCIe x8 Slots 4 and 7 (Processor 1) that provide two PCIe 3.0 x4 ports each for connections to four SSDs (two SSDs per 810-4P) without oversubscription.
 - Three 1610-4P NVMe Switch adapters installed in the PCIe x16 Slot 1 (Processor 1) and PCIe x16 Slots 5 and 6 (Processor 2) that provide four PCIe 3.0 x4 ports each for connections to twelve SSDs (four SSDs per 1610-4P) without oversubscription.
- Configurations with 24x 2.5-inch U.2 NVMe PCIe drive bays use the following interfaces and adapters for balanced JBOD (non-RAID) connectivity to up to 24x U.2 NVMe PCIe SSDs (up to 12 SSDs per processor) with 2:1 oversubscription:
 - One 1610-8P NVMe Switch Adapter installed in the PCIe x16 Slot 1 (Processor 2) that provides eight PCIe 3.0 x4 ports for connections to eight SSDs with 2:1 oversubscription.
 - Four 810-4P NVMe Switch adapters installed in the PCIe x8 Slots 2, 4, and 7 (Processor 1) and PCIe x16 Slot 6 (Processor 2) that provide four PCIe 3.0 x4 ports each for connections to 16 SSDs (four SSDs per 810-4P) with 2:1 oversubscription.
- In the configurations without GPU installed, the total quantity of the RAID 730-8i 2GB, RAID 930-8i, RAID 930-16i, RAID 930-24i, and RAID 930-8e controllers in the server must not exceed 4 (up to 4 supercapacitors can be mounted in the server).
- In the configurations with GPU installed, the total quantity of the RAID 730-8i 2GB, RAID 930-8i, RAID 930-16i, RAID 930-24i, and RAID 930-8e controllers in the server must not exceed 3 (up to 3 supercapacitors can be mounted in the server).

For more information about the server configurations with 16/20/24x 2.5-inch U.2 NVMe PCIe drive bays, refer to the *NVMe-Rich Configurations of the ThinkSystem SR650* article:
<http://lenovopress.com/LP0904>

The following table summarizes features of supported SAS/SATA storage controllers.

Table 13. Storage controller features and specifications (LP = Low profile, FHHL = Full-height half-length)

Feature	RAID 530-8i	RAID 530-16i	RAID 730-8i 1GB	RAID 730-8i 2GB	RAID 930-8i	RAID 930-16i	RAID 930-24i	430-8i HBA	430-16i HBA
Form factor	PCIe LP		PCIe LP	PCIe LP	PCIe LP	PCIe LP	PCIe FHHL	PCIe LP	
SAS controller	SAS3408	SAS3416	SAS3108	SAS3108	SAS3508	SAS3516	SAS3508	SAS3408	SAS3416
SAS expander	None		None	None	None	None	SAS35X36R	None	
Host interface	PCIe 3.0 x8		PCIe 3.0 x8	PCIe 3.0 x8				PCIe 3.0 x8	
Port interface	12 Gb SAS		12 Gb SAS	12 Gb SAS				12 Gb SAS	
Number of ports	8	16	8	8	8	16	24	8	16
Connector type	SFF-8643 x4		SFF-8643 x4	SFF-8643 x4				SFF-8643 x4	
Number of connectors	2	4	2	2	2	4	6	2	4
Drive interface	SAS, SATA		SAS, SATA	SAS, SATA				SAS, SATA	
Drive type	HDD, SSD, SED		HDD, SSD	HDD, SSD, SED				HDD, SSD, SED*	

Feature	RAID 530-8i	RAID 530-16i	RAID 730-8i 1GB	RAID 730-8i 2GB	RAID 930-8i	RAID 930-16i	RAID 930-24i	430-8i HBA	430-16i HBA
Hot-swap drive support	Yes		Yes	Yes				Yes	
Number of drives	8	16	8	8	8	16	24	8	16
RAID levels	0/1/10/5/50	0/1/10	0/1/10/5/50	0/1/10/5/50/6/60				None	
JBOD mode	Yes		Yes	Yes				Yes	
Cache	None		1 GB	2 GB	2 GB	4 GB; 8 GB	4 GB	None	
Cache protection	None		None	Flash backup (Included)				None	
SED key management (SafeStore)	Yes		No	Yes				No	
SSD I/O acceleration (FastPath)	Yes		No	Yes				No	
SSD Caching (CacheCade Pro 2.0)	No		No	No				No	
Consistency check	Yes		Yes	Yes				No	
Patrol read	Yes		Yes	Yes				No	
Online capacity expansion	Yes		Yes	Yes				No	
Online RAID level migration	Yes		Yes	Yes				No	
Global Hot Spare	Yes		Yes	Yes				No	
Auto-rebuild	Yes		Yes	Yes				No	

* HBAs do not support key management for SEDs; third-party host software is responsible for managing the keys.

** The SSD caching feature has been phased out in the new generation of advanced RAID controllers.

For more information, see the list of Product Guides in the following categories:

- RAID adapters
<http://lenovopress.com/servers/options/raid#rt=product-guide>
- Host bus adapters
<http://lenovopress.com/servers/options/hba#rt=product-guide>

Drives for internal storage

The following tables list the hard disk drive and solid-state drive options for the internal disk storage of the server.

2.5-inch hot-swap drives:

- [2.5-inch hot-swap 12 Gb SAS HDDs](#)
- [2.5-inch hot-swap 6 Gb SATA HDDs](#)
- [2.5-inch hot-swap 12 Gb SAS SSDs](#)
- [2.5-inch hot-swap 6 Gb SATA SSDs](#)
- [2.5-inch hot-swap PCIe 4.0 NVMe SSDs](#)
- [2.5-inch hot-swap PCIe 3.0 NVMe SSDs](#)

3.5-inch hot-swap drives:

- [3.5-inch hot-swap 12 Gb SAS HDDs](#)
- [3.5-inch hot-swap 6 Gb SATA HDDs](#)
- [3.5-inch hot-swap 12 Gb SAS SSDs](#)
- [3.5-inch hot-swap 6 Gb SATA SSDs](#)
- [3.5-inch hot-swap PCIe 4.0 NVMe SSDs](#)
- [3.5-inch hot-swap PCIe 3.0 NVMe SSDs](#)

M.2 drives:

- [M.2 SATA drives](#)

M.2 drive support: The use of M.2 drives requires an additional adapter as described in the [Internal storage](#) section.

PCIe 4.0 NVMe drive support: When installed in this server, PCIe 4.0 NVMe drives will operate at PCIe 3.0 speeds.

Table 14. 2.5-inch hot-swap 12 Gb SAS HDDs

Part number	Feature	Description	Maximum supported
2.5-inch hot-swap HDDs - 12 Gb SAS 10K			
7XB7A00024	AULY	ThinkSystem 2.5" 300GB 10K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00025	AULZ	ThinkSystem 2.5" 600GB 10K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00026	AUM0	ThinkSystem 2.5" 900GB 10K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00027	AUM1	ThinkSystem 2.5" 1.2TB 10K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00028	AUM2	ThinkSystem 2.5" 1.8TB 10K SAS 12Gb Hot Swap 512e HDD	24
7XB7A00069	B0YS	ThinkSystem 2.5" 2.4TB 10K SAS 12Gb Hot Swap 512e HDD	24
2.5-inch hot-swap HDDs - 12 Gb SAS 15K			
7XB7A00021	AULV	ThinkSystem 2.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00022	AULW	ThinkSystem 2.5" 600GB 15K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00023	AULX	ThinkSystem 2.5" 900GB 15K SAS 12Gb Hot Swap 512e HDD	24
2.5-inch hot-swap HDDs - 12 Gb NL SAS			
7XB7A00034	AUM6	ThinkSystem 2.5" 1TB 7.2K SAS 12Gb Hot Swap 512n HDD	24
7XB7A00035	AUM7	ThinkSystem 2.5" 2TB 7.2K SAS 12Gb Hot Swap 512n HDD	24
2.5-inch hot-swap SED HDDs - 12 Gb SAS 10K			
7XB7A00030	AUM4	ThinkSystem 2.5" 300GB 10K SAS 12Gb Hot Swap 512n HDD SED	24
7XB7A00031	AUM5	ThinkSystem 2.5" 600GB 10K SAS 12Gb Hot Swap 512n HDD SED	24
7XB7A00033	B0YX	ThinkSystem 2.5" 1.2TB 10K SAS 12Gb Hot Swap 512n HDD SED	24
7XB7A00070	B0YV	ThinkSystem 2.5" 2.4TB 10K SAS 12Gb Hot Swap 512e HDD FIPS	24
2.5-inch hot-swap SED HDDs - 12 Gb NL SAS			
7XB7A00064	B0YM	ThinkSystem 2.5" 2TB 7.2K SAS 12Gb Hot Swap 512e HDD FIPS	24

Table 15. 2.5-inch hot-swap 6 Gb SATA HDDs

Part number	Feature	Description	Maximum supported
2.5-inch hot-swap HDDs - 6 Gb NL SATA			
7XB7A00036	AUUE	ThinkSystem 2.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD	24
7XB7A00037	AUJJ	ThinkSystem 2.5" 2TB 7.2K SATA 6Gb Hot Swap 512e HDD	24

Table 16. 2.5-inch hot-swap 12 Gb SAS SSDs

Part number	Feature	Description	Maximum supported
2.5-inch hot-swap SSDs - 12 Gb SAS - Performance (10+ DWPD)			
4XB7A10219	B4Y4	ThinkSystem 2.5" SS530 400GB Performance SAS 12Gb Hot Swap SSD	24
4XB7A10230	B4Y5	ThinkSystem 2.5" SS530 800GB Performance SAS 12Gb Hot Swap SSD	24
4XB7A10231	B4Y6	ThinkSystem 2.5" SS530 1.6TB Performance SAS 12Gb Hot Swap SSD	24
4XB7A10232	B4Y7	ThinkSystem 2.5" SS530 3.2TB Performance SAS 12Gb Hot Swap SSD	24
2.5-inch hot-swap SSDs - 12 Gb SAS - Mainstream (3-5 DWPD)			
4XB7A17062	B8HU	ThinkSystem 2.5" PM1645a 800GB Mainstream SAS 12Gb Hot Swap SSD	24
4XB7A17063	B8J4	ThinkSystem 2.5" PM1645a 1.6TB Mainstream SAS 12Gb Hot Swap SSD	24
4XB7A17064	B8JD	ThinkSystem 2.5" PM1645a 3.2TB Mainstream SAS 12Gb Hot Swap SSD	24
4XB7A17065	B8JA	ThinkSystem 2.5" PM1645a 6.4TB Mainstream SAS 12Gb Hot Swap SSD	24
4XB7A13654	B4A1	ThinkSystem 2.5" PM1645 1.6TB Mainstream SAS 12Gb Hot Swap SSD	24
4XB7A13655	B4A2	ThinkSystem 2.5" PM1645 3.2TB Mainstream SAS 12Gb Hot Swap SSD	24
2.5-inch hot-swap SSDs - 12 Gb SAS - Entry / Capacity (<3 DWPD)			
4XB7A38175	B91A	ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD	24
4XB7A38176	B91B	ThinkSystem 2.5" PM1643a 1.92TB Entry SAS 12Gb Hot Swap SSD	24
4XB7A17054	B91C	ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	24
4XB7A17055	B91D	ThinkSystem 2.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD	24
4XB7A17056	BC4R	ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD	24
4XB7A17168	B6TL	ThinkSystem 2.5" PM1643 960GB Entry SAS 12Gb Hot Swap SSD	24
4XB7A13645	B4A7	ThinkSystem 2.5" PM1643 3.84TB Capacity SAS 12Gb Hot Swap SSD	24

Table 17. 2.5-inch hot-swap 6 Gb SATA SSDs

Part number	Feature	Description	Maximum supported
2.5-inch hot-swap SSDs - 6 Gb SATA - Mainstream (3-5 DWPD)			
4XB7A17087	B8J1	ThinkSystem 2.5" 5300 240GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A17088	B8HY	ThinkSystem 2.5" 5300 480GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A17089	B8J6	ThinkSystem 2.5" 5300 960GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A17090	B8JE	ThinkSystem 2.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A17091	B8J7	ThinkSystem 2.5" 5300 3.84TB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A13633	B49L	ThinkSystem 2.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A13634	B49M	ThinkSystem 2.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A13635	B49N	ThinkSystem 2.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A13636	B49P	ThinkSystem 2.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A13637	B49Q	ThinkSystem 2.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A10237	B488	ThinkSystem 2.5" 5200 240GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A10239	B48A	ThinkSystem 2.5" 5200 960GB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A10240	B48B	ThinkSystem 2.5" 5200 1.92TB Mainstream SATA 6Gb Hot Swap SSD	24
4XB7A10241	B48C	ThinkSystem 2.5" 5200 3.84TB Mainstream SATA 6Gb Hot Swap SSD	24
2.5-inch hot-swap SSDs - 6 Gb SATA - Entry (<3 DWPD)			
4XB7A38271	BCTC	ThinkSystem 2.5" Multi Vendor 240GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A38272	BCTD	ThinkSystem 2.5" Multi Vendor 480GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A38273	BCTE	ThinkSystem 2.5" Multi Vendor 960GB Entry SATA 6Gb Hot Swap SSD	24

