

# ThinkSystem 6500 ION Read Intensive NVMe PCIe 4.0 SSDs

## Product Guide

The ThinkSystem 6500 ION Read Intensive NVMe SSDs are general-purpose yet high-performance family of NVMe solid-state drives. They are engineered for greater performance and endurance in a cost-effective design, and to support a broader set of workloads. Now with SED encryption as standard, these drives help ensure data security, even when the drive is removed from the server.

**SED support:** All drives listed in this product guide include SED drive encryption. Our naming convention for new drives doesn't include SED in the name.



Figure 1. ThinkSystem 6500 ION Read Intensive NVMe SSDs

## Did you know?

Lenovo Read Intensive (Entry) SSDs are suitable for read-intensive and general-purpose data center workloads, however their NVMe PCIe interface means the drives also offer high performance. Overall, these SSDs provide outstanding IOPS/watt and cost/IOPS for enterprise solutions.

Self-encrypting drives (SEDs) provide benefits by encrypting data on-the-fly at the drive level with no performance impact, by providing instant secure erasure thereby making the data no longer readable, and by enabling auto-locking to secure active data if a drive is misplaced or stolen from a system while in use. These features are essential for many businesses, especially those storing customer data.

## Part number information

The following table lists the part numbers and feature codes for the 6500 ION SSDs.

Table 1. Part number information

Part number	Feature	Description	Supplier model
4XB7A91176	BZC1	ThinkSystem 2.5" U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	MTFDKCC30T7TGR-1BK4DFCYY

The part numbers include the following items:

- One solid-state drive
- Hot swap drives include a hot-swap tray
- Documentation flyer

## Features

Non-Volatile Memory Express (NVMe) is PCIe high performance SSD technology that provides high I/O throughput and low latency. NVMe interfaces remove SAS/SATA bottlenecks and unleash all of the capabilities of contemporary NAND flash memory. Each NVMe PCI SSD has direct PCIe x4 connection, which provides at 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 ThinkSystem 6500 ION Read Intensive NVMe SSDs have the following features:

- NVMe SSD with PCIe 4.0 performance and a U.3 interface
- Based on the Micron 6500 ION family of SSDs
- Compliant with Trusted Computing Group Opal 2.01 Security Subsystem Class cryptographic standard (TCG Opal 2.01 SSC)
- Micron 232-layer 3D TLC NAND
- Direct PCIe 4.0 x4 connection for each NVMe drive, resulting in up to 8 GBps overall throughput.
- Advanced ECC Engine and End-to-End Data Protection
- Protect data integrity from unexpected power loss with advanced power-loss protection architecture
- Adaptive Thermal Monitoring to monitor the internal temperature of the drive with power adjustment to ensure operation within thermal limits
- Supports Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T).
- Enterprise-level security features:
  - Secure Execution Environment - dedicated security processing hardware with physical isolation
  - Asymmetric Roots of Trust - Enables authenticated revocation of root keys
  - Strong Asymmetric Key Support - Uses standard, NIST-approved algorithms with 208-bit/3072-bit RSA keys
  - RSA Delegation Key Support - Enables customers to maintain ownership of RSA keys
  - Secure Boot - Helps ensure firmware integrity on running platform
  - Key-Based Firmware Update - Validates firmware using public key-based authentication prior to firmware update
  - Key-Based Privileged Access - Protects against unauthorized privileged SSD function execution with public key-based authorization

Read Intensive SSDs and Write Intensive SSDs have similar read IOPS performance, but the key difference between them is their endurance -- how long they can reliably perform write operations. Read Intensive SSDs have a better cost/IOPS ratio but lower endurance compared to Write Intensive SSDs. SSD write endurance is typically measured by the number of program/erase (P/E) write cycles that the drive incurs over its lifetime, listed as the total bytes of written data (TBW) in the device specification.

The TBW value assigned to a solid-state device is the total bytes of written data (based on the number of P/E cycles) that a drive can be guaranteed to complete (% of remaining P/E cycles = % of remaining TBW). Reaching this limit does not cause the drive to immediately fail. It simply denotes the maximum number of writes that can be guaranteed. A solid-state device will not fail upon reaching the specified TBW. At some point based on manufacturing variance margin, after surpassing the TBW value, the drive will reach the end-of-life point, at which the drive will go into a read-only mode.

