

# ThinkSystem Intel P4510 and P4511 Entry NVMe PCIe 3.0 x4 SSDs

## Product Guide

The ThinkSystem Intel P4510 and P4511 Entry NVMe SSDs are general-purpose yet high-performance drives with a PCIe 3.0 x4 interface. They are designed for greater performance and endurance in a cost-effective design, and to support a broader set of workloads.

The Intel P4510 Series SSDs are based on Intel-developed controller, firmware, and 64-layer TLC Intel 3D NAND technology. Rigorous qualification and compatibility testing by Lenovo ensures a highly reliable SSD.



Figure 1. ThinkSystem Intel P4510 Entry NVMe PCIe 3.0 x4 SSDs

### Did You Know?

NVMe (Non-Volatile Memory Express) is a technology that overcomes SAS/SATA SSD performance limitations by optimizing hardware and software to take full advantage of flash technology. Intel Xeon processors efficiently transfer data in fewer clock cycles with the NVMe optimized software stack compared to the legacy Advance Host Controller Interface (AHCI) stack, thereby reducing latency and overhead. These SSDs connect directly to the processor via the PCIe bus, further reducing latency and TCO.

## Part number information

The following table lists the ordering part numbers and feature codes for the SSDs.

Table 1. Ordering information

Part number	Feature	Description
2.5-inch hot-swap drives		
4XB7A10202	B58F	ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD
4XB7A10204	B58G	ThinkSystem 2.5" U.2 P4510 2.0TB Read Intensive NVMe PCIe 3.0 x4 HS SSD
4XB7A10205	B58H	ThinkSystem U.2 Intel P4510 4.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD
EDSFF hot-swap drives		
4XB7A17198	BA1E	ThinkSystem E1.S P4511 4.0TB Read Intensive NVMe PCIe 3.0 x4 HS SSD

The part numbers for the drives include the following items:

- One drive with a hot-swap tray attached
- Publication package

## EDSFF form factor

Some members of the ThinkSystem server family now support EDSFF (Enterprise & Datacenter SSD Form Factor) drives with the E1.S (short) form factor. The ThinkSystem SR630 V2, for example, supports 16 hot-swap EDSFF drives installed in the space of eight 2.5-inch drives.

EDSFF E1.S drives are a new type of NVMe solid-state drive and have the following characteristics:

- NVMe SSD with PCIe 4.0 x4 host interface
- Hot-swap drive tray
- Installs vertically or horizontally depending on the server design
- E1.S form factor defined by SNIA specification SFF-TA-1006
- 112 mm (4.4 inches) long x 32 mm (1.2 inches) tall

A single Intel P4511 EDSFF drive with a ThinkSystem hot-swap tray is shown in the following figure.



Figure 2. EDSFF E1.S form factor drive with hot-swap tray

## Features

Non-Volatile Memory Express (NVMe) is new PCIe 3.0 high performance SSD technology that provides high I/O throughput and low latency. NVMe interfaces remove SAS/SATA bottlenecks and unleash all of the capabilities of contemporary NAND flash memory. Each NVMe PCI SSD has direct PCIe 3.0 x4 connection, which provides at least 2x more bandwidth and 2x less latency than SATA/SAS-based SSD solutions. NVMe drives are also optimized for heavy multi-threaded workloads by using internal parallelism and many other improvements, such as enlarged I/O queues.

The P4510 drives provide performance, quality of service (QoS) and capacity improvements over the previous generation P4500 drives. With the P4510 compared to the P4500, applications can achieve up to 35% faster write rate and up to a 4x reduction in service time at a QoS metric of 99.99% availability for random access workloads.