Part number	Feature	Description	Maximum supported
4XB7A38274	BCTF	ThinkSystem 2.5" Multi Vendor 1.92TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A38275	BCTG	ThinkSystem 2.5" Multi Vendor 3.84TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17075	B8HV	ThinkSystem 2.5" 5300 240GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17076	B8JM	ThinkSystem 2.5" 5300 480GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17077	B8HP	ThinkSystem 2.5" 5300 960GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17078	B8J5	ThinkSystem 2.5" 5300 1.92TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17079	B8JP	ThinkSystem 2.5" 5300 3.84TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A17080	B8J2	ThinkSystem 2.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A38185	B9AC	ThinkSystem 2.5" 5210 960GB Entry SATA 6Gb Hot Swap QLC SSD	24
4XB7A38144	B7EW	ThinkSystem 2.5" 5210 1.92TB Entry SATA 6Gb Hot Swap QLC SSD	24
4XB7A38145	B7EX	ThinkSystem 2.5" 5210 3.84TB Entry SATA 6Gb Hot Swap QLC SSD	24
4XB7A38146	B7EY	ThinkSystem 2.5" 5210 7.68TB Entry SATA 6Gb Hot Swap QLC SSD	24
4XB7A10247	B498	ThinkSystem 2.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10248	B499	ThinkSystem 2.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10249	B49A	ThinkSystem 2.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A13622	B49B	ThinkSystem 2.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A13623	B49C	ThinkSystem 2.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10195	B34H	ThinkSystem 2.5" PM883 240GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10196	B34J	ThinkSystem 2.5" PM883 480GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10197	B34K	ThinkSystem 2.5" PM883 960GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10198	B34L	ThinkSystem 2.5" PM883 1.92TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10199	B34M	ThinkSystem 2.5" PM883 3.84TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10200	B4D2	ThinkSystem 2.5" PM883 7.68TB Entry SATA 6Gb Hot Swap SSD	24
7SD7A05740	B0Z0	ThinkSystem 2.5" Intel S4500 960GB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10155	B2X4	ThinkSystem 2.5" 5200 1.92TB Entry SATA 6Gb Hot Swap SSD	24
4XB7A10157	B2X6	ThinkSystem 2.5" 5200 7.68TB Entry SATA 6Gb Hot Swap SSD	24
2.5-inch hot-swap SED SSDs - 6 Gb SATA - Mainstream (3-5 DWPD)			
4XB7A38193	B93K	ThinkSystem 2.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD SED	24
4XB7A64222	BEMB	ThinkSystem 2.5" 5300 3.84TB Mainstream SATA 6Gb Hot Swap SSD SED	24
4XB7A14063	B6K0	ThinkSystem 2.5" 5200 1.92TB Mainstream SATA 6Gb Hot Swap SSD SED	24
2.5-inch hot-swap SED SSDs - 6 Gb SATA - Entry (<3 DWPD)			
4XB7A38141	BE29	ThinkSystem 2.5" 5300 960GB Entry SATA 6Gb Hot Swap SSD SED	24
4XB7A38191	B93L	ThinkSystem 2.5" 5300 3.84TB Entry SATA 6Gb Hot Swap SSD SED	24
4XB7A38192	B93M	ThinkSystem 2.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD SED	24

Table 18. 2.5-inch hot-swap PCIe 4.0 NVMe SSDs (operate at PCIe 3.0 speeds in this server)

Part number	Feature	Description	Maximum supported
2.5-inch SSDs - PCIe 4.0 NVMe - Mainstream (3-5 DWPD)			
4XB7A17152	BCFV	ThinkSystem U.2 Intel P5600 1.6TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A17153	BCFR	ThinkSystem U.2 Intel P5600 3.2TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A17154	BCFS	ThinkSystem U.2 Intel P5600 6.4TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A64175	BE03	ThinkSystem U.3 Kioxia CM6-V 800GB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A17112	B96Z	ThinkSystem U.3 Kioxia CM6-V 1.6TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	24
4XB7A17113	B96T	ThinkSystem U.3 Kioxia CM6-V 3.2TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	24
4XB7A17114	B96P	ThinkSystem U.3 Kioxia CM6-V 6.4TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	24
2.5-inch SSDs - PCIe 4.0 NVMe - Entry (<3 DWPD)			
4XB7A17145	BCFT	ThinkSystem U.2 Intel P5500 1.92TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A17146	BCFW	ThinkSystem U.2 Intel P5500 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A17147	BCFU	ThinkSystem U.2 Intel P5500 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A38197	BC4Z	ThinkSystem U.2 PM1733 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A38283	BE2E	ThinkSystem U.2 PM1733 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A38284	BE2F	ThinkSystem U.2 PM1733 15.36TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A64141	BE2G	ThinkSystem U.3 Kioxia CM6-R 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
4XB7A64142	BE2H	ThinkSystem U.3 Kioxia CM6-R 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	24
2.5-inch hot-swap SED SSDs - PCIe 4.0 NVMe - Entry (<3 DWPD)			
4XB7A38257	BE2A	ThinkSystem U.2 PM1733 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD SED	24
4XB7A38258	BE2B	ThinkSystem U.2 PM1733 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD SED	24
4XB7A38269	BE2C	ThinkSystem U.3 Kioxia CM6-R 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD SED	24
4XB7A38270	BE2D	ThinkSystem U.3 Kioxia CM6-R 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD SED	24

Table 19. 2.5-inch hot-swap PCIe 3.0 NVMe SSDs

Part number	Feature	Description	Maximum supported
2.5-inch SSDs - PCIe 3.0 NVMe - Performance (10+ DWPD)			
7N47A00081	AUMJ	ThinkSystem U.2 Intel Optane P4800X 375GB Performance NVMe PCIe 3.0 x4 Hot Swap SSD	24
7N47A00083	B2ZJ	ThinkSystem U.2 Intel Optane P4800X 750GB Performance NVMe PCIe 3.0 x4 Hot Swap SSD	24
2.5-inch SSDs - PCIe 3.0 NVMe - Mainstream (3-5 DWPD)			
4XB7A13936	B589	ThinkSystem U.2 Intel P4610 1.6TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A13937	B58A	ThinkSystem U.2 Intel P4610 3.2TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A13938	B58B	ThinkSystem U.2 Intel P4610 6.4TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A08516	B21W	ThinkSystem U.2 Toshiba CM5-V 800GB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	24
4XB7A08517	B21X	ThinkSystem U.2 Toshiba CM5-V 1.6TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	24
4XB7A08518	B21Y	ThinkSystem U.2 Toshiba CM5-V 3.2TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	24
4XB7A08519	B2XJ	ThinkSystem U.2 Toshiba CM5-V 6.4TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	24
2.5-inch SSDs - PCIe 3.0 NVMe - Entry (<3 DWPD)			
4XB7A10202	B58F	ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A10204	B58G	ThinkSystem U.2 Intel P4510 2.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A10205	B58H	ThinkSystem U.2 Intel P4510 4.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A08513	B58J	ThinkSystem U.2 Intel P4510 8.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
4XB7A10175	B34N	ThinkSystem U.2 PM983 1.92TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	24
4XB7A10176	B34P	ThinkSystem U.2 PM983 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	24
4XB7A10177	B4D3	ThinkSystem U.2 PM983 7.68TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
7SD7A05777	B11E	ThinkSystem U.2 Intel P4500 4.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	24
2.5-inch SED SSDs - PCIe 3.0 NVMe - Entry (<3 DWPD)			
4XB7A14060	B6K4	ThinkSystem U.2 CM5-R 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD SED	24

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

Table 20. 3.5-inch hot-swap 12 Gb SAS HDDs

Part number	Feature	Description	Maximum supported
3.5-inch hot-swap HDDs - 12 Gb SAS 10K			
7XB7A00063	B1JJ	ThinkSystem 3.5" 300GB 10K SAS 12Gb Hot Swap 512n HDD	14
3.5-inch hot-swap HDDs - 12 Gb SAS 15K			
7XB7A00038	AUU2	ThinkSystem 3.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD	14
7XB7A00039	AUU3	ThinkSystem 3.5" 600GB 15K SAS 12Gb Hot Swap 512n HDD	14
7XB7A00040	AUUC	ThinkSystem 3.5" 900GB 15K SAS 12Gb Hot Swap 512e HDD	14
3.5-inch hot-swap HDDs - 12 Gb NL SAS			
7XB7A00041	AUU4	ThinkSystem 3.5" 1TB 7.2K SAS 12Gb Hot Swap 512n HDD	14
7XB7A00042	AUU5	ThinkSystem 3.5" 2TB 7.2K SAS 12Gb Hot Swap 512n HDD	14
7XB7A00043	AUU6	ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD	14
7XB7A00044	AUU7	ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
7XB7A00045	B0YR	ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
7XB7A00046	AUUG	ThinkSystem 3.5" 10TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
7XB7A00067	B117	ThinkSystem 3.5" 12TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
4XB7A13906	B496	ThinkSystem 3.5" 14TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
4XB7A13911	B7EZ	ThinkSystem 3.5" 16TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
4XB7A38266	BCFP	ThinkSystem 3.5" 18TB 7.2K SAS 12Gb Hot Swap 512e HDD	14
3.5-inch hot-swap SED HDDs - 12 Gb NL SAS			
7XB7A00065	B0YN	ThinkSystem 3.5" 2TB 7.2K SAS 12Gb Hot Swap 512e HDD FIPS	14
7XB7A00047	AUUH	ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD FIPS	14
7XB7A00048	B0YP	ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD FIPS	14
7XB7A00066	B0YQ	ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD FIPS	14

Table 21. 3.5-inch hot-swap 6 Gb SATA HDDs

Part number	Feature	Description	Maximum supported
3.5-inch hot-swap HDDs - 6 Gb NL SATA			
7XB7A00049	AUUF	ThinkSystem 3.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD	14
7XB7A00050	AUUD	ThinkSystem 3.5" 2TB 7.2K SATA 6Gb Hot Swap 512n HDD	14
7XB7A00051	AUU8	ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD	14
7XB7A00052	AUUA	ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
7XB7A00053	AUU9	ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
7XB7A00054	AUUB	ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
7XB7A00068	B118	ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
4XB7A13907	B497	ThinkSystem 3.5" 14TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
4XB7A13914	B7F0	ThinkSystem 3.5" 16TB 7.2K SATA 6Gb Hot Swap 512e HDD	14
4XB7A38130	BCFH	ThinkSystem 3.5" 18TB 7.2K SATA 6Gb Hot Swap 512e HDD	14

Table 22. 3.5-inch hot-swap 12 Gb SAS SSDs

Part number	Feature	Description	Maximum supported
3.5-inch hot-swap SSDs - 12 Gb SAS - Performance (10+ DWPD)			
4XB7A10234	B4Y8	ThinkSystem 3.5" SS530 800GB Performance SAS 12Gb Hot Swap SSD	14
4XB7A10235	B4Y9	ThinkSystem 3.5" SS530 1.6TB Performance SAS 12Gb Hot Swap SSD	14
4XB7A10236	B4YA	ThinkSystem 3.5" SS530 3.2TB Performance SAS 12Gb Hot Swap SSD	14
3.5-inch hot-swap SSDs - 12 Gb SAS - Mainstream (3-5 DWPD)			
4XB7A17066	B8HT	ThinkSystem 3.5" PM1645a 800GB Mainstream SAS 12Gb Hot Swap SSD	14
4XB7A17043	B8JN	ThinkSystem 3.5" PM1645a 1.6TB Mainstream SAS 12Gb Hot Swap SSD	14
4XB7A17067	B8JK	ThinkSystem 3.5" PM1645a 3.2TB Mainstream SAS 12Gb Hot Swap SSD	14
4XB7A17068	B8JG	ThinkSystem 3.5" PM1645a 6.4TB Mainstream SAS 12Gb Hot Swap SSD	14
4XB7A13658	B4A4	ThinkSystem 3.5" PM1645 1.6TB Mainstream SAS 12Gb Hot Swap SSD	14
4XB7A13659	B4A5	ThinkSystem 3.5" PM1645 3.2TB Mainstream SAS 12Gb Hot Swap SSD	14
3.5-inch hot-swap SSDs - 12 Gb SAS - Entry / Capacity (<3 DWPD)			
4XB7A17058	B91E	ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	14
4XB7A17059	BEVK	ThinkSystem 3.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD	14
4XB7A13649	B4A8	ThinkSystem 3.5" PM1643 3.84TB Capacity SAS 12Gb Hot Swap SSD	14

