

ThinkSystem PM1643a Entry 12Gb SAS SSDs

Product Guide

The ThinkSystem PM1643a Entry SAS 12Gb solid-state drives (SSDs) are next-generation SSDs suitable for a wide range of applications. The PM1643a SAS SSDs are designed for dense storage and with a 12 Gb SAS interface, these drives feature all the capacity and performance that is needed to replace large numbers of 15K rpm and 10K rpm spinning disks, and consolidate storage into tightly packed server configurations.

The PM1643a SSDs are the follow-on to the PM1643 SSDs and offer improved random write performance.



Figure 1. ThinkSystem PM1643a 12Gb SAS SSDs

Did you know?

Unlike SATA drives, the 12 Gb/s SAS interface on PM1643a drives supports full duplex data transfer for higher performance, as well as enterprise-level error recovery for better availability.

Rigorous testing of PM1643a Entry SATA SSDs by Lenovo through the ServerProven program assures a high degree of storage subsystem compatibility and reliability. Providing additional peace of mind, these drives are covered under Lenovo warranty.

Part number information

The following table lists the part numbers and feature codes for ThinkSystem servers.

Table 1. Ordering part numbers and feature codes - ThinkSystem

Part number	Feature code	Description
2.5-inch hot-swap drives		
4XB7A38175	B91A	ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD
4XB7A38176	B91B	ThinkSystem 2.5" PM1643a 1.92TB Entry SAS 12Gb Hot Swap SSD
4XB7A17054	B91C	ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD
4XB7A17055	B91D	ThinkSystem 2.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD
4XB7A17056	BC4R	ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD
3.5-inch hot-swap drives		
4XB7A17058	B91E	ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD
4XB7A17059	BEVK	ThinkSystem 3.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD

Features

The ThinkSystem PM1643a Entry SAS SSDs have the following features:

- Enterprise-grade SSD suitable for read-intensive workloads
- Based on Samsung 64-layer V-NAND technology and TLC flash memory
- Endurance of 1 drive-write per day (DWPD) over 5 years
- 2.5-inch or 3.5-inch industry standard form factor with hot-swap tray
- SAS 12 Gbps interface
- Single port host interface
- Protect data integrity from unexpected power loss with Samsung's advanced power-loss protection architecture
- Supports Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T)
- End-to-end data protection
- Support 16 Initiator with Tag Command Queuing (TCQ) Command Set with a queue-depth of up to 128 commands
- Compliant with SCSI Specification (SAS-3 / SPL-3 / SBC-4 / SPC-4 / SAM-5)
- RoHS Compliant

SSDs have a huge but finite number of program/erase (P/E) cycles, which affect how long they can perform write operations and thus their life expectancy. Entry SSDs typically have a better cost per read IOPS ratio but lower endurance and performance compared to Mainstream or Performance SSDs.

SSD write endurance is typically measured by the number of program/erase (P/E) 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.

Technical specifications

The following tables present technical specifications for the PM1643a Entry SSDs.

Table 2. Technical specifications

Feature	960 GB drive	1.92 TB drive	3.84 TB drive	7.68 TB drive	15.36 TB drive
Interface	12 Gbps SAS	12 Gbps SAS	12 Gbps SAS	12 Gbps SAS	12 Gbps SAS
Capacity	960 GB	1.92 TB	3.84 TB	7.68 TB	15.36 TB
SED encryption	None	None	None	None	None
Endurance (drive writes per day for 5 years)	1 DWPD	1 DWPD	1 DWPD	1 DWPD	1 DWPD
Endurance (total bytes written)	1,752 TB	3,504 TB	7,008 TB	14,016 TB	28,032 TB
Data reliability (UBER)	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read	< 1 in 10 ¹⁷ bits read
MTBF	2,000,000 hours	2,000,000 hours	2,000,000 hours	2,000,000 hours	2,000,000 hours
IOPS reads (4 KB blocks)	230,000	230,000	230,000	230,000	230,000
IOPS writes (4 KB blocks)	40,000	60,000	85,000	90,000	65,000
Sequential read rate (128 KB blocks)	1,000 MBps	1,000 MBps	1,000 MBps	1,000 MBps	1,000 MBps
Sequential write rate (128 KB blocks)	1,000 MBps	1,000 MBps	1,000 MBps	1,000 MBps	1,000 MBps
Read latency (sequential)	240 µs	240 µs	240 µs	240 µs	240 µs
Write latency (sequential)	220 µs	220 µs	220 µs	220 µs	220 µs
Read latency (random)	120 µs	120 µs	120 µs	130 µs	130 µs
Write latency (random)	45 µs	45 µs	45 µs	45 µs	45 µs
Shock, non-operating	1,500 G (Max) at 0.5 ms	1,500 G (Max) at 0.5 ms	1,500 G (Max) at 0.5 ms	1,500 G (Max) at 0.5 ms	1,500 G (Max) at 0.5 ms
Vibration, non-operating	20 G _{RMS} (10-2000 Hz)	20 G _{RMS} (10-2000 Hz)	20 G _{RMS} (10-2000 Hz)	20 G _{RMS} (10-2000 Hz)	20 G _{RMS} (10-2000 Hz)
Typical power (R / W)	9 W / 12 W	9 W / 12 W	9 W / 12 W	9 W / 12 W	9 W / 12 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 3)