Because of such behavior by Read Intensive solid-state drives, careful planning must be done to use them only in read-intensive or mixed use (70% read/30% write) environments to ensure that the TBW of the drive will not be exceeded before the required life expectancy.

For example, the 30.72 TB drive has an endurance of 16,800 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 9,205 GB of writes per day, which is equivalent to 0.3 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 15,342 GB of writes per day, which is equivalent to 0.5 full drive writes per day.

## **The benefits of drive encryption**

All ThinkSystem 6500 ION Read Intensive NVMe SSDs support drive encryption.

Self-encrypting drives (SEDs) provide benefits in three main ways:

- By encrypting data on-the-fly at the drive level with no performance impact
- By providing instant secure erasure (cryptographic erasure, thereby making the data no longer readable)
- By enabling auto-locking to secure active data if a drive is misplaced or stolen from a system while in use

The following sections describe the benefits in more details.

### **Automatic encryption**

It is vital that a company keep its data secure. With the threat of data loss due to physical theft or improper inventory practices, it is important that the data be encrypted. However, challenges with performance, scalability, and complexity have led IT departments to push back against security policies that require the use of encryption. In addition, encryption has been viewed as risky by those unfamiliar with key management, a process for ensuring a company can always decrypt its own data. Self-encrypting drives comprehensively resolve these issues, making encryption both easy and affordable.

When the self-encrypting drive is in normal use, its owner need not maintain authentication keys (otherwise known as credentials or passwords) in order to access the data on the drive. The self-encrypting drive will encrypt data being written to the drive and decrypt data being read from it, all without requiring an authentication key from the owner.

## Drive retirement and disposal

When hard drives are retired and moved outside the physically protected data center into the hands of others, the data on those drives is put at significant risk. IT departments retire drives for a variety of reasons, including:

- Returning drives for warranty, repair, or expired lease agreements
- Removal and disposal of drives
- Repurposing drives for other storage duties

Nearly all drives eventually leave the data center and their owner's control. Corporate data resides on such drives, and when most leave the data center, the data they contain is still readable. Even data that has been striped across many drives in a RAID array is vulnerable to data theft because just a typical single stripe in today's high-capacity arrays is large enough to expose for example, hundreds of names and bank account numbers.

In an effort to avoid data breaches and the ensuing customer notifications required by data privacy laws, companies use different methods to erase the data on retired drives before they leave the premises and potentially fall into the wrong hands. Current retirement practices that are designed to make data unreadable rely on significant human involvement in the process, and are thus subject to both technical and human failure.

The drawbacks of today's drive retirement practices include the following:

- Overwriting drive data is expensive, tying up valuable system resources for days. No notification of completion is generated by the drive, and overwriting won't cover reallocated sectors, leaving that data exposed.
- Methods that include degaussing or physically shredding a drive are expensive. It is difficult to ensure the degauss strength is optimized for the drive type, potentially leaving readable data on the drive. Physically shredding the drive is environmentally hazardous, and neither practice allows the drive to be returned for warranty or expired lease.
- Some companies have concluded the only way to securely retire drives is to keep them in their control, storing them indefinitely in warehouses. But this is not truly secure because a large volume of drives coupled with human involvement inevitably leads to some drives being lost or stolen.
- Professional disposal services is an expensive option and includes the cost of reconciling the services as well as internal reports and auditing. Transporting of the drives also has the potential of putting the data at risk.

Self-encrypting drives eliminate the need to overwrite, destroy, or store retired drives. When the drive is to be retired, it can be cryptographically erased, a process that is nearly instantaneous regardless of the capacity of the drive.

### Instant secure erase

The self-encrypting drive provides instant data encryption key destruction via cryptographic erasure. When it is time to retire or repurpose the drive, the owner sends a command to the drive to perform a cryptographic erasure. Cryptographic erasure simply replaces the encryption key inside the encrypted drive, making it impossible to ever decrypt the data encrypted with the deleted key.