Table 23. 3.5-inch hot-swap 6 Gb SATA SSDs

Part number	Feature	Description	Maximum supported
3.5-inch hot-swap SSDs - 6 Gb SATA - Mainstream (3-5 DWPD)			
4XB7A17096	B8JL	ThinkSystem 3.5" 5300 240GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A17097	B8JF	ThinkSystem 3.5" 5300 480GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A17098	B8J0	ThinkSystem 3.5" 5300 960GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A17099	B8HR	ThinkSystem 3.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A17100	B8HX	ThinkSystem 3.5" 5300 3.84TB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A13639	B49R	ThinkSystem 3.5" Intel S4610 240GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A13640	B49S	ThinkSystem 3.5" Intel S4610 480GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A13641	B49T	ThinkSystem 3.5" Intel S4610 960GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A13642	B49U	ThinkSystem 3.5" Intel S4610 1.92TB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A13643	B49V	ThinkSystem 3.5" Intel S4610 3.84TB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A10242	B48D	ThinkSystem 3.5" 5200 240GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A10244	B48F	ThinkSystem 3.5" 5200 960GB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A10245	B48G	ThinkSystem 3.5" 5200 1.92TB Mainstream SATA 6Gb Hot Swap SSD	14
4XB7A10246	B48H	ThinkSystem 3.5" 5200 3.84TB Mainstream SATA 6Gb Hot Swap SSD	14
3.5-inch hot-swap SSDs - 6 Gb SATA - Entry (<3 DWPD)			
4XB7A38276	BCTH	ThinkSystem 3.5" Multi Vendor 240GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A38277	BCTJ	ThinkSystem 3.5" Multi Vendor 480GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A38278	BCTK	ThinkSystem 3.5" Multi Vendor 960GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A38279	BCTL	ThinkSystem 3.5" Multi Vendor 1.92TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A38281	BCTM	ThinkSystem 3.5" Multi Vendor 3.84TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17081	B8JB	ThinkSystem 3.5" 5300 240GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17082	B8J9	ThinkSystem 3.5" 5300 480GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17083	B8JC	ThinkSystem 3.5" 5300 960GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17084	B8HZ	ThinkSystem 3.5" 5300 1.92TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17085	B8HQ	ThinkSystem 3.5" 5300 3.84TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17086	B8J3	ThinkSystem 3.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A13625	B49D	ThinkSystem 3.5" Intel S4510 240GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A13626	B49E	ThinkSystem 3.5" Intel S4510 480GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A13627	B49F	ThinkSystem 3.5" Intel S4510 960GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A13628	B49G	ThinkSystem 3.5" Intel S4510 1.92TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A13629	B49H	ThinkSystem 3.5" Intel S4510 3.84TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17176	B6TM	ThinkSystem 3.5" PM883 240GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17177	B6TN	ThinkSystem 3.5" PM883 480GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17178	B6TP	ThinkSystem 3.5" PM883 960GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17179	B6JY	ThinkSystem 3.5" PM883 1.92TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A17180	B6JZ	ThinkSystem 3.5" PM883 3.84TB Entry SATA 6Gb Hot Swap SSD	14
7SD7A05735	B0Z5	ThinkSystem 3.5" Intel S4500 960GB Entry SATA 6Gb Hot Swap SSD	14
4XB7A10160	B2X9	ThinkSystem 3.5" 5200 1.92TB Entry SATA 6Gb Hot Swap SSD	14
4XB7A10162	B2XB	ThinkSystem 3.5" 5200 7.68TB Entry SATA 6Gb Hot Swap SSD	14

Table 24. 3.5-inch hot-swap PCIe 4.0 NVMe SSDs

Part number	Feature	Description	Maximum supported
3.5-inch SSDs - PCIe 4.0 NVMe - Mainstream (3-5 DWPD)			
4XB7A17155	BCFM	ThinkSystem 3.5" Intel P5600 1.6TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4
4XB7A17156	BCFJ	ThinkSystem 3.5" Intel P5600 3.2TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4
4XB7A17157	BCFQ	ThinkSystem 3.5" Intel P5600 6.4TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4
4XB7A64176	BE04	ThinkSystem 3.5" Kioxia CM6-V 800GB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4
4XB7A17115	B96V	ThinkSystem 3.5" Kioxia CM6-V 1.6TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4
4XB7A17116	B96K	ThinkSystem 3.5" Kioxia CM6-V 3.2TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4
4XB7A17117	B96W	ThinkSystem 3.5" Kioxia CM6-V 6.4TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4

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

Table 25. 3.5-inch hot-swap PCIe 3.0 NVMe SSDs

Part number	Feature	Description	Maximum supported
3.5-inch SSDs - PCIe 3.0 NVMe - Mainstream (3-5 DWPD)			
4XB7A13944	B58C	ThinkSystem 3.5" Intel P4610 1.6TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	4
4XB7A13945	B58D	ThinkSystem 3.5" Intel P4610 3.2TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	4
4XB7A13946	B58E	ThinkSystem 3.5" Intel P4610 6.4TB Mainstream NVMe PCIe3.0 x4 Hot Swap SSD	4
4XB7A08532	B21Z	ThinkSystem 3.5" Toshiba CM5-V 800GB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	4
4XB7A08533	B220	ThinkSystem 3.5" Toshiba CM5-V 1.6TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	4
4XB7A08534	B221	ThinkSystem 3.5" Toshiba CM5-V 3.2TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	4
4XB7A08535	B2XK	ThinkSystem 3.5" Toshiba CM5-V 6.4TB Mainstream NVMe PCIe 3.0 x4 Hot Swap SSD	4
3.5-inch SSDs - PCIe 3.0 NVMe - Entry (<3 DWPD)			
4XB7A10178	B34Q	ThinkSystem 3.5" PM983 1.92TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	4
4XB7A10179	B34R	ThinkSystem 3.5" PM983 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	4
4XB7A10180	B4D4	ThinkSystem 3.5" PM983 7.68TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	4

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

Table 26. M.2 SATA drives

Part number	Feature	Description	Maximum supported
M.2 SSDs - 6 Gb SATA - Entry (<3 DWPD)			
7N47A00129	AUUL	ThinkSystem M.2 32GB SATA 6Gbps Non-Hot Swap SSD	2
7N47A00130	AUUV	ThinkSystem M.2 128GB SATA 6Gbps Non-Hot Swap SSD	2
7SD7A05703*	B11V	ThinkSystem M.2 5100 480GB SATA 6Gbps Non-Hot Swap SSD	2
4XB7A17071*	B8HS	ThinkSystem M.2 5300 240GB SATA 6Gbps Non-Hot Swap SSD	2
4XB7A17073*	B919	ThinkSystem M.2 5300 480GB SATA 6Gbps Non-Hot Swap SSD	2

* The 5100 and 5300 M.2 drives may require the SSD Thermal Kit, 4XH7A08791. See [Cooling](#) for details.

Optical drives

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

Table 27. 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, CD-RW, CD-R, CD-ROM.

I/O expansion

The SR650 server supports one LOM card slot and up to seven PCIe slots: one slot on the system planar that is dedicated to an internal storage controller, one regular PCIe slot on the system planar, and up to five PCIe slots with different riser cards installed into two riser sockets on the system planar (one riser socket supports installation of one riser card).

The slot form factors are as follows:

- LOM card slot
- Slot 1: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, half-length (PCIe x16 slot can be single- or double-wide)
- Slot 2: PCIe 3.0 x8; full-height, half-length (not present if Slot 1 is PCIe x16 double-wide or Slot 3 is ML2 x16)
- Slot 3: PCIe 3.0 x8, or PCIe 3.0 x16, or ML2 x8, or ML2 x16; full-height, half-length
- Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar)
- Slot 5: PCIe 3.0 x16; full-height, half-length
- Slot 6: PCIe 3.0 x16; full-height, half-length
- Slot 7: PCIe 3.0 x8 (dedicated to an internal storage controller)

Configuration notes:

- Slots 5 and 6 require the second processor to be installed.
- Single-wide PCIe 3.0 x16 Slot 1 requires the second processor to be installed.
- The following configurations require the single-wide PCIe 3.0 x16 Slot 1:
 - 24 NVMe PCIe drive bays.
 - Two double-wide GPUs and one PCIe x16 adapter.
- Slots 1 - 3 are not present if the Rear HDD Kit is installed.
- Slots 1, 5, and 6 can be enabled for full-length PCIe adapters (such as GPU adapters):
 - Factory-installed GPUs: When a GPU adapter is selected, all required parts are derived.
 - Factory-enabled full-length support (no adapters included): Select the feature code B3RY, and all required parts will be derived based on the number of processors and PCIe riser cards selected.
 - Field upgrades: Refer to [Cooling](#) for upgrade kit requirements.

The locations of the PCIe slots are shown in the following figure.

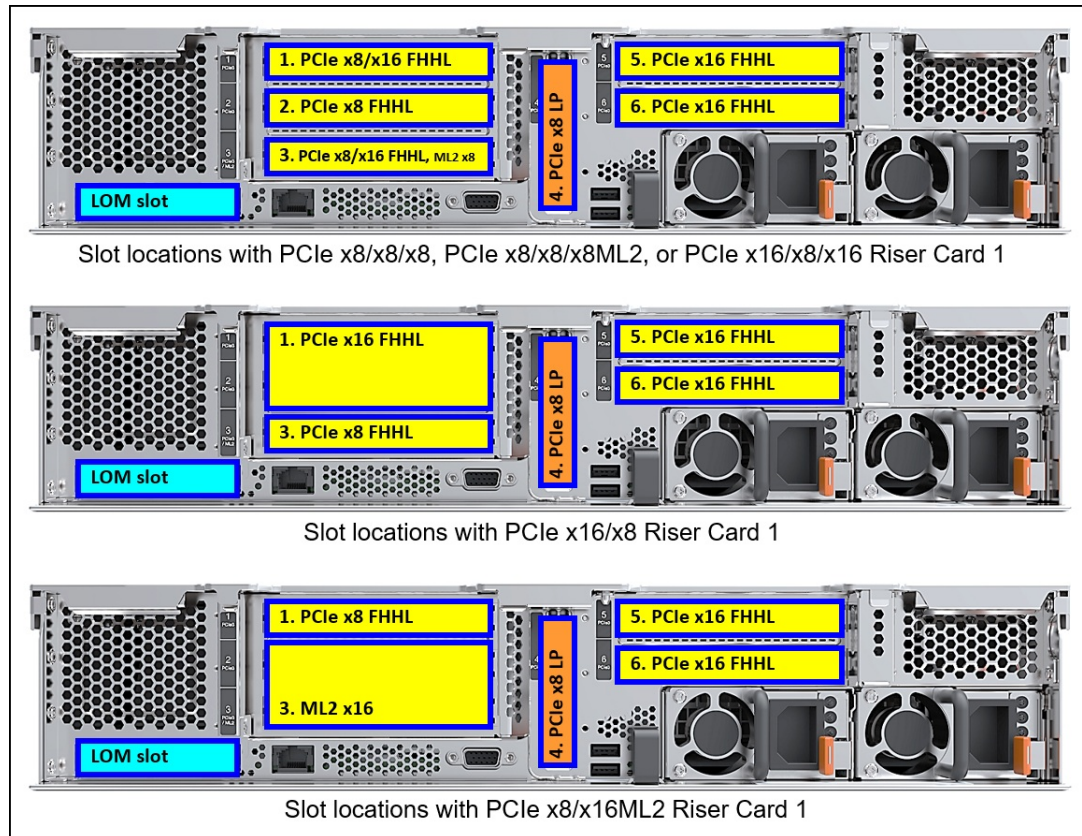


Figure 11. Slot locations

Riser 1 supplies slots 1, 2, and 3, and Riser 2 supplies slots 5 and 6. The slots that are available for use depend on the number of riser cards that are installed and whether the second processor is installed, as shown in the following table.

Table 28. Slots available for use

Riser Card 1	Riser Card 2	Slots available for use	
		Processor 1	Processor 2
None	None	LOM, 4, 7	-
None	PCIe x16/x16	LOM, 4, 7	5, 6
PCIe x8/x8/x8 or PCIe x8/x8/x8ML2	None	LOM, 1, 2, 3, 4, 7	-
PCIe x16/x8 or PCIe x8/x16ML2	None	LOM, 1, 3, 4, 7	-
PCIe x8/x8/x8 or PCIe x8/x8/x8ML2	PCIe x16/x16	LOM, 1, 2, 3, 4, 7	5, 6
PCIe x16/x8 or PCIe x8/x16ML2	PCIe x16/x16	LOM, 1, 3, 4, 7	5, 6
PCIe x16/x8/x16	PCIe x16/x16	LOM, 2, 3, 4, 7	1, 5, 6

The following table lists available PCIe riser card options.

Table 29. PCIe riser cards and miscellaneous options

Description	Part number	Feature code	Maximum quantity
x8 Riser Card 1 options (Riser card 1 supplies slots 1, 2, and 3)			
ThinkSystem 2U x8/x8/x8 PCIe FH Riser 1	7XH7A02677	AUR4	1
ThinkSystem 2U x8/x8/x8ML2 PCIe FH Riser 1	7XH7A02680	AUR7	1
ThinkSystem SR650 x16/x8/x16 PCIe FH Riser 1	4XH7A09902	B4PB	1
x16 Riser Card 1 options (Riser card 1 supplies slots 1 and 3)			
ThinkSystem 2U x16/x8 PCIe FH Riser 1	7XH7A02678	AUR3	1
ThinkSystem SR650 x8/x16ML2 PCIe FH Riser 1 Kit	7XH7A02681	AURB	1
Riser Card 2 option (Riser card 2 supplies slots 5 and 6)			
ThinkSystem SR550/SR650 (x16/x8)/(x16/x16) PCIe FH Riser 2 Kit	7XH7A02679	AURC	1
ThinkSystem SR650 x16/x8(or x16) PCIe FH Riser 2 Kit V2	4TA7A70026	BFJZ	1
Serial port upgrade kit			
ThinkSystem COM Port Upgrade Kit	7Z17A02577	AUSL	1

Configuration notes:

- If the PCIe x16/x8/x16 Riser Card (4XH7A09902) is installed, the onboard NVMe interface cannot be used for connections to U.2 NVMe or AnyBay drive bays.
- In the configurations with 16x 2.5-inch U.2 NVMe PCIe drive bays, the PCIe 3.0 x8 Slot 3 and PCIe 3.0 x16 Slot 5 are available, and the remaining slots are occupied by the NVMe switch adapters.
Note: If the additional 8-bay SAS/SATA backplane is installed, only the PCIe 3.0 x16 Slot 5 is available (the PCIe 3.0 x8 Slot 3 is occupied by an internal storage controller).
- In the configurations with 20x 2.5-inch U.2 NVMe PCIe drive bays, the PCIe 3.0 x8 Slot 3 is available, and the remaining slots are occupied by the NVMe switch adapters.
- In the configurations with 24x 2.5-inch U.2 NVMe PCIe drive bays, the PCIe 3.0 x16 Slots 3 and 5 are available, and the remaining slots are occupied by the NVMe switch adapters.
- For field upgrades to add the NVIDIA A100 GPU, the use of Riser 2 V2 riser kit (4TA7A70026) is required when the GPU is to be installed in slot 5. The older Riser 2 kit (7XH7A02679, now withdrawn) is not supported with the A100. For CTO orders, feature code BF9Y will be used for the correct Riser 2 bracket.
- The COM Port Upgrade Kit, part number 7Z17A02577, is used for mounting the external serial port on the rear of the SR650 server, and it includes the bracket and the cable. The COM Port option is mounted in place of one of the PCIe slots 1 - 6, and that PCIe slot cannot be used.