Part Number	Description	Edge		1S Intel V2				AMD V3				Intel V3				Dense V3			
		SE350 (7Z46 / 7D1X)	SE450 (7D8T)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	SR675 V3 (7D9Q / 7D9R)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)
2.5-inch hot-swap drives																			
4XB7A38175	ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A17054	ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4XB7A17056	ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3.5-inch hot-swap drives																			
4XB7A17058	ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	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 3)

Part Number	Description	2S Intel V2				AMD V1				Dense V2				4S V2	8S	4S V1				
		ST650 V2 (TZ75 / TZ74)	SR630 V2 (ZZ70 / TZ71)	SR650 V2 (ZZ72 / TZ73)	SR670 V2 (ZZ22 / TZ23)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / TZ01)	SR655 Client OS	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (TZ69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (ZZ59 / TZ60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)
2.5-inch hot-swap drives																				
4XB7A38175	ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y
4XB7A17054	ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y
4XB7A17056	ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y	N	Y
3.5-inch hot-swap drives																				
4XB7A17058	ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	Y	Y	Y	N	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N

Table 5. Server support (Part 3 of 3)

Part Number	Description	1S Intel V1				2S Intel V1								Dense 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)
2.5-inch hot-swap drives																	
4XB7A38175	ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y
4XB7A17054	ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y
4XB7A17056	ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y
3.5-inch hot-swap drives																	
4XB7A17058	ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N

Operating system support

SSDs operate transparently to users, storage systems, applications, databases, and operating systems.

Operating system support is based on the controller used to connect to the drives. Consult the controller product guide for more information:

- RAID controllers: <https://lenovopress.com/servers/options/raid>
- SAS HBAs: <https://lenovopress.com/servers/options/hba>

Warranty

The PM1643a Entry SAS 12Gb SSDs carry a one-year, customer-replaceable unit (CRU) limited warranty. When the SSDs are installed in a supported server, these drives assume the server'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 PM1643a Entry SAS 12Gb SSDs have the following physical specifications:

Dimensions and weight (approximate, without the hot-swap tray, if applicable):

- Height: 15 mm (0.6 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 158 g (5.6 oz)

Shipping dimensions and weight for the 2.5-inch drives (approximate):

- Height: 63 mm (2.5 in.)
- Width: 133 mm (5.2 in.)
- Depth: 174 mm (6.9 in.)

Shipping dimensions and weight for the 3.5-inch drives (approximate):

- Height: 95 mm (3.7 in.)
- Width: 194 mm (7.6 in.)
- Depth: 257 mm (10.0 in.)

Operating environment

The PM1643a Entry SAS 12Gb SSDs are supported in the following environment:

- Temperature, operating: 0 - 70 °C (32 - 158 °F)
- Temperature, non-operating: -40 to 85 °C (-40 - 185 °F)
- Relative humidity: 5 - 95% (noncondensing)
- Maximum altitude: -300 - 4,572 m (-1,000 to 15,000 feet)

Agency approvals

The PM1643a Entry SAS 12Gb SSDs conform to the following regulations:

- UL
- TUV
- FCC
- IC
- CB
- CE Mark
- C-Tick Mark
- BSMI (Taiwan)
- KCC (Korea EMI)
- VCCI

Related publications and links

For more information, see the following documents:

- Lenovo Press product guides and papers on RAID adapters and HBAs
<https://lenovopress.com/servers/options/raid>
- Lenovo RAID Management Tools and Resources
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>
- Samsung Enterprise SSDs home page
<https://www.samsung.com/semiconductor/ssd/enterprise-ssd/>

Related product families

Product families related to this document are the following:

- [Drives](#)

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