Self-encrypting drives reduce IT operating expenses by reducing asset control challenges and disposal costs. Data security with self-encrypting drives helps ensure compliance with privacy regulations without hindering IT efficiency. So called "Safe Harbor" clauses in government regulations allow companies to not have to notify customers of occurrences of data theft if that data was encrypted and therefore unreadable.

Furthermore, self-encrypting drives simplify decommissioning and preserve hardware value for returns and repurposing by:

- Eliminating the need to overwrite or destroy the drive
- Securing warranty returns and expired lease returns
- Enabling drives to be repurposed securely

### Auto-locking

Insider theft or misplacement is a growing concern for businesses of all sizes; in addition, managers of branch offices and small businesses without strong physical security face greater vulnerability to external theft. Self-encrypting drives include a feature called auto-lock mode to help secure active data against theft.

Using a self-encrypting drive when auto-lock mode is enabled simply requires securing the drive with an authentication key. When secured in this manner, the drive's data encryption key is locked whenever the drive is powered down. In other words, the moment the self-encrypting drive is switched off or unplugged, it automatically locks down the drive's data.

When the self-encrypting drive is then powered back on, it requires authentication before being able to unlock its encryption key and read any data on the drive, thus protecting against misplacement and theft.

While using self-encrypting drives just for the instant secure erase is an extremely efficient and effective means to help securely retire a drive, using self-encrypting drives in auto-lock mode provides even more advantages. From the moment the drive or system is removed from the data center (with or without authorization), the drive is locked. No advance thought or action is required from the data center administrator to protect the data. This helps prevent a breach should the drive be mishandled and helps secure the data against the threat of insider or outside theft.

### Technical specifications

The following table presents technical specifications for the ThinkSystem 6500 ION Read Intensive NVMe SSDs.

Table 2. Technical specifications

Feature	30.72 TB drive
Interface	PCIe 4.0 x4
Capacity	30.72 TB
SED encryption	TCG Opal
Endurance (total bytes written) (100% 4KB Random)	16,800 TB
Endurance (drive writes per day for 5 years)	0.3 DWPD
Data reliability (UBER)	< 1 in 10 <sup>17</sup> bits read
MTBF	2,000,000 hours
IOPS reads (4 KB blocks)	1,000,000
IOPS writes (4 KB blocks)	200,000
Sequential read rate (128 KB blocks)	6800 MBps
Sequential write rate (128 KB blocks)	5000 MBps
Latency (random R/W)	70 µs / 15 µs
Typical power (R/W)	15 / 20 W

## Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

Part Number	Description	Edge		1S V3	AMD V3		Intel V3	
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
4XB7A91176	ThinkSystem 2.5" U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N
		N	N	N	N	N	N	N

Table 4. Server support (Part 2 of 4)

Part Number	Description	Dense V3		1S Intel V2	2S Intel V2		AMD V1		Dense V2	
		SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)
4XB7A91176	ThinkSystem 2.5" U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N
		N	N	N	N	N	N	N	N	N

Table 5. Server support (Part 3 of 4)

Part Number	Description	4S V2	8S	4S V1	1S Intel V1			2S Intel V1											
		SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	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)
4XB7A91176	ThinkSystem 2.5" U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 6. Server support (Part 4 of 4)

Part Number	Description	Dense V1			
		SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XB7A91176	ThinkSystem 2.5" U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	N	N	N	N

## Storage controller support

NVMe PCIe SSDs require a NVMe drive backplane and some form of PCIe connection to processors. PCIe connections can take the form of either an adapter (PCIe Interposer or PCIe extender) or simply a cable that connects to an onboard NVMe connector.

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

## Operating system support

The following table lists the supported operating systems.

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

**VMware vSAN certification:** The drives listed in this product guide are VMware vSAN certified, however in the [VMware Compatibility Guide](#) (VCG), they are listed under the drive vendor company name instead of Lenovo. To check a drive for vSAN certification, search the VCG using the Supplier part number as listed in Table 1 in the [Part number information](#) section.