Network adapters

The SR650 server supports up to four onboard network ports with optional LOM cards that use the Intel Ethernet Connection X722 1/10 GbE technology integrated into the Intel C624 Platform Controller Hub (PCH). The server also supports ML2 adapters that are installed in the custom ML2 slot provided by an ML2 riser card. The LOM cards and ML2 network adapters support direct connectivity to the XClarity Controller via the Network Controller Sideband Interface (NSCI) for out-of-band systems management.

The integrated Intel Ethernet Connection X722 has the following features:

- Four 1/10 Gb Ethernet capable ports (no 10/100 Mb Ethernet support)
- NIC Teaming (load balancing and failover)
- Data Center Bridging
- iWARP (RDMA over IP)
- VMDq and SR-IOV virtualization (10 Gb speeds only, 4 PFs, 128 VFs per device)
- IEEE 802.1q Virtual Local Area Networks (VLANs)
- NVGRE, VXLAN, IPinGRE, and MACinUDP network virtualization
- IEEE 802.1Qbg Edge Virtual Bridging
- TCP, IP, and UDP checksum offload
- Large Send Offload (LSO) and Generic Send Offload (GSO)
- Receive Side Scaling (RSS) for TCP and UDP traffic
- Jumbo frames up to 9.5 Kbytes

The following table lists the network adapters that are supported with the SR650 server.

Table 30. Network adapters

Description	Part number	Feature code	Max qty#	I/O slots supported
LOM cards - 1 Gb Ethernet				
ThinkSystem 1Gb 2-port RJ45 LOM	7ZT7A00544	AUKG	1	LOM slot
ThinkSystem 1Gb 4-port RJ45 LOM	7ZT7A00545	AUKH	1	LOM slot
LOM cards - 10 Gb Ethernet				
ThinkSystem 10Gb 2-port Base-T LOM	7ZT7A00548	AUKL	1	LOM slot
ThinkSystem 10Gb 2-port SFP+ LOM	7ZT7A00546	AUKJ	1*	LOM slot
ThinkSystem 10Gb 4-port Base-T LOM	7ZT7A00549	AUKM	1	LOM slot
ThinkSystem 10Gb 4-port SFP+ LOM	7ZT7A00547	AUKK	1*	LOM slot
ML2 adapters - 10 Gb Ethernet				
Broadcom NX-E ML2 10Gb 2-Port Base-T Ethernet Adapter	7ZT7A00497	AUKQ	1	3 (ML2)
Emulex VFA5.2 ML2 Dual Port 10GbE SFP+ Adapter	00AG560	AT7U	1*	3 (ML2)
Emulex VFA5.2 ML2 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW	01CV770	AU7Z	1*	3 (ML2)
Intel X710-DA2 ML2 2x10GbE SFP+ Adapter	00JY940	ATRH	1*	3 (ML2)
ML2 adapters - 25 Gb Ethernet				
Mellanox ConnectX-4 Lx 10/25GbE SFP28 1-port ML2 Ethernet Adapter	00MN990	ATZR	1*	3 (ML2)
Mellanox ConnectX-4 Lx 10/25GbE SFP28 2-port ML2 Ethernet Adapter	7ZT7A00507	AUKU	1*	3 (ML2)
ML2 adapters - FDR InfiniBand				
Mellanox ConnectX-3 Pro ML2 FDR 2-Port QSFP VPI Adapter	7ZT7A00501	AUKR	1*	3 (ML2)
PCIe Low Profile adapters - 1 Gb Ethernet				
Broadcom 5720 1GbE RJ45 2-Port PCIe Ethernet Adapter	7ZT7A00482	AUZX	4 / 6	4, 2, 6, 3, 5, 1
Broadcom 5719 1GbE RJ45 4-Port PCIe Ethernet Adapter	7ZT7A00484	AUZV	4 / 6	4, 2, 6, 3, 5, 1
ThinkSystem I350-F1 PCIe 1Gb 1-Port SFP Ethernet Adapter	7ZT7A00533	AUZZ	4 / 6	4, 2, 6, 3, 5, 1
ThinkSystem I350-T2 PCIe 1Gb 2-Port RJ45 Ethernet Adapter	7ZT7A00534	AUZY	4 / 6	4, 2, 6, 3, 5, 1
ThinkSystem I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter	7ZT7A00535	AUZW	4 / 6	4, 2, 6, 3, 5, 1
SiNEAD I350-C4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter	4XC7A62589\$	BE8A\$	4 / 6	4, 2, 6, 3, 5, 1

Description	Part number	Feature code	Max qty#	I/O slots supported
PCIe Low Profile adapters - 10 Gb Ethernet				
Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter	7ZT7A00496	AUKP	4 / 6	4, 2, 6, 3, 5, 1
Emulex VFA5.2 2x10 GbE SFP+ PCIe Adapter	00AG570	AT7S	4 / 6*	4, 2, 6, 3, 5, 1
Emulex VFA5.2 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW	00AG580	AT7T	4 / 6*	4, 2, 6, 3, 5, 1
Intel X550-T2 Dual Port 10GBase-T Adapter	00MM860	ATPX	4 / 6	4, 2, 6, 3, 5, 1
Intel X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter	7ZT7A00537	AUKX	4 / 6*	4, 2, 6, 3, 5, 1
QLogic QL41134 PCIe 10Gb 4-Port Base-T Ethernet Adapter	4XC7A08225	B31G	4 / 6	4, 2, 6, 3, 5, 1
PCIe Full Height adapters - 10 Gb Ethernet				
Emulex OCe14104B-NX PCIe 10Gb 4-Port SFP+ Ethernet Adapter	7ZT7A00493	AUKN	3 / 5*	2, 6, 3, 5, 1
PCIe Low Profile adapters - 25 Gb Ethernet				
Broadcom 57412 10/25GbE SFP28 1-Port PCIe Ethernet Adapter	7ZT7A00505	AUKS	4 / 6*	4, 2, 6, 3, 5, 1
Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter	4XC7A08238	B5T0	4 / 6*	4, 2, 6, 3, 5, 1
Intel XXV710-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	7XC7A05523	B0WY	4 / 6*	4, 2, 6, 3, 5, 1
Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4XC7A08270	B652	4 / 6*	4, 2, 6, 3, 5, 1
Mellanox ConnectX-4 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	01GR250	AUAJ	4 / 6*	4, 2, 6, 3, 5, 1
Mellanox ConnectX-5 EN 10/25GbE SFP28 2-port PCIe Ethernet Adapter	4XC7A62574	BEAP	4 / 6*	4, 2, 6, 3, 5, 1
Mellanox Innova-2 ConnectX-5 FPGA 25GbE 2-port Adapter	4XC7A16683	B5XZ	1 / 3*	1, 5, 6†
QLogic QL41262 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4XC7A08228	B21R	4 / 6*	4, 2, 6, 3, 5, 1
PCIe Low Profile adapters - 40 Gb Ethernet				
Mellanox ConnectX-4 Lx 1x40GbE QSFP+ Adapter	00MM950	ATRN	4 / 6*	4, 2, 6, 3, 5, 1
Mellanox ConnectX-5 Ex 25/40GbE 2-port Low-Latency Adapter	4XC7A08229	B31C	1 / 3*^	1, 5, 6†
PCIe Low Profile adapters - FDR InfiniBand				
Mellanox ConnectX-4 PCIe FDR 1-Port QSFP VPI Adapter	7XC7A05524	B0WX	4 / 6*	4, 2, 6, 3, 5, 1
Mellanox ConnectX-4 PCIe FDR 2-Port QSFP VPI Adapter	7ZT7A00500	AUVG	4 / 6*	4, 2, 6, 3, 5, 1
PCIe x16 Low Profile adapters - 100 Gb Ethernet / EDR InfiniBand				
Mellanox ConnectX-4 2x100GbE/EDR IB QSFP28 VPI Adapter	00MM960	ATRP	1 / 3*	1, 5, 6†
PCIe x16 Low Profile adapters - HDR InfiniBand				
ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe 4 VPI Adapter	4C57A15326	B4RC	1 / 1*	1†‡
Mellanox HDR/200GbE 2x PCIe Aux Kit	4C57A14179	B4RB	1 / 1*	5, 6†‡
ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 1-port PCIe VPI Adapter	4C57A14177	B4R9	1 / 3*	1, 5, 6†
ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 1-port PCIe VPI Adapter	4C57A14178	B4RA	1 / 3*	1, 5, 6†
PCIe Low Profile adapters - Omni-Path				
Intel OPA 100 Series Single-port PCIe 3.0 x8 HFA	00WE023	AU0A	4 / 6*	4, 2, 6, 3, 5, 1
Intel OPA 100 Series Single-port PCIe 3.0 x16 HFA	00WE027	AU0B	1 / 3*	1, 5, 6†

The maximum quantity shown is with one processor / two processors (this does not apply to LOM cards and ML2 adapters).

* The adapter comes without transceivers or cables; for ordering transceivers or cables, see the product guide for the adapter.

† The adapter is supported in the PCIe x16 slots supplied by the riser cards 1 and 2.

^ The 25 GbE connectivity requires the optional Mellanox QSA 100G to 25G Cable Adapter (4G17A10853) (one per port); the supported cables include 25 GbE passive DAC and active optical cables (25 GbE transceivers not supported)

‡ The ConnectX-6 HDR adapter is supported only in the configurations with two processors, and it requires the HDR/200GbE 2x PCIe Aux Kit.

§ The SiNEAD I350-C4 adapter is only available for customers in Mainland China (PRC). Not supported installed with Intel I350 adapters.

Configuration notes:

- ML2 network adapters are supported in the ML2 x8 slot 3 supplied by the x8/x8/x8ML2 Riser Card 1 (7XH7A02680).

- PCIe full-height network adapters are supported in the full-height PCIe x8 and x16 slots supplied by the riser cards 1 and 2.
- PCIe x16 Low Profile network adapters are supported in the full-height PCIe x16 slots supplied by the riser cards 1 and 2.
- PCIe x8 or x4 Low Profile network adapters are supported in the low profile PCIe x8 slot 4 on the system board and full-height PCIe x8 and x16 slots supplied by the riser cards 1 and 2.
- The Mellanox HDR and HDR100 InfiniBand QSFP56 adapters are supported only in the configurations with up to 16x 2.5-inch or 8x 3.5-inch drive bays and only with an ambient temperature of up to 35 °C (95 °F). Not supported in 12x 3.5-inch or 24x 2.5-inch configurations.
- In the configurations with two double-wide GPU adapters and a PCIe x16 adapter, the following adapters are supported in the PCIe 3.0 x16 slot 3 supplied by the PCIe x16/x8/x16 Riser Card (4XH7A09902):
 - Mellanox ConnectX-4 1x100GbE/EDR IB QSFP28 VPI Adapter (00KH924)
 - Mellanox ConnectX-4 2x100GbE/EDR IB QSFP28 VPI Adapter (00MM960)
 - Mellanox ConnectX-5 Ex 25/40GbE 2-port Low-Latency Adapter (4XC7A08229)
 - Intel OPA 100 Series Single-port PCIe 3.0 x16 HFA (00WE027)
- Supported transceivers or DAC cables should be purchased for the SFP+, SFP28, QSFP+, and QSFP28 adapters, and UTP Category 6 or Category 5e cables should be purchased for the 10 GbE (Cat6) or 1 GbE (Cat5e or Cat6) RJ-45 adapters. The maximum number of transceivers or cables that are supported per adapter equals the quantity of the adapter ports, and all adapter ports must have the same type of the transceiver or cable selected. See the product guide for the adapter for the list of supported transceivers and cables.

For more information, see the list of Product Guides in the Ethernet Adapters category:
<http://lenovopress.com/servers/options/ethernet#rt=product-guide>

SAS adapters for external storage

The following table lists SAS RAID controllers and HBAs for external storage attachments that are supported by the SR650 server.

Table 31. SAS RAID adapters and HBAs for external storage

Description	Part number	Feature code	Maximum quantity*	I/O slots supported
12 Gbps SAS RAID adapters				
ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapter	7Y37A01087	AUNQ	4 / 4	1, 2, 3, 4, 5
12 Gbps SAS HBAs				
ThinkSystem 430-8e SAS/SATA 12Gb HBA	7Y37A01090	AUNR	4 / 5	1, 2, 3, 4, 5
ThinkSystem 430-16e SAS/SATA 12Gb HBA	7Y37A01091	AUNN	4 / 5	1, 2, 3, 4, 5

* The maximum quantity shown is with one processor / two processors.

Configuration notes:

- Low profile SAS RAID controllers and HBAs for external storage are supported in the low profile PCIe x8 slot 4 on the system board and full-high PCIe x8 and x16 slots supplied by the riser cards 1 and 2 (except slot 6).
- In the configurations without GPU installed, the total quantity of the RAID 730-8i 2GB, RAID 930-8i, RAID 930-16i, RAID 930-24i, and RAID 930-8e controllers in a supported combination in the server must not exceed 4 (up to 4 supercapacitors can be mounted in the server).
- In the configurations with GPU installed, the total quantity of the RAID 730-8i 2GB, RAID 930-8i, RAID 930-16i, RAID 930-24i, and RAID 930-8e controllers in a supported combination in the server must not exceed 3 (up to 3 supercapacitors can be mounted in the server).