The Intel P4510 NVMe drives have the following key characteristics:

- PCIe 3.0 connection for each NVMe drive
- Ultra-low I/O latency, with a read latency as low as of 9  $\mu$ s and write latency as low as 11  $\mu$ s
- Suitable for read-intensive workloads
- Available in capacities up to 8 TB
- Variable sector size and end-to-end data-path protection
- Enhanced power-loss data protection
- Thermal throttling and monitoring
- SMART health reporting

The key metric for solid state drives is their endurance (life expectancy). SSDs have a huge, but finite, number of program/erase (P/E) cycles, which determines how long the drives can perform write operations and thus their life expectancy. Performance SSDs have better endurance than Mainstream SSDs, which in turn have better endurance than Entry SSDs.

SSD write endurance is typically measured by the number of program/erase cycles that the drive can incur over its lifetime, which is listed as TBW in the device specification. The TBW value that is assigned to a solid-state device is the total bytes of written data that a drive can be guaranteed to complete. Reaching this limit does not cause the drive to immediately fail; the TBW simply denotes the maximum number of writes that can be guaranteed.

A solid-state device does not fail upon reaching the specified TBW, but at some point after surpassing the TBW value (and based on manufacturing variance margins), the drive reaches the end-of-life point, at which time the drive goes into read-only mode. Because of such behavior, careful planning must be done to use SSDs in the application environments to ensure that the TBW of the drive is not exceeded before the required life expectancy.

For example, the P4510 4.0 TB drive has an endurance of 6,300 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 3,452 GB of writes per day, which is equivalent to 0.85 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 5,753 GB of writes per day, which is equivalent to 1.4 full drive writes per day.

## Technical specifications

The following table present technical specifications for the Intel P4510 drives.

Table 2. Technical specifications

Feature	1.0 TB P4510 drive	2.0 TB P4510 drive	4.0 TB P4510 drive	4.0 TB P4511 drive	8.0 TB P4510 drive
Form factor	2.5-inch	2.5-inch	2.5-inch	EDSFF E1.S	2.5-inch
Interface	PCIe 3.0 x4	PCIe 3.0 x4	PCIe 3.0 x4	PCIe 3.0 x4	PCIe 3.0 x4
SED encryption	None	None	None	None	None
Capacity	1.0 TB	2.0 TB	4.0 TB	4.0 TB	8.0 TB
Endurance (total bytes written)	1.92 PB	2.61 PB	6.3 PB	3.33 PB	13.88 PB
Endurance (drive writes per day over 5 years)	1.0 DWPD	0.7 DWPD	0.85 DWPD	0.5 DWPD	0.90 DWPD
Data reliability	< 1 in 10 <sup>17</sup> bits read	< 1 in 10 <sup>17</sup> bits read	< 1 in 10 <sup>17</sup> bits read	< 1 in 10 <sup>17</sup> bits read	< 1 in 10 <sup>17</sup> bits read
MTBF, hours	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
IOPS read (4 KB blocks)	465,000	637,000	636,500	610,200	641,800
IOPS write (4 KB blocks)	70,000	81,500	111,500	75,000	134,500
Sequential read rate	2.85 GBps	3.2 GBps	3.0 GBps	2.8 GBps	3.2 GBps
Sequential write rate	1.1 GBps	2.0 GBps	2.9 GBps	2.4 GBps	3.0 GBps
Read access latency sequential*	10 µs	10 µs	9 µs	12 µs	9 µs
Write access latency sequential*	12 µs	12 µs	11 µs	14 µs	12 µs
Read access latency random*	77 µs	77 µs	77 µs		77 µs
Write access latency random*	18 µs	18 µs	18 µs		18 µs
Shock, operating	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms	1,000 G (Max) at 0.5 ms
Vibration, max, operating	2.17 G <sub>RMS</sub> (5-700 Hz)	2.17 G <sub>RMS</sub> (5-700 Hz)	2.17 G <sub>RMS</sub> (5-700 Hz)	2.17 G <sub>RMS</sub> (5-700 Hz)	2.17 G <sub>RMS</sub> (5-700 Hz)
Average power (Active Read / Active Write)	10 / 10 W	10 / 12 W	10 / 14 W	12.5 W	10 / 16 W

\* Latency measured using 4 KB transfer size with queue depth = 1 on a random workload.

## Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 2)

Part Number	Description	Edge		1S Intel V2		2S Intel V2				AMD				Dense V2			4S V2	8S			
		SE350 (7Z46 / 7D1X)	SE450 (7D8T)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)	SR670 V2 (7Z22 / 7Z23)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)
<b>2.5-inch hot-swap drives</b>																					
4XB7A10202	ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
4XB7A10205	ThinkSystem U.2 Intel P4510 4.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
4XB7A08513	ThinkSystem U.2 Intel P4510 8.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y

Table 4. Server support (Part 2 of 2)

Part Number	Description	1S Intel V1				2S Intel V1						Dense V1				4S V1					
		ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)	ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	
<b>2.5-inch hot-swap drives</b>																					
4XB7A10202	ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	Y	Y	N	N	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y
4XB7A10205	ThinkSystem U.2 Intel P4510 4.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	N	Y	N	N	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y
4XB7A08513	ThinkSystem U.2 Intel P4510 8.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N

## Operating system support

The drives support the following operating systems:

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

Table 5. Operating system support for ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD, 4XB7A10202 (Part 1 of 2)

Operating systems	SR250	SR850 V2	SR860 V2	SR635	SR645	SR655	SR665	SD530 (Gen 2)	SN550 (Gen 2)	SN850 (Gen 2)	SR570 (Gen 2)	SR590 (Gen 2)	SR630 (Gen 2)	SR650 (Gen 2)	SR850 (Gen 2)	SR850P	SR860 (Gen 2)	SR950 (Gen 2)	ST550 (Gen 2)
Microsoft Windows 10	N	N	N	N	N	Y <sup>22</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows 11	N	N	N	N	N	Y <sup>22</sup>	N	N	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows Server 2012 R2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows Server 2016	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server version 1709	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows Server version 1803	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 6.10	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 6.9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 7.3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 7.4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 7.5	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 7.6	N	N	N	Y <sup>1</sup>	Y <sup>15</sup>	Y <sup>23</sup>	Y <sup>27</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.7	Y	N	N	Y <sup>2</sup>	Y <sup>16</sup>	Y <sup>16</sup>	Y <sup>16</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	Y	N	N	Y <sup>3</sup>	Y <sup>3</sup>	Y <sup>3</sup>	Y <sup>3</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	Y	Y	Y	Y <sup>4</sup>	Y <sup>17</sup>	Y <sup>17</sup>	Y <sup>17</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.0	Y	N	N	Y <sup>5</sup>	N	Y <sup>24</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.1	Y	N	N	Y <sup>6</sup>	Y <sup>18</sup>	Y <sup>18</sup>	Y <sup>18</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.2	Y	Y	Y	Y <sup>7</sup>	Y <sup>19</sup>	Y <sup>19</sup>	Y <sup>19</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 SP4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 12 SP2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 12 SP2 with Xen	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 12 SP3	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N

Operating systems	SR250	SR850 V2	SR860 V2	SR635	SR645	SR655	SR665	SD530 (Gen 2)	SN550 (Gen 2)	SN850 (Gen 2)	SR570 (Gen 2)	SR590 (Gen 2)	SR630 (Gen 2)	SR650 (Gen 2)	SR850 (Gen 2)	SR850P	SR860 (Gen 2)	SR950 (Gen 2)	ST550 (Gen 2)
SUSE Linux Enterprise Server 12 SP3 with Xen	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
SUSE Linux Enterprise Server 12 SP4	N	N	N	Y <sup>8</sup>	N	Y <sup>8</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4 with Xen	N	N	N	Y <sup>9</sup>	N	Y <sup>9</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	Y	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1	Y	N	N	Y <sup>10</sup>	Y <sup>10</sup>	Y <sup>10</sup>	Y <sup>10</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1 with Xen	Y	N	N	Y <sup>11</sup>	Y <sup>20</sup>	Y <sup>20</sup>	Y <sup>20</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 with Xen	Y	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 22.04 LTS	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	N
VMware vSphere Hypervisor (ESXi) 6.5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.5 U3	Y	N	N	Y <sup>12</sup>	N	Y <sup>25</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.7 U2	Y	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	N	N	Y <sup>13</sup>	Y <sup>21</sup>	Y <sup>21</sup>	Y <sup>21</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	Y	Y	Y <sup>14</sup>	Y	Y <sup>26</sup>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

<sup>1</sup> RHEL 7.6 Not support with EPYC 7003 processors.