Table 7. Operating system support for ThinkSystem 2.5 U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD, 4XB7A91176

Operating systems	SR630 V3	SR635 V3	SR650 V3	SR655 V3	SR630 V2	SR650 V2	SR635	SR655
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.6	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 7.7	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 7.8	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 7.9	N	N	N	N	Y	Y	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 8.0	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 8.1	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 8.2	N	N	N	N	Y	Y	Y <sup>1</sup>	Y <sup>1</sup>
Red Hat Enterprise Linux 8.3	N	N	N	N	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	N	N	N	N	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	N	N	N	N	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.7	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.8	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.1	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.2	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1	N	N	N	N	N	N	Y <sup>1</sup>	Y <sup>1</sup>
SUSE Linux Enterprise Server 15 SP2	N	N	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	N	N	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 20.04 LTS	N	N	N	N	Y	Y	N	N
Ubuntu 20.04.5 LTS	N	Y	N	Y	N	N	N	N
Ubuntu 22.04 LTS	Y	Y	Y	Y	Y	Y	Y	Y

<sup>1</sup> The OS is not supported with EPYC 7003 processors.



## IBM SKLM Key Management support

To effectively manage a large deployment of SEDs in Lenovo servers, IBM Security Key Lifecycle Manager (SKLM) offers a centralized key management solution. Certain Lenovo servers support Features on Demand (FoD) license upgrades that enable SKLM support.

The following table lists the part numbers and feature codes to enable SKLM support in the management processor of the server.

Table 8. FoD upgrades for SKLM support

Part number	Feature code	Description
Security Key Lifecycle Manager - FoD (United States, Canada, Asia Pacific, and Japan)		
00D9998	A5U1	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S
00D9999	AS6C	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S
Security Key Lifecycle Manager - FoD (Latin America, Europe, Middle East, and Africa)		
00FP648	A5U1	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/1Yr S&S
00FP649	AS6C	SKLM for System x/ThinkSystem w/SEDs - FoD per Install w/3Yr S&S

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

Table 9. IBM Security Key Lifecycle Manager licenses

Part number	Description
7S0A007FWW	IBM Security Key Lifecycle Manager Basic Edition Install License + SW Subscription & Support 12 Months
7S0A007HWW	IBM Security Key Lifecycle Manager For Raw Decimal Terabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007KWW	IBM Security Key Lifecycle Manager For Raw Decimal Petabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007MWW	IBM Security Key Lifecycle Manager For Usable Decimal Terabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months
7S0A007PWW	IBM Security Key Lifecycle Manager For Usable Decimal Petabyte Storage Resource Value Unit License + SW Subscription & Support 12 Months

The following tables list the ThinkSystem servers that support the SKLM FoD license upgrades.

Table 10. IBM SKLM Key Management license upgrades (Part 1 of 4)

Part Number	Description	Edge		1S V3	AMD V3	Intel V3
A5U1	SKLM for System x w/SEDs - FoD per Install w/1 Yr S&S	N	SE350 (7Z46 / 7D1X)	N	N	N
		N	SE350 V2 (7DA9)	N	N	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	SE360 V2 (7DAM)	N	N	N
		N	SE450 (7D8T)	N	N	N
		N	SE455 V3 (7DBY)	N	N	N
		N	ST250 V3 (7DCF / 7DCE)	Y	Y	Y
		N	SR250 V3 (7DCM / 7DCL)	Y	Y	Y
		N	SR635 V3 (7D9H / 7D9G)	N	N	N
		N	SR655 V3 (7D9F / 7D9E)	N	N	N
		N	SR645 V3 (7D9D / 7D9C)	Y	Y	Y
		N	SR665 V3 (7D9B / 7D9A)	N	N	N
		N	SR675 V3 (7D9Q / 7D9R)	N	N	N
		Y	ST650 V3 (7D7B / 7D7A)	Y	Y	Y
		Y	SR630 V3 (7D72 / 7D73)	Y	Y	Y
		Y	SR650 V3 (7D75 / 7D76)	Y	Y	Y
		N	SR850 V3 (7D97 / 7D96)	N	N	N
		N	SR860 V3 (7D94 / 7D93)	N	N	N
		N	SR950 V3 (7DC5 / 7DC4)	N	N	N

Table 11. IBM SKLM Key Management license upgrades (Part 2 of 4)