The following table summarizes features of supported RAID controllers and HBAs for external storage.

Table 32. Features and specifications of the RAID controllers and HBAs for external storage

Feature	RAID 930-8e	430-8e HBA	430-16e HBA
Form factor	PCIe LP	PCIe LP	PCIe LP

Feature	RAID 930-8e	430-8e HBA	430-16e HBA
SAS controller chip	SAS3516	SAS3408	SAS3416
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	12 Gb SAS	12 Gb SAS	12 Gb SAS
Number of ports	8	8	16
Connector type	SFF-8644 x4	SFF-8644 x4	SFF-8644 x4
Number of connectors	2	2	4
Drive interface	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SSD, SED	HDD, SSD, SED*	HDD, SSD, SED*
Hot-swap drive support	Yes	Yes	Yes
Number of devices	240	1024	1024
RAID levels	0/1/10/5/50/6/60	None	None
JBOD mode	Yes	Yes	Yes
Cache	4 GB	None	None
Cache protection	Flash backup (Included)	None	None
SED key management (SafeStore)	Yes	No	No
SSD I/O acceleration (FastPath)	Yes	No	No
SSD Caching (CacheCade Pro 2.0)	No**	No	No
Consistency check	Yes	No	No
Patrol read	Yes	No	No
Online capacity expansion	Yes	No	No
Online RAID level migration	Yes	No	No
Global Hot Spare	Yes	No	No
Auto-rebuild	Yes	No	No

* HBAs do not support key management for SEDs; third-party host software is responsible for managing the keys.

** The SSD caching feature has been phased out in the new generation of advanced RAID controllers.

For more information, see the list of Product Guides in the following categories:

- RAID adapters
<http://lenovopress.com/servers/options/raid#rt=product-guide>
- Host bus adapters
<http://lenovopress.com/servers/options/hba#rt=product-guide>

Fibre Channel host bus adapters

The following table lists Fibre Channel HBAs supported by the SR650 server.

Table 33. Fibre Channel HBAs

Description	Part number	Feature code	Maximum quantity*	I/O slots supported
32 Gb Fibre Channel - PCIe				
Emulex LPe35000 32Gb 1-port PCIe Fibre Channel Adapter	4XC7A08250	B5SX	4 / 6	4, 2, 6, 3, 5, 1
Emulex LPe35002 32Gb 2-port PCIe Fibre Channel Adapter	4XC7A08251	B5SY	4 / 6	4, 2, 6, 3, 5, 1
QLogic QLE2740 PCIe 32Gb 1-Port SFP+ FC HBA	7ZT7A00516	AUNS	4 / 6	4, 2, 6, 3, 5, 1
QLogic QLE2742 PCIe 32Gb 2-Port SFP+ FC HBA	7ZT7A00518	AUNU	4 / 6	4, 2, 6, 3, 5, 1
16 Gb Fibre Channel - PCIe				
Emulex 16Gb Gen6 FC Single-port HBA	01CV830	ATZU	4 / 6	4, 2, 6, 3, 5, 1
Emulex 16Gb Gen6 FC Dual-port HBA	01CV840	ATZV	4 / 6	4, 2, 6, 3, 5, 1
QLogic 16Gb Enhanced Gen5 FC Single-port HBA	01CV750	ATZB	4 / 6	4, 2, 6, 3, 5, 1

Description	Part number	Feature code	Maximum quantity*	I/O slots supported
QLogic 16Gb Enhanced Gen5 FC Dual-port HBA	01CV760	ATZC	4 / 6	4, 2, 6, 3, 5, 1
8 Gb Fibre Channel - PCIe (available only in PRC and Asia Pacific)				
Emulex LPe12000-M8-L PCIe 8Gb 1-Port SFP+ FC HBA	4XC7A08220	B0WZ	4 / 6	4, 2, 6, 3, 5, 1
Emulex LPe12002-M8-L PCIe 8Gb 2-Port SFP+ FC HBA	4XC7A08221	B0X0	4 / 6	4, 2, 6, 3, 5, 1

* The maximum quantity shown is with one processor / two processors.

Configuration note: FC HBAs are supported in the low profile PCIe x8 slot 4 on the system board and full-high PCIe x8 and x16 slots supplied by the riser cards 1 and 2.

For more information, see the list of Product Guides in the Host bus adapters category:
<http://lenovopress.com/servers/options/hba#rt=product-guide>

Flash storage adapters

The SR650 server supports the flash storage adapters listed in the following table.

Table 34. Flash storage adapters

Part number	Feature code	Description	Maximum quantity*	I/O slots supported
Mainstream Flash Adapters - PM1735				
4XB7A14075	B8JH	ThinkSystem HHHH PM1735 1.6TB Mainstream NVMe PCIe4.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
4XB7A14076	B8HW	ThinkSystem HHHH PM1735 3.2TB Mainstream NVMe PCIe4.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
4XB7A14077	B96M	ThinkSystem HHHH PM1735 6.4TB Mainstream NVMe PCIe4.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
Mainstream Flash Adapters - CM5-V				
4XB7A38234	BCGJ	CM5-V 1.6TB Mainstream NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
4XB7A38237	BCGK	CM5-V 3.2TB Mainstream NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
4XB7A38240	BCGL	CM5-V 6.4TB Mainstream NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
Mainstream Flash Adapters - P4600				
7SD7A05769	B11X	Intel P4600 2.0TB Mainstream NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
Entry Flash Adapters - P4500				
7SD7A05776	B11Z	Intel P4500 4.0TB Entry NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1
7SD7A05775	B120	Intel P4500 8.0TB Entry NVMe PCIe 3.0 x4 Flash Adapter	4 / 6	4, 2, 6, 3, 5, 1

* The maximum quantity shown is with one processor / two processors.

Configuration notes:

- Flash storage adapters are supported in the low profile PCIe x8 slot on the system board and full-high PCIe x8 and x16 slots supplied by the riser cards 1 and 2.
- The Flash storage adapters are supported only in the environments with the ambient temperature of up to 35 °C (95 °F).
- The Flash storage adapters are supported only with the processors of up to 165 W TDP.

For more information, see the list of Product Guides in the Flash storage adapters category:
<http://lenovopress.com/servers/options/ssdadapter#rt=product-guide>

GPU adapters

The SR650 server supports graphics processing units (GPUs) listed in the following table.

Table 35. GPU adapters

Description	Part number	Feature code	Maximum quantity*	I/O slots supported
Low profile PCIe 3.0 x16 single-wide GPU adapters				
ThinkSystem NVIDIA Quadro P620 2GB PCIe Active GPU	4X67A11584	B31D	1 / 3	1, 5, 6
ThinkSystem NVIDIA Tesla T4 16GB PCIe Passive GPU	4X67A14926	B4YB	1 / 4	1, 2, 3, 5, 6
Full-height, full-length PCIe 3.0 x16 double-wide GPU adapters				
ThinkSystem AMD Radeon Instinct MI25 16GB PCIe Passive GPU	7C57A02897	B228	1 / 2	1, 5
ThinkSystem NVIDIA A100 40GB PCIe Gen4 Passive GPU	4X67A13135†	BEL5	1 / 2	1, 5
ThinkSystem NVIDIA Quadro P6000 24GB GPU, PCIe (active)	7C57A02895	B2V5	1 / 2	1, 5
ThinkSystem NVIDIA Quadro RTX 5000 16GB PCIe Active GPU	4X67A17267	B6CH	1 / 2	1, 5
ThinkSystem NVIDIA Tesla M10 32GB PCIe Passive GPU	7C57A02891	B15V	1 / 2	1, 5
NVIDIA Tesla M60 GPU, PCIe (Passive)	00KG655	B13J	1 / 2	1, 5
ThinkSystem NVIDIA Tesla P40 24GB PCIe Passive GPU	7C57A02888	B15U	1 / 2	1, 5
ThinkSystem NVIDIA Tesla V100 16GB PCIe Passive GPU	4C57A09498	B1JY	1 / 2	1, 5
ThinkSystem NVIDIA Tesla V100 32GB PCIe Passive GPU	4X67A12088	B34S	1 / 2	1, 5
ThinkSystem NVIDIA Tesla V100S 32GB PCIe Passive GPU	4X67A13124	BB2E	1 / 2	1, 5
Full-height, half-length PCIe 3.0 x16 single-wide GPU adapters				
ThinkSystem NVIDIA Tesla V100 FHHL 16GB PCIe GPU	4X67A11524	B32D	1 / 3	1, 5, 6
Full-height, full-length PCIe 3.0 x16 single-wide GPU adapters				
ThinkSystem NVIDIA Quadro P4000 8GB PCIe Active GPU	4V17A10255	B225	1 / 3	1, 5, 6
ThinkSystem NVIDIA Quadro RTX 4000 8GB PCIe Active GPU	4X67A14934	B6CG	1 / 3	1, 5, 6

* The maximum quantity shown is with one processor / two processors.

† The NVIDIA A100 requires UEFI firmware 2.80 or later, and XClarity Controller firmware 5.40 or higher.

Configuration notes:

- All GPU adapters in the server must be of the same model; mixing different GPU adapter models is not supported.
- The GPU adapters require the PCIe x16 riser cards (except T4 GPU adapters).
- For field upgrades to add the NVIDIA A100 GPU, the use of Riser 2 V2 riser kit (4TA7A70026) is required when the GPU is to be installed in slot 5. The older Riser 2 kit (7XH7A02679, now withdrawn) is not supported with the A100. For CTO orders, feature code BF9Y will be used for the correct Riser 2 bracket.
- The T4 GPU adapters are supported only in the specific I/O slots, as follows:
 - 1x T4 GPU adapter (one or two processors):
 - PCIe 3.0 x16 Slot 1 on the x16/x8 Riser Card 1 (7XH7A02678); or
 - PCIe 3.0 x8 Slot 1 on the x8/x8/x8 Riser Card 1 (7XH7A02677).
 - 2x T4 GPU adapters:
 - One processor: PCIe 3.0 x8 Slots 1 and 2 on the x8/x8/x8 Riser Card 1 (7XH7A02677).
 - Two processors:
 - PCIe 3.0 x16 or x8 Slot 1 on one of the following riser cards:
 - PCIe 3.0 x16 Slot 1 on the x16/x8 Riser Card 1 (7XH7A02678); or
 - PCIe 3.0 x8 Slot 1 on the x8/x8/x8 Riser Card 1 (7XH7A02677).
 - PCIe 3.0 x16 Slot 5 on the x16/x16 Riser Card 2 (4TA7A70026).
 - **Note:** Slot 6 must remain unoccupied in the configurations with two T4 GPU adapters.
 - 3x T4 GPU adapters:
 - One processor: PCIe 3.0 x8 Slots 1, 2, and 3 on the x8/x8/x8 Riser Card 1 (7XH7A02677).
 - Two processors:
 - PCIe 3.0 x16 or x8 Slot 1 on one of the following riser cards:
 - PCIe 3.0 x16 Slot 1 on the x16/x8 Riser Card 1 (7XH7A02678); or

Cooling

The SR650 server supports up to six hot-swap system fans that provide N+1 cooling redundancy. SR650 server models with one processor include five system fans, and server models with two processors include six system fans.

Configuration note: The server performance might be impacted in case of a system fan failure in the following server configurations:

- Intel Xeon 6137, 6144, 6146, 6154, 8168, 8180, and 8180M processors are installed.
- GPU adapters are installed.
- 16/20/24x 2.5" U.2 NVMe PCIe drive bays at the ambient temperature of more than 30 °C (86 °F).

The following table shows additional cooling options for configurations with the M.2 5100 or 5300 SSDs, GPUs, and other full-length PCIe adapters.

Table 37. Cooling options

Description	Part number	Feature code	Maximum quantity
ThinkSystem M.2 SSD Thermal Kit	4XH7A08791	B31F	1
ThinkSystem SR650 GPU Thermal Kit	7XH7A05897	None	1
ThinkSystem SR650 2nd GPU Upgrade Kit	7XH7A05899	AURU	1
ThinkSystem SR650 GPU 1U Heatsink Option Kit	7XH7A05898	None	1
ThinkSystem SR650 V100 FHHL Air Duct Companion Kit	4XH7A08792	B37F	2

Configuration notes:

- The M.2 SSD Thermal Kit (4XH7A08791) is required when at least one M.2 5100 or 5300 SSD is installed in the server; however, the SSD Thermal Kit is not required in the server configurations with the GPU Thermal Kit (7XH7A05897) (factory-installed or field upgrade). If required, the M.2 SSD Thermal Kit is derived by the configurator for initial server configurations, or it should be purchased for M.2 5100 or 5300 SSDs for field upgrades.
- The P620 GPU adapters do not require any thermal kits.
- The full-length PCIe adapters and GPU adapters other than P620 require one of the following thermal kits depending on the configuration:
 - The GPU Thermal Kit (7XH7A05897) is required when adding GPUs or full-length PCIe adapters to the SR650 server models without factory-installed GPUs or factory-enabled full-length support. The kit provides support for up to three GPUs or full-length adapters in the PCIe x16 slots 1, 5, and 6, and it contains an air duct, two low-profile heatsinks, and two full-length card holders.
 - The 2nd GPU Upgrade Kit (7XH7A05899) is required when adding more GPUs or full-length adapters to the SR650 server models with one riser card and the factory-enabled full-length support or factory-installed GPUs. The kit provides support for the additional GPUs or full-length adapters, and it contains a full-length card holder (the second riser card is not included in the kit).
 - The GPU 1U Heatsink Option Kit (7XH7A05898) is required when adding the second processor to the SR650 server models with one processor and the factory-enabled full-length support or factory-installed GPUs. The kit contains a low-profile heatsink for the second processor option.
- The V100 FHHL GPU adapters require the V100 FHHL Air Duct Companion Kit (4XH7A08792) in addition to one of the thermal kits described above. One air duct kit is required when one V100 FHHL GPU adapter is installed in the server, and two air duct kits are required when two or three V100 FHHL GPU adapters are installed in the server.