- <sup>2</sup> RHEL7.7 Not support with EPYC 7003 processors.
- <sup>3</sup> RHEL7.8 Not support with EPYC 7003 processors
- <sup>4</sup> RHEL7.9 Not support with EPYC 7003 processors.
- <sup>5</sup> RHEL8.0 Not support with EPYC 7003 processors.
- <sup>6</sup> RHEL8.1 Not support with EPYC 7003 processors.
- <sup>7</sup> RHEL8.2 Not support with EPYC 7003 processors.
- <sup>8</sup> SLES12 SP4 Not support with EPYC 7003 processors
- <sup>9</sup> SLES12 SP4 Xen Not support with EPYC 7003 processors
- <sup>10</sup> SLES15 SP1 Not support with EPYC 7003 processors
- <sup>11</sup> SLES15 SP1 Xen Not support with EPYC 7003 processors.
- <sup>12</sup> VMware 6.5 U3 Not support with EPYC 7003 processors.
- <sup>13</sup> VMware 7.0 Not support with EPYC 7003 processors.
- <sup>14</sup> VMware 7.0 U1 Not support with EPYC 7003 processors.
- <sup>15</sup> RHEL7.6 Not support with EPYC 7003 processors
- <sup>16</sup> RHEL7.7 Not support with EPYC 7003 processors
- <sup>17</sup> RHEL7.9 Not support with EPYC 7003 processors
- <sup>18</sup> RHEL8.1 Not support with EPYC 7003 processors
- <sup>19</sup> RHEL8.2 Not support with EPYC 7003 processors
- <sup>20</sup> SLES15 SP1 Xen Not support with EPYC 7003 processors
- <sup>21</sup> VMware 7.0 Not support with EPYC 7003 processors
- <sup>22</sup> ISG will not sell/preload this OS, but compatibility and cert only.
- <sup>23</sup> RHEL 7.6 Not support with EPYC 7003 processors
- <sup>24</sup> RHEL8.0 Not support with EPYC 7003 processors
- <sup>25</sup> VMware 6.5 U3 Not support with EPYC 7003 processors
- <sup>26</sup> VMware 7.0 U1 Not support with EPYC 7003 processors
- <sup>27</sup> RHEL7.6 Not support with EPYC 7003 processors.

Table 6. Operating system support for ThinkSystem U.2 Intel P4510 1.0TB Entry NVMe PCIe3.0 x4 Hot Swap SSD, 4XB7A10202 (Part 2 of 2)

Operating systems	SD530 (Gen 1)	SN550 (Gen 1)	SN850 (Gen 1)	SR570 (Gen 1)	SR590 (Gen 1)	SR630 (Gen 1)	SR650 (Gen 1)	SR850 (Gen 1)	SR860 (Gen 1)	SR950 (Gen 1)	ST550 (Gen 1)
Microsoft Windows 10	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows 11	N	N	N	N	N	N	N	N	N	N	N
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y