Part Number	Description	Dense V3		1S Intel V2		2S Intel V2			AMD V1			Dense V2			
A5U1	SKLM for System x w/SEDs - FoD per Install w/1 Yr S&S	N	SD665 V3 (7D9P)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SD665-N V3 (7DAZ)	N	N	N	N	N	N	N	N	N	N	N	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	SD650 V3 (7D7M)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SD650-I V3 (7D7L)	N	N	N	N	N	N	N	N	N	N	N	N
		N	ST50 V2 (7D8K / 7D8J)	N	N	N	N	N	N	N	N	N	N	N	N
		Y	ST250 V2 (7D8G / 7D8F)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Y	SR250 V2 (7D7R / 7D7Q)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		N	ST650 V2 (7Z75 / 7Z74)	N	N	N	N	N	N	N	N	N	N	N	N
		Y	SR630 V2 (7Z70 / 7Z71)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Y	SR650 V2 (7Z72 / 7Z73)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		N	SR670 V2 (7Z22 / 7Z23)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SR635 (7Y98 / 7Y99)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SR655 (7Y00 / 7Z01)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SR655 Client OS	N	N	N	N	N	N	N	N	N	N	N	N
		N	SR645 (7D2Y / 7D2X)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SR665 (7D2W / 7D2V)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SD630 V2 (7D1K)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SD650 V2 (7D1M)	N	N	N	N	N	N	N	N	N	N	N	N
		N	SD650-N V2 (7D1N)	N	N	N	N	N	N	N	N	N	N	N	N
		Y	SN550 V2 (7Z69)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 12. IBM SKLM Key Management license upgrades (Part 3 of 4)

Part Number	Description	4S V2		8S	4S V1		1S Intel V1				2S Intel V1								
		SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)		SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	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)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	N	Y	Y	Y	Y	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	N	Y	Y	Y	Y	N

Table 13. IBM SKLM Key Management license upgrades (Part 4 of 4)

Part Number	Description	Dense V1			
		SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
A5U1	SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	N	N	N	N
AS6C	SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	N	N	N	N

## Warranty

The 6500 ION SSDs carry a one-year, customer-replaceable unit (CRU) limited warranty. When the SSDs are installed in a supported server, these drives assume the system's base warranty and any warranty upgrades.

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

## Physical specifications

The 6500 ION SSDs have the following physical specifications:

- Height: 15mm (0.6 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 200 g (7.1 oz)

## Operating environment

The 6500 ION SSDs are supported in the following environment:

- Temperature:
  - Operating: 0 to 70 °C (32 to 158 °F)
  - Non-operating: -40 to 85 °C (-40 to 185 °F)
- Relative humidity, Non-operating: 5 to 90% (non-condensing)
- Maximum altitude: 3,050 m (10,000 ft)
- Shock, non-operating: 1,500 G (Max) at 0.5 ms
- Vibration, non-operating: 9.1 G<sub>RMS</sub> (5-800 Hz)

## Agency approvals

The 6500 ION SSDs conform to the following regulations:

- CE (Europe): EN55032, EN55024 Class B, RoHS
- FCC: CFR Title 47, Part 15, Class B
- UL/cUL: approval to UL-60950-1, 2nd Edition, IEC 60950-1:2005 (2nd Edition); EN 60950-1 (2006) + A11:2009+ A1:2010 + A12:2011 + A2:2013
- BSMI (Taiwan): approval to CNS 13438, Class B, CNS 15663
- RCM (Australia, New Zealand): AS/NZS CISPR32 Class B
- KC RRL (Korea): approval to KN32 Class B, KN 35 Class B
- W.E.E.E.: Compliance with EU WEEE directive 2012/19/EC.
- TUV (Germany): approval to IEC60950/EN60950
- VCCI (Japan): 2015-04 Class B
- IC (Canada): ICES-003 Class B
- Morocco: EN55032, EN55024 Class B
- UkrSEPRO (Ukraine): EN55032 Class B, IEC60950/EN60950, RoHS (Resolution 2017 No. 139)
- UKCA (UK): SI 2016/1091 Class B and SI 2012/3032 RoHS

## Related publications and links

For more information, see the following documents:

- Lenovo ThinkSystem storage options product web page  
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- Micron 6500 ION product page  
<https://www.micron.com/products/ssd/product-lines/6500-ion>

## Related product families

Product families related to this document are the following:

- [Drives](#)

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