Power supplies and cables

The SR650 server supports up to two redundant power supplies and is capable of N+N redundancy depending on the configuration. A second power supply can be added to the models that come with one power supply.

The following table lists the power supply options.

Table 38. Power supplies

Description	Part number	Feature code	Maximum quantity
ThinkSystem 550W (230V/115V) Platinum Hot-Swap Power Supply	7N67A00882	AVWC	2
ThinkSystem 750W (230/115V) Platinum Hot-Swap Power Supply	7N67A00883	AVWD	2
ThinkSystem 750W (230V) Titanium Hot-Swap Power Supply	7N67A00884	AVWE	2
ThinkSystem 1100W (230V/115V) Platinum Hot-Swap Power Supply	7N67A00885	AVWF	2
ThinkSystem 1600W (230V) Platinum Hot-Swap Power Supply	7N67A00886	AVWG	2
ThinkSystem 1100W -48V DC Power Supply	4P57A15363	B4Z5	2

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

Configuration notes:

- Minimum of 1 and maximum of 2 power supplies per system.
- If 2 are installed, power supplies must be identical.
- AC power supplies support AC (Worldwide) and HVDC (PRC only) power sources
- AC power supplies have a C14 connector. The -48V DC power supply has a Weidmuller TOP 4GS/3 7.6 terminal.

Important: The Standalone Solution Configuration Tool (SSCT) and Lenovo Data Center Solution Configurator (DCSC) power supply selection rules allow a subset of possible configurations due to power restrictions. Configurations that cannot be built in SSCT or DCSC due to power restrictions may still be supported. To verify support and ensure that the right power supply is chosen for optimal performance, you should always validate your server configuration using the latest version of the Lenovo Capacity Planner:

<http://datacentersupport.lenovo.com/us/en/solutions/invo-lcp>

Power cords

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

110V customers: If you plan to use the ThinkSystem 1100W power supply with a 110V power source, select a power cable that is rated above 10A. Power cables that are rated at 10A or below are not supported with 110V power.

Table 39. Power cords

Part number	Feature code	Description
Rack cables		
00Y3043	A4VP	1.0m, 10A/100-250V, C13 to C14 Jumper Cord
39Y7937	6201	1.5m, 10A/100-250V, C13 to C14 Jumper Cord
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

Part number	Feature code	Description
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
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
39Y7926	6335	4.3m, 12A/100V, C13 to JIS C-8303 (Japan) 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
23R7158	6386	2.8m, 10A/125V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2375	6317	2.8m, 10A/250V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2374	6402	2.8m, 13A/125V, C13 to CNS 10917 (Taiwan) Line Cord
4L67A08363	AX8B	4.3m, 10A/125V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2389	6531	4.3m, 10A/250V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2388	6530	4.3m, 13A/125V, 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
90Y3016	6313	2.8M, 10A/125V, C13 to NEMA 5-15P (US) Line Cord
46M2592	A1RF	2.8m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord
00WH545	6401	2.8M, 13A/125V, C13 to NEMA 5-15P (US) Line Cord
4L67A08359	6370	4.3m, 10A/125V, C13 to NEMA 5-15P (US) Line Cord
4L67A08361	6373	4.3m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord
4L67A08360	AX8A	4.3m, 13A/125V, C13 to NEMA 5-15P (US) Line Cord

For the -48V DC Power Supply, the following power cable is supported.

Table 40. -48V DC power cable

Part number	Feature code	Description
CTO only	B93F	ThinkSystem 2.5m,DC Cable

Systems management

The SR650 supports the following systems management tools:

- Lenovo XClarity Controller
- Light path diagnostics
- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials
- Lenovo XClarity Administrator
- Lenovo XClarity Integrators
- Lenovo XClarity Energy Manager
- Lenovo Capacity Planner

Lenovo XClarity Controller

The SR650 server contains Lenovo XClarity Controller (XCC), which provides advanced service-processor control, monitoring, and alerting functions. XClarity Controller offers three functional levels: Standard, Advanced, and Enterprise.

By default, the SR650 server includes XClarity Controller Standard features, and it can be upgraded to Advanced or Enterprise functionality by using the Features on Demand (FoD) upgrades.

XClarity Controller Standard offers the following capabilities:

- Gathering and viewing system information and inventory
- Monitoring system status and health
- Alerting and notifications
- Event logging
- Configuring network connectivity
- Configuring security
- Updating system firmware
- Configuring server settings and devices
- Real-time power usage monitoring
- Remotely controlling server power (Power on, Power off, Restart)
- Managing FoD activation keys
- Redirecting serial console via IPMI
- Capturing the video display contents when an operating system hang condition is detected

XClarity Controller Advanced Upgrade adds the following functionality to the Standard features:

- Remotely viewing video with graphics resolutions:
 - Up to 1600x1200 with up to 23 bits per pixel; or
 - Up to 1920x1200 with up to 15 bits per pixel
- Remotely accessing the server using the keyboard and mouse from a remote client
- Remotely deploying an operating system
- Syslog alerting
- Redirecting serial console via SSH
- Displaying graphics for real-time and historical power usage data and temperature

XClarity Controller Enterprise Upgrade adds the following functionality to the Advanced features:

- Capping power usage
- 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
- Collaborating across up to six users of the virtual console
- Controlling quality and bandwidth usage

The XClarity Controller provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Data Center Manageability Interface (DCMI) Version 1.5
- Redfish REpresentational State Transfer (REST) API
- Web browser with HTML5 support
- Command-line interface
- Virtual Operator Panel with XClarity Mobile App via the front USB port with XClarity Controller access

Virtual Operator Panel provides quick access to system status, firmware, network, health, and alerts information. With proper authentication, it also allows to configure systems management and network settings and to control system power (Power on, Power off, Restart). The Virtual Operator Panel can be accessed from the XClarity Mobile App running on the Android or iOS mobile device that is connected to the front USB port with XClarity Controller access (See [Components and connectors](#)).

Note: Depending on the system settings, the front USB port can be assigned to XClarity Controller for management functions, or to the system as a regular USB 2.0 port, or switched between two functions by using the system ID button.

The following table lists the XClarity Controller FoD upgrades.

Table 41. XClarity Controller FoD upgrades

Description	Part number	Feature code	Maximum quantity
ThinkSystem XClarity Controller Standard to Advanced Upgrade	4L47A09132	AVUT	1
ThinkSystem XClarity Controller Standard to Enterprise Upgrade	None*	AUPW	1
ThinkSystem XClarity Controller Advanced to Enterprise Upgrade	4L47A09133	None**	1

* Factory-installed only.

** Field upgrade only.

Configuration notes:

- For factory-installed upgrades, either Standard to Advanced Upgrade (feature AVUT) or Standard to Enterprise Upgrade (feature AUPW) can be selected, but not both.
- For field upgrades, the Advanced to Enterprise Upgrade (4L47A09133) requires the Standard to Advanced Upgrade to be activated on the server previously with either the factory-installed feature AVUT or field upgrade 4L47A09132.

Light path diagnostics

All SR650 server models include basic light path diagnostics, which provides the system LEDs on the front of the server (see [Components and connectors](#)) and the LEDs near the monitored components (for example, the DIMM error LEDs on the system board).

Lenovo XClarity Provisioning Manager

Lenovo XClarity Provisioning Manager is a UEFI-embedded GUI application that combines the functions of configuring system setup settings, configuring RAID, and updating applications and firmware. It also enables you to install the supported operating systems and associated device drivers, run diagnostics, and collect service data.

Lenovo XClarity Provisioning Manager has the following features:

- Automatic hardware detection
- Collecting and viewing system inventory information
- Configuring UEFI system setup settings
- Updating the system firmware
- Configuring RAID by using the RAID Setup Wizard or Advanced mode
- Installing an operating system and device drivers automatically or manually
- Running diagnostics and collecting service data

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 XClarity Essentials OneCLI**
OneCLI is a collection of server management tools that utilize 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 setting, and update system firmware and drivers.
- **Lenovo XClarity 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 XClarity 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 Administrator

Lenovo XClarity is a centralized systems management solution that helps administrators deliver infrastructure faster. This solution integrates easily with Lenovo x86 servers, RackSwitch switches, and DS Series storage, providing automated agent-less discovery, monitoring, firmware updates, configuration management, and bare metal deployment of operating systems and hypervisors across multiple servers.

Lenovo XClarity Administrator is an optional software component for the SR650 server which can be downloaded and used at no charge to discover and monitor the SR650 and manage firmware upgrades for them.

If software support is required for Lenovo XClarity Administrator, or Lenovo XClarity Administrator premium features (such as configuration management and operating system deployment) are required, or both, 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 geo-specific Lenovo XClarity software license options.

Table 42. Lenovo XClarity software options

Description	Part number (NA, AP, Japan)*	Part number (EMEA, LA)**	Quantity
Lenovo XClarity Pro, per Managed Endpoint w/1 Yr SW S&S	00MT201	00MT207	1
Lenovo XClarity Pro, per Managed Endpoint w/3 Yr SW S&S	00MT202	00MT208	1
Lenovo XClarity Pro, per Managed Endpoint w/5 Yr SW S&S	00MT203	00MT209	1

* NA = North America; AP = Asia Pacific

** EMEA = Europe, Middle East, Africa; LA = Latin America

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

- Auto-discovery and monitoring of Lenovo x86 servers, RackSwitch switches, Flex System chassis, and DS Series storage 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 offers at no charge (if software support is required, a Lenovo XClarity Pro software subscription license should be ordered) two software plug-in modules, Lenovo XClarity Integrators, to manage physical infrastructure from leading external virtualization management software tools from Microsoft and VMware:

- Lenovo XClarity Integrator for Microsoft System Center
- Lenovo XClarity Integrator for VMware vCenter

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, refer to the Lenovo XClarity Integrators web page:

<http://www3.lenovo.com/us/en/data-center/software/systems-management/xclarity-integrators>

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager provides a stand-alone, web-based agent-less power management console that provides real time data and enables you to observe, plan and manage power and cooling for Lenovo servers. Using built-in intelligence, it identifies server power consumption trends and ideal power settings and performs cooling analysis so that you can define and optimize power-saving policies.

Lenovo XClarity Energy Manager offers the following capabilities:

- Monitors room, row, rack, and device levels in the data center
- Reports vital server information, such as power, temperature and resource utilization
- Monitors inlet temperature to locate hot spots, reducing the risk of data or device damage
- Provides finely-grained controls to limit platform power in compliance with IT policy
- Generates alerts when a user-defined threshold is reached

Lenovo XClarity Energy Manager is an optional software component for the SR650 server that is licensed on a per managed node basis, that is, each managed server requires a license. The 1-node Energy Manager license is included in the XClarity Controller Enterprise upgrade.

To manage systems without XClarity Controller Enterprise licenses, a node license pack should be purchased. The following table lists the geo-specific Lenovo XClarity Energy Manager software license options.

Table 43. Lenovo XClarity Energy Manager software options

Description	Part number (NA, AP, Japan)*	Part number (EMEA, LA)**	Quantity
Lenovo XClarity Energy Manager, 1 Node w/ 1 Yr S&S	01DA225	01DA228	1

* NA = North America; AP = Asia Pacific.

** EMEA = Europe, Middle East, Africa; LA = Latin America.

For more information, refer to the Lenovo XClarity Energy Manager web page:

<http://datacentersupport.lenovo.com/us/en/solutions/invo-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/invo-lcp>

Security

The SR650 server offers the following security features:

- Power-on password
- Administrator's password
- Secure firmware updates
- Onboard Trusted Platform Module (TPM) version 1.2 or 2.0 (configurable UEFI system setting)
- Trusted Cryptographic Module (TCM) (optional; PRC only)
- Nationz Trusted Platform Module v2.0 (optional; PRC only)
- Lockable front bezel (optional)
- Security Key Lifecycle Manager (SKLM) encryption key management for SEDs - FoD upgrade (optional)
- Lenovo Business Vantage security software (optional; PRC only)

The following table lists the security options that are available for the SR650 server.

Table 44. Security options

Description	Part number	Feature code	Maximum quantity
Lockable front bezel			
ThinkSystem 2U Security Bezel	7Z17A02580	AURX	1
Trusted Cryptographic Module (PRC only)			
ThinkSystem Trusted Cryptographic Module	None*	AVKE	1
Trusted Platform Module (PRC only)			
ThinkSystem Nationz Trusted Platform Module v2.0	None*	B22N	1
Security Key Lifecycle Manager - FoD (United States, Canada, Asia Pacific, and Japan)			
SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S	00D9998	A5U1	1
SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S	00D9999	AS6C	1
Security Key Lifecycle Manager - FoD (Latin America, Europe, Middle East, and Africa)			
SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S	00FP648	A5U1	1
SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S	00FP649	AS6C	1

* Factory-installed only; no field upgrade.

Lenovo Business Vantage is a security software tool suite (available only in PRC) designed to work with the Trusted Cryptographic Module (TCM) adapter for enhanced security, to keep user data safe, and to erase confidential data completely from a hard disk drive.

Lenovo Business Vantage provides the following features:

- Encrypts files to ensure data safety by using the TCM.
- Erases confidential data from a hard disk.
- Prohibits unauthorized access to the USB port of devices.
- Encrypts files to ensure data security on a USB storage device.