	SD530 (Gen 1)	SN550 (Gen 1)	SN850 (Gen 1)	SR570 (Gen 1)	SR590 (Gen 1)	SR630 (Gen 1)	SR650 (Gen 1)	SR850 (Gen 1)	SR860 (Gen 1)	SR950 (Gen 1)	ST550 (Gen 1)
<b>Operating systems</b>											
Microsoft Windows Server 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server version 1709	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server version 1803	Y	Y	N	N	N	Y	Y	Y	Y	Y	N
Red Hat Enterprise Linux 6.10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 6.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.3	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y
Red Hat Enterprise Linux 7.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.6	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP2	Y	N	Y	N	N	Y	Y	Y	N	Y	Y
SUSE Linux Enterprise Server 12 SP2 with Xen	Y	N	Y	N	N	Y	Y	Y	N	Y	Y
SUSE Linux Enterprise Server 12 SP3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP3 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

	SD530 (Gen 1)	SN550 (Gen 1)	SN850 (Gen 1)	SR570 (Gen 1)	SR590 (Gen 1)	SR630 (Gen 1)	SR650 (Gen 1)	SR850 (Gen 1)	SR860 (Gen 1)	SR950 (Gen 1)	ST550 (Gen 1)
<b>Operating systems</b>											
SUSE Linux Enterprise Server 15 SP3 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 22.04 LTS	N	Y	N	N	N	Y	Y	Y	Y	Y	N
VMware vSphere Hypervisor (ESXi) 6.5	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y
VMware vSphere Hypervisor (ESXi) 6.5 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

## Warranty

The SSDs carry a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a supported Lenovo server, these drives assume the system's base warranty and any warranty upgrade.

Solid State Memory cells have an intrinsic, finite number of program/erase cycles that each cell can incur. As a result, each solid state device has a maximum amount of program/erase cycles to which it can be subjected. The warranty for Lenovo solid state drives (SSDs) is limited to drives that have not reached the maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the SSD product. A drive that reaches this limit may fail to operate according to its Specifications.

## Physical specifications

The Intel P4510 drives have the following physical dimensions and weight:

- Height: 15 mm (0.6 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: up to 139 g (4.9 oz)

## Operating environment

The Intel P4510 drives are supported in the following environment:

- Temperature (operational): 0 to 70 °C (32 to 158 °F) at 0 to 3,048 m (0 to 10,000 ft)
- Relative humidity: 5 to 90% (non-condensing)
- Maximum altitude (operational): 3,048 m (10,000 ft)
- Shock: 1,000 G (Max) at 0.5 ms
- Vibration: 2.17 G<sub>RMS</sub> (5-700 Hz)

## Agency approvals

The Intel P4510 drives conform to the following regulations:

- FCC Title 47, Part 15B, Class B
- CA/CSA-CEI/IEC CISPR 22:02
- EN 55024: 1998
- EN 55022: 2006
- EN-60950-1 2nd Edition
- UL/CSA EN-60950-1 2nd Edition
- Low Voltage Directive 2006/95/EC
- C-Tick: AS/NZS3584
- BSMI: CNS 13438
- KCC Article 11.1
- RoHS DIRECTIVE 2011/65/EU
- WEEE Directive 2002/96/EC

## Related publications and links

For more information, see the following documents:

- Storage Options for ThinkSystem Servers  
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- ServerProven  
<http://www.lenovo.com/us/en/serverproven>
- Intel P4510 specifications  
<https://www.intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/dc-p4510-series.html>
- Intel P4510 product brief  
<https://www.intel.com/content/www/us/en/products/docs/memory-storage/solid-state-drives/data-center-ssds/dc-p4510-series-brief.html>

## Related product families

Product families related to this document are the following:

- [Drives](#)

## Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.  
8001 Development Drive  
Morrisville, NC 27560  
U.S.A.  
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2022. All rights reserved.

This document, LP1033, was created or updated on September 12, 2022.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:  
<https://lenovopress.lenovo.com/LP1033>
- Send your comments in an e-mail to:  
[comments@lenovopress.com](mailto:comments@lenovopress.com)

This document is available online at <https://lenovopress.lenovo.com/LP1033>.

## Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

ServerProven®

ThinkSystem

The following terms are trademarks of other companies:

Intel® and Xeon® are trademarks of Intel Corporation or its subsidiaries.

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Microsoft®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.