For more information, refer to the Lenovo Business Vantage web page:

<http://support.lenovo.com.cn/lenovo/wsi/es/es.html>

Rack installation

The following table lists the rack installation options that are available for the SR650 server.

Table 45. Rack installation options

Description	Part number	Feature code	Maximum quantity
4-post rail kits			
ThinkSystem Tool-less Slide Rail	7M27A05702	AXCA	1
ThinkSystem Tool-less Slide Rail Kit with 2U CMA	7M27A05700	AXCH	1
ThinkSystem Screw-in Slide Rail	4M17A07274	AXFN	1
ThinkSystem Screw-in Slide Rail Kit with 2U CMA	4M17A07280	B0TD	1
ThinkSystem Tool-less Friction Rail	4M17A07273	AXFM	1
Cable management arm (CMA) upgrade			
ThinkSystem 2U CMA Upgrade Kit for Tool-less Slide Rail	7M27A05698	None^	1*
ThinkSystem 2U CMA Upgrade Kit for Screw-in Slide Rail	4M17A07275	AXFU	1**
Front VGA port			
ThinkSystem SR550/SR590/SR650 EIA Latch w/ VGA Upgrade Kit	7Z17A02578	AUS8	1

^ Field upgrade only.

* The CMA Upgrade Kit for Tool-less Slide Rail is supported with the Tool-less Slide Rail (7M27A05702) only.

** The CMA Upgrade Kit for Screw-in Slide Rail is supported with the Screw-in Slide Rail (4M17A07274) only.

The following table summarizes the rail kit features and specifications.

Table 46. Rail kit features and specifications summary

Feature	Tool-less Slide Rail		Screw-in Slide Rail		Tool-less Friction Rail
	Without CMA	With CMA	Without CMA	With CMA	
Part number	7M27A05702	7M27A05700	4M17A07274	4M17A07280	4M17A07273
CMA	7M27A05698	Included	4M17A07275	Included	No support
Rail length	730 mm (28.74 in.)	807 mm (31.8 in.)	836.8 mm (32.9 in.)	836.8 mm (32.9 in.)	728.1 mm (28.7 in.)
Rail type	Full-out slide (ball bearing)		Full-out slide (ball bearing)		Half-out slide (friction)
Tool-less installation	Yes		No		Yes
In-rack server maintenance	Yes		Yes		No
1U PDU support	Yes		Yes		Yes
0U PDU support	Limited*		Limited*		Limited**
Rack type	IBM and Lenovo 4-post, IEC standard-compliant		IBM and Lenovo 4-post, IEC standard-compliant		IBM and Lenovo 4-post, IEC standard-compliant
Mounting holes	Square or round		Square, round, or threaded		Square or round
Mounting flange thickness	2 mm (0.08 in.) – 3.3 mm (0.13 in.)		2 mm (0.08 in.) – 3.3 mm (0.13 in.)		2 mm (0.08 in.) – 3.3 mm (0.13 in.)
Distance between front and rear mounting flanges^	609.6 mm (24 in.) – 863.6 mm (34 in.)		609.6 mm (24 in.) – 812.8 mm (32 in.)		609.6 mm (24 in.) – 863.6 mm (34 in.)

* If a 0U PDU is used, the rack cabinet must be at least 1100 mm (43.31 in.) deep if no CMA is used, or at least 1200 mm (47.24 in.) deep if a CMA is used.

** If a 0U PDU used, the rack must be at least 1000 mm (39.37 in.) deep.

^ Measured when mounted on the rack, from the front surface of the front mounting flange to the rear most point of the rail.

Operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Microsoft Windows Server, version 1709
- Microsoft Windows Server, version 1803
- Red Hat Enterprise Linux 6.10 x64
- Red Hat Enterprise Linux 6.9 x64
- Red Hat Enterprise Linux 7.3
- Red Hat Enterprise Linux 7.4
- Red Hat Enterprise Linux 7.5
- Red Hat Enterprise Linux 7.6
- Red Hat Enterprise Linux 7.7
- Red Hat Enterprise Linux 7.8
- Red Hat Enterprise Linux 7.9
- Red Hat Enterprise Linux 8.0
- Red Hat Enterprise Linux 8.1
- Red Hat Enterprise Linux 8.2
- Red Hat Enterprise Linux 8.3
- SUSE Linux Enterprise Server 11 Xen x64 SP4
- SUSE Linux Enterprise Server 11 x64 SP4
- SUSE Linux Enterprise Server 12 SP2
- SUSE Linux Enterprise Server 12 SP3
- SUSE Linux Enterprise Server 12 SP4
- SUSE Linux Enterprise Server 12 SP5
- SUSE Linux Enterprise Server 12 Xen SP2
- SUSE Linux Enterprise Server 12 Xen SP3
- SUSE Linux Enterprise Server 12 Xen SP4
- SUSE Linux Enterprise Server 12 Xen SP5
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Server 15 SP1
- SUSE Linux Enterprise Server 15 SP2
- SUSE Linux Enterprise Server 15 Xen
- SUSE Linux Enterprise Server 15 Xen SP1
- SUSE Linux Enterprise Server 15 Xen SP2
- VMware ESXi 6.0 U3
- VMware ESXi 6.5
- VMware ESXi 6.5 U1
- VMware ESXi 6.5 U2
- VMware ESXi 6.5 U3
- VMware ESXi 6.7
- VMware ESXi 6.7 U1
- VMware ESXi 6.7 U2
- VMware ESXi 6.7 U3
- VMware ESXi 7.0
- VMware ESXi 7.0 U1

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=sr650-7x05-7x06>

For configure-to-order configurations, the server can be preloaded with VMware ESXi installed on M.2 cards. Ordering information is listed in the following table.

Table 47. VMware ESXi preload

Part number	Feature code	Description
CTO only	AXFS	VMware ESXi 6.0 U3 (factory installed)
CTO only	AXFT	VMware ESXi 6.5 U1 (factory installed)
CTO only	B3VW	VMware ESXi 6.5 U2 (Factory Installed)
CTO only	B6U0	VMware ESXi 6.5 U3 (factory installed)
CTO only	B3VX	VMware ESXi 6.7 (Factory Installed)
CTO only	B4XA	VMware ESXi 6.7 U1 (Factory Installed)
CTO only	B6U1	VMware ESXi 6.7 U2 (factory installed)
CTO only	B88T	VMware ESXi 6.7 U3 (factory installed)
CTO only	BBZG	VMware ESXi 7.0 (Factory Installed)
CTO only	BE5E	VMware ESXi 7.0 U1 (Factory Installed)

Physical specifications

The SR650 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: 445 mm (17.5 inches)
- Height: 87 mm (3.4 inches)
- Depth: 764 mm (30.1 inches)

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

Table 48. Detailed dimensions

Dimension	Description
482 mm	X _a = Width, to the outsides of the front EIA flanges
435 mm	X _b = Width, to the rack rail mating surfaces
445 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
698 mm	Z _a = Depth, from the rack flange mating surface to the rearmost I/O port surface
730 mm	Z _b = Depth, from the rack flange mating surface to the rearmost feature of the chassis body
727 mm	Z _c = Depth, from the rack flange mating surface to the rearmost feature such as power supply handle
34 mm	Z _d = Depth, from the forwardmost feature on front of EIA flange to the rack flange mating surface
47 mm	Z _e = Depth, from the front of security bezel (if applicable) or forwardmost feature to the rack flange mating surface

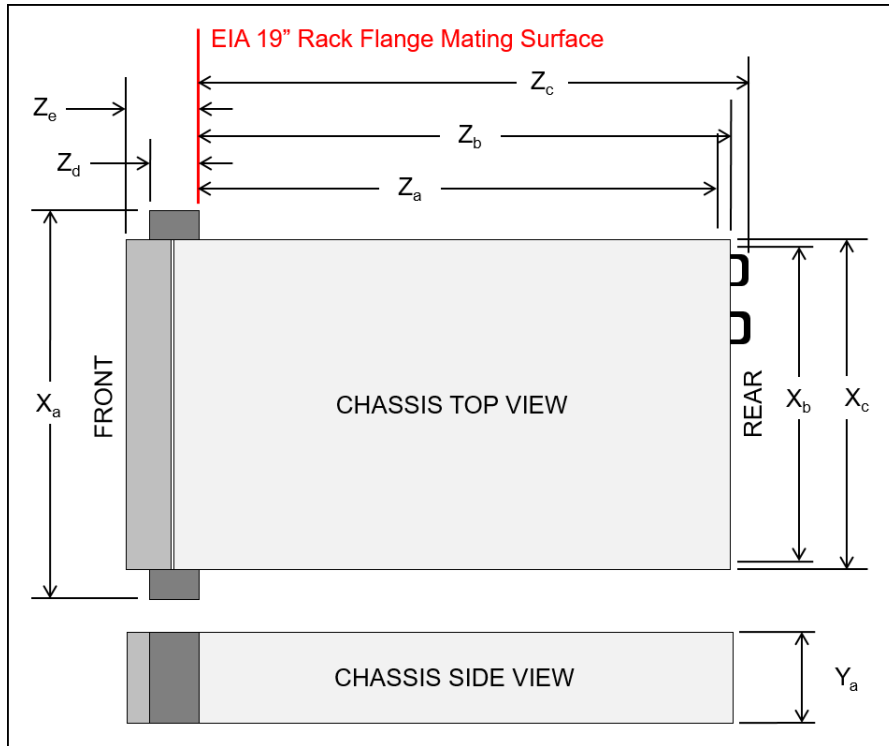


Figure 12. Server dimensions

The shipping dimensions (cardboard packaging) of the SR650 are as follows:

- Width: 592 mm (23.3 inches)
- Height: 282 mm (11.1 inches)
- Depth: 992 mm (39.1 inches)

The server has the following weight:

- Minimum configuration: 19 kg (41.9 lb)
- Maximum configuration: 32 kg (70.5 lb)

Operating environment

The SR650 server complies with ASHRAE class A2 specifications. The server performance might be impacted when the operating temperature is outside the ASHRAE A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications.

To comply with ASHRAE class A3 and class A4 specifications, the server models must meet the following hardware configuration requirements at the same time:

- Two power supplies installed
- NVMe drives not installed
- M.2 5100 or 5300 SSDs not installed
- QLogic QL41134 PCIe 10Gb 4-Port Base-T Ethernet Adapter not installed
- Mellanox ConnectX-6 and Innova-2 FPGA adapters not installed
- NVMe PCIe flash adapters not installed
- Graphic processing units (GPUs) not installed
- Processors with TDP more than or equal to 150 W not installed
- Intel Xeon 4112, 5122, 6126, 6128, 6132, 6134, 6134M, and 8156 processors not installed in the following models:
 - Models with 24x 2.5-inch drive bays
 - Models with 12x 3.5-inch drive bays

The SR650 server is supported in the following environment:

- Air temperature:
 - Operating:
 - ASHRAE Class A4: 5 °C - 45 °C (41 °F - 113 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 125-m (410-ft) increase in altitude
 - ASHRAE Class A3: 5 °C - 40 °C (41 °F - 104 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 175-m (574-ft) increase in altitude
 - ASHRAE Class A2: 10 °C - 35 °C (50 °F - 95 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 300-m (984-ft) increase in altitude
 - Non-operating: 5 °C - 45 °C (41 °F - 113 °F)
 - Storage: -40 °C - +60 °C (-40 °F - 140 °F)
- Maximum altitude: 3,050 m (10,000 ft)
- Humidity:
 - Operating:
 - ASHRAE Class A4: 8% - 90% (non-condensing); maximum dew point: 24 °C (75 °F)
 - ASHRAE Class A3: 8% - 85% (non-condensing); maximum dew point: 24 °C (75 °F)
 - ASHRAE Class A2: 8% - 80% (non-condensing); maximum dew point: 21 °C (70 °F)
 - Storage: 8% - 90% (non-condensing)
- Electrical:
 - 100 - 127 (nominal) V AC; 50 Hz / 60 Hz
 - 200 - 240 (nominal) V AC; 50 Hz / 60 Hz
 - 180 - 300 V DC (HVDC; supported in PRC only)
- Acoustics:
 - Minimum configuration:
 - Operating: 5.1 bels
 - Idle: 4.9 bels
 - Maximum configuration:
 - Operating: 6.2 bels
 - Idle: 6.1 bels
- Vibration:
 - Operating: 0.21 G rms at 5 Hz to 500 Hz for 15 minutes across 3 axes
 - Non-operating: 1.04 G rms at 2 Hz to 200 Hz for 15 minutes across 6 surfaces
- Shock:
 - Operating: 15 G for 3 milliseconds in each direction (positive and negative X, Y, and Z axes)
 - Non-operating:
 - 12 kg - 22 kg: 50 G for 152 in./sec velocity change across 6 surfaces
 - 23 kg - 31 kg: 35 G for 152 in./sec velocity change across 6 surfaces

The following table lists the maximum system power load, rated inlet current, and system heat output based on the power supply and source voltage.

Table 49. Rated system power, inlet current, and system heat output

Power supply	Source voltage	Maximum power load per system (two power supplies)	Rated current per inlet	System heat output
550 W Platinum	100 - 127 V AC	722 W	6.2 A	2463 BTU/hour
	200 - 240 V AC	704 W	3 A	2402 BTU/hour
	180 - 300 V DC	702 W	2.5 A	2395 BTU/hour
750 W Platinum	100 - 127 V AC	984 W	8.4 A	3357 BTU/hour
	200 - 240 V AC	958 W	4.1 A	3269 BTU/hour
	180 - 300 V DC	958 W	3.5 A	3269 BTU/hour
750 W Titanium	200 - 240 V AC	949 W	4.1 A	3238 BTU/hour
	180 - 300 V DC	948 W	3.5 A	3235 BTU/hour
1100W Platinum	100 - 127 V AC	1382 W	12 A	4715 BTU/hour
	200 - 240 V AC	1408 W	6 A	4804 BTU/hour
	180 - 300 V DC	1408 W	5.1 A	4804 BTU/hour
1600 W Platinum	200 - 240 V AC	2068 W	8.7 A	7056 BTU/hour
	180 - 300 V DC	2024 W	7.3 A	6906 BTU/hour

Warranty and support

The SR650 server has a one-year (7X05) or three-year (Machine Type 7X06) 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 countries). Bundled with YourDrive YourData.
- **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select countries). 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 your 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://lenovocator.com/>

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

- Lenovo Statement of Limited Warranty for Data Center Group (DCG) 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 countries. For more information, go to <https://www.lenovo.com/systems/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 SR650 server conforms to the following regulations:

- United States FCC Part 15, Class A
- Canada ICES-003/NMB-03, Class A
- UL/CSA 60950-1
- Mexico NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22, Class A
- China CCC GB4943.1, GB9254 Class A, GB17625.1
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- Korea KN22, Class A; KN24
- Russia/GOST ME01; IEC-60950-1; GOST R 51318.22, 51318.24, 51317.3.2, and 51317.3.3
- IEC 60950-1 (CB Certificate and CB Test Report)
- Europe CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A
- Germany TUV-GS (EN60950-1 /IEC60950-1,EK1-ITB2000)
- Reduction of Hazardous Substances (ROHS)
- Energy Star 3.0 (excluding configurations with Bronze 3104, Silver 4112, Gold 5122, or Platinum 8156 processors)

Note: For more information on the Energy Star 3.0 certification, refer to the Energy Star 3.0 Certifications for ThinkSystem Servers publication:

<http://lenovopress.com/lp1230>

External drive enclosures

The server supports attachment to external drive enclosures using a RAID controller with external ports or a SAS host bus adapter. Adapters supported by the server are listed in the [SAS adapters for external storage](#) section.

Note: Information provided in this section is for ordering reference purposes only. For the operating system and adapter support details, refer to the interoperability matrix for a particular storage enclosure that can be found on the Lenovo Data Center Support web site:

<http://datacentersupport.lenovo.com>

Table 50. External drive enclosures

Description	Part number		
	Worldwide	Japan	PRC
Lenovo Storage D1212 LFF Disk Expansion with Dual SAS IO Modules	4587A11	4587A1J	4587A1C
Lenovo Storage D1224 SFF Disk Expansion with Dual SAS IO Modules	4587A31	4587A3J	4587A3C
Lenovo Storage D3284 4TB x 84 HD Expansion Enclosure	641311F		
Lenovo Storage D3284 6TB x 84 HD Expansion Enclosure	641312F		
Lenovo Storage D3284 8TB x 84 HD Expansion Enclosure	641313F		
Lenovo Storage D3284 10TB x 84 HD Expansion Enclosure	641314F		

For details about supported drives, adapters, and cables, see the following Lenovo Press Product Guides:

- Lenovo Storage D1212 and D1224
<http://lenovopress.com/lp0512>
- Lenovo Storage D3284
<http://lenovopress.com/lp0513>

External storage systems

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

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

External backup units

The following table lists the external backup options that are offered by Lenovo.

Table 51. External backup options

Part number	Description
External RDX USB drives	
4T27A10725	ThinkSystem RDX External USB 3.0 Dock
External SAS tape backup drives	
6160S6E	IBM TS2260 Tape Drive Model H6S
6160S7E	IBM TS2270 Tape Drive Model H7S
6160S8E	IBM TS2280 Tape Drive Model H8S
External SAS tape backup autoloaders	
6171S5R	IBM TS2900 Tape Autoloader w/LTO5 HH SAS
6171S6R	IBM TS2900 Tape Autoloader w/LTO6 HH SAS
6171S7R	IBM TS2900 Tape Autoloader w/LTO7 HH SAS
External tape backup libraries	
6741A1F	IBM TS4300 3U Tape Library-Base Unit
6741A3F	IBM TS4300 3U Tape Library-Expansion Unit
Full High 8 Gb Fibre Channel for TS4300	
01KP954	LTO 8 FH Fibre Channel Drive
01KP938	LTO 7 FH Fibre Channel Drive
01KP935	LTO 6 FH Fibre Channel Drive
Half High 8 Gb Fibre Channel for TS4300	
01KP952	LTO 8 HH Fibre Channel Drive
01KP936	LTO 7 HH Fibre Channel Drive
01KP933	LTO 6 HH Fibre Channel Drive
Half High 6 Gb SAS for TS4300	
01KP953	LTO 8 HH SAS Drive
01KP937	LTO 7 HH SAS Drive
01KP934	LTO 6 HH SAS Drive

For more information, see the list of Product Guides in the Backup units category:
<https://lenovopress.com/servers/options/backup>

Fibre Channel SAN switches

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

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

Rack cabinets

The following table lists the supported rack cabinets.

Table 52. Rack cabinets

Part number	Description
7D2B0001WW / 7D2N0001WW	12U 1200mm Deep Micro Datacenter Rack
7D2C0001WW / 7D2P0001WW	18U 1200mm Deep Micro Datacenter Rack
93072RX	25U Standard Rack
93072PX	25U Static S2 Standard Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93084EX	42U Enterprise Expansion Rack
93084PX	42U Enterprise Rack
93074RX	42U Standard Rack

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, keyboards, and KVM switches.

Table 53. Console keyboards

Part number	Description
Console keyboards	
7ZB7A05469	ThinkSystem Keyboard w/ Int. Pointing Device USB - Arabic 253 RoHS v2
7ZB7A05468	ThinkSystem Keyboard w/ Int. Pointing Device USB - Belg/UK 120 RoHS v2
7ZB7A05206	ThinkSystem Keyboard w/ Int. Pointing Device USB - Czech 489 RoHS v2
7ZB7A05207	ThinkSystem Keyboard w/ Int. Pointing Device USB - Danish 159 RoHS v2
7ZB7A05208	ThinkSystem Keyboard w/ Int. Pointing Device USB - Dutch 143 RoHS v2
7ZB7A05210	ThinkSystem Keyboard w/ Int. Pointing Device USB - Fr/Canada 445 RoHS v2
7ZB7A05209	ThinkSystem Keyboard w/ Int. Pointing Device USB - French 189 RoHS v2
7ZB7A05211	ThinkSystem Keyboard w/ Int. Pointing Device USB - German 129 RoHS v2
7ZB7A05212	ThinkSystem Keyboard w/ Int. Pointing Device USB - Greek 219 RoHS v2
7ZB7A05213	ThinkSystem Keyboard w/ Int. Pointing Device USB - Hebrew 212 RoHS v2
7ZB7A05214	ThinkSystem Keyboard w/ Int. Pointing Device USB - Hungarian 208 RoHS v2
7ZB7A05215	ThinkSystem Keyboard w/ Int. Pointing Device USB - Italian 141 RoHS v2
7ZB7A05216	ThinkSystem Keyboard w/ Int. Pointing Device USB - Japanese 194 RoHS v2

Part number	Description
7ZB7A05217	ThinkSystem Keyboard w/ Int. Pointing Device USB - Korean 413 RoHS v2
7ZB7A05218	ThinkSystem Keyboard w/ Int. Pointing Device USB - LA Span 171 RoHS v2
7ZB7A05219	ThinkSystem Keyboard w/ Int. Pointing Device USB - Norwegian 155 RoHS v2
7ZB7A05220	ThinkSystem Keyboard w/ Int. Pointing Device USB - Polish 214 RoHS v2
7ZB7A05221	ThinkSystem Keyboard w/ Int. Pointing Device USB - Portuguese 163 RoHS v2
7ZB7A05222	ThinkSystem Keyboard w/ Int. Pointing Device USB - Russian 441 RoHS v2
7ZB7A05223	ThinkSystem Keyboard w/ Int. Pointing Device USB - Slovak 245 RoHS v2
7ZB7A05231	ThinkSystem Keyboard w/ Int. Pointing Device USB - Slovenian 234 RoHS v2
7ZB7A05224	ThinkSystem Keyboard w/ Int. Pointing Device USB - Spanish 172 RoHS v2
7ZB7A05225	ThinkSystem Keyboard w/ Int. Pointing Device USB - Swed/Finn 153 RoHS v2
7ZB7A05226	ThinkSystem Keyboard w/ Int. Pointing Device USB - Swiss F/G 150 RoHS v2
7ZB7A05227	ThinkSystem Keyboard w/ Int. Pointing Device USB - Thai 191 RoHS v2
7ZB7A05467	ThinkSystem Keyboard w/ Int. Pointing Device USB - Trad Chinese/US 467 RoHS v2
7ZB7A05228	ThinkSystem Keyboard w/ Int. Pointing Device USB - Turkish 179 RoHS v2
7ZB7A05229	ThinkSystem Keyboard w/ Int. Pointing Device USB - UK Eng 166 RoHS v2
7ZB7A05470	ThinkSystem Keyboard w/ Int. Pointing Device USB - US Eng 103P RoHS v2
7ZB7A05230	ThinkSystem Keyboard w/ Int. Pointing Device USB - US Euro 103P RoHS v2
ThinkSystem Digital and Analog KVM Console switches and cables	
1754D1T	ThinkSystem Digital 2x1x16 KVM Switch (DVI video output port)
1754A1T	ThinkSystem Analog 1x8 KVM Switch (DVI video output port)
4X97A11108	ThinkSystem VGA to DVI Conversion Cable
4X97A11109	ThinkSystem Single-USB Conversion Cable for Digital KVM
4X97A11107	ThinkSystem Dual-USB Conversion Cable for Digital KVM
4X97A11106	ThinkSystem USB Conversion Cable for Analog KVM
GCM and LCM Console switches and cables	
1754D2X	Global 4x2x32 Console Manager (GCM32)
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)
1754A1X	Local 1x8 Console Manager (LCM8)
43V6147	Single Cable USB Conversion Option (UCO)
39M2895	USB Conversion Option (4 Pack UCO)
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>

Power distribution units

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

Table 54. Power distribution units

Part number	Description
0U Basic PDUs	
00YJ776	0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord
00YJ777	0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord
00YJ778	0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord
00YJ779	0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord
Switched and Monitored PDUs	
00YJ780	0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord
00YJ781	0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord
00YJ782	0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord
00YJ783	0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord
46M4003	1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
46M4004	1U 12 C13 Switched and Monitored DPI PDU (without line cord)
46M4005	1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
71762NX	Ultra Density Enterprise C19/C13 PDU Module (without line cord)
71763NU	Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
39M2816	DPI C13 Enterprise PDU+ (without line cord)
39Y8941	DPI Single Phase C13 Enterprise PDU (without line cord)
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
39Y8948	DPI Single Phase C19 Enterprise PDU (without line cord)
39Y8923	DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord
Front-end PDUs (3x IEC 320 C19 outlets)	
39Y8938	DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord
39Y8939	DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord
39Y8934	DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8940	DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8935	DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
NEMA PDUs (6x NEMA 5-15R outlets)	
39Y8905	DPI 100-127V PDU with Fixed NEMA L5-15P line cord
Line cords for PDUs that ship without a line cord	
40K9611	DPI 32a Line Cord (IEC 309 3P+N+G)
40K9612	DPI 32a Line Cord (IEC 309 P+N+G)
40K9613	DPI 63a Cord (IEC 309 P+N+G)
40K9614	DPI 30a Line Cord (NEMA L6-30P)
40K9615	DPI 60a Cord (IEC 309 2P+G)
40K9617	DPI Australian/NZ 3112 Line Cord
40K9618	DPI Korean 8305 Line Cord

For more information, see the Lenovo Press documents in the PDU category:

<https://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

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

Table 55. Uninterruptible power supply units

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

† Only available in China and countries in the Asia Pacific region.

For more information, see the list of Product Guides in the UPS category:

<https://lenovopress.com/servers/options/ups>

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

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

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

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

Related publications and links

For more information, see these resources:

- ThinkSystem SR650 product page
<https://www.lenovo.com/us/en/data-center/servers/racks/ThinkSystem-SR650/p/77XX7SR650>
- Datasheet for the ThinkSystem SR650:
<https://lenovopress.com/ds0032-lenovo-thinksystem-sr650>
- 3D Interactive Tour of the ThinkSystem SR650:
<https://lenovopress.com/lp0673-3d-tour-thinksystem-sr650>
- Walkthrough Video for the ThinkSystem SR650:
<https://lenovopress.com/lp0700-thinksystem-sr650-server-video-walkthrough>
- User Manuals for the ThinkSystem SR650:
https://thinksystem.lenovofiles.com/help/topic/7X05/introduction.html?cp=4_9
 - Quick Start Guide
 - Setup Guide
 - Rack Installation Guides
 - Maintenance Manual
 - Messages and Codes Reference
 - UEFI Manual
- Lenovo Data Center Support Downloads - ThinkSystem SR650:
<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr650/7x05/downloads>
<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr650/7x06/downloads>
- Lenovo Hardware Installation & Removal Videos on the ThinkSystem SR650:
 - YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-A25P7vBoGa_wn7D7XTgDS_
 - Youku: https://list.youku.com/albumlist/show/id_50483444
- Lenovo Data Center Solution Configurator (DCSC):
<http://dcsc.lenovo.com>

Related product families

Product families related to this document are the following:

- [2-Socket Rack Servers](#)
- [ThinkSystem SR650 Server](#)

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