

ThinkSystem PM893 Read Intensive SATA 6Gb SSDs Product Guide

The ThinkSystem PM893 Read Intensive SATA SSDs are general-purpose SSDs based on the Samsung PM893 platform and are available in capacities ranging from 480GB to 7.86TB. They are engineered for greater performance and endurance in a cost-effective design, and to support a broader set of workloads.



Figure 1. Lenovo ThinkSystem 2.5" PM893 Read Intensive SATA 6Gb Hot Swap SSD

Did you know?

Lenovo Read Intensive SSDs are suitable for read-intensive and general-purpose data center workloads. Overall, these SSDs provide outstanding IOPS/watt and cost/IOPS for enterprise solutions and are an excellent choice for applications such as web serving, hyperscale cloud, content delivery, caching, databases, and analytics.

Part number information

The following table lists the part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
2.5-inch hot-swap drives for ThinkSystem		
4XB7A72441	BM88	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD
3.5-inch hot-swap drives for ThinkSystem		
4XB7A87461	BUT1	ThinkSystem 3.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD

The part numbers include the following items:

- One 2.5-inch solid-state drive in a ThinkSystem hot-swap tray
- Documentation flyer

Features

The PM893 SSDs have the following features:

- Low cost, read-intensive SSD from Samsung
- 2.5-inch industry standard form factor with hot-swap tray
- 6 Gbps SATA interface
- Advanced ECC Engine and End-to-End Data Protection
- Samsung V6 (128-layer) TLC V-NAND stacks the vertical NAND layers in three dimensions, solving the cell-to-cell interference that causes data corruption in planar NAND.
- Protect data integrity from unexpected power loss with Samsung's advanced power-loss protection (PLP) architecture
- Supports Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T).
- Dynamic Thermal Guard Protection protects the SSD from overheating by automatically controlling the speed of the CPU relative to its core temperature

Read-Intensive (Entry) SSDs and Write-Intensive (Performance) SSDs have similar read and write IOPS performance, but the key difference between them is their endurance (or lifetime) (that is, how long they can perform write operations because SSDs have a finite number of program/erase (P/E) cycles). 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) 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 mix-use up to 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 3.84TB PM893 drive has an endurance of 7,008 TB of total bytes written (TBW). This means that for full operation over five years, write workload must be limited to no more than 3,840 GB of writes per day, which is equivalent to 1.0 full drive writes per day (DWPD). For the device to last three years, the drive write workload must be limited to no more than 6,400 GB of writes per day, which is equivalent to 1.7 full drive writes per day.

Technical specifications

The following table lists the technical specifications of the PM893 SSDs.

Table 2. Technical specifications

Feature	480 GB drive	960 GB drive	1.92 TB drive	3.84 TB drive	7.68 TB drive
Interface	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA	6 Gbps SATA
Capacity	480 GB	960 GB	1.92 TB	3.84 TB	7.68 TB
SED encryption	None	None	None	None	None
Endurance (total bytes written)	876 TB	1752 TB	3504 TB	7008 TB	14,016 TB
Endurance (drive writes per day for 5 years)	1 DWPD	1 DWPD	1 DWPD	1 DWPD	1 DWPD
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)	98,000	98,000	98,000	98,000	98,000
IOPS writes (4 KB blocks)	29,000	31,000	31,000	31,000	31,000
Sequential read rate (128 KB blocks)	560 MBps	560 MBps	560 MBps	560 MBps	560 MBps
Sequential write rate (128 KB blocks)	530 MBps	530 MBps	530 MBps	530 MBps	530 MBps
Read latency (random)	120 µs	120 µs	120 µs	120 µs	120 µs
Write latency (random)	40 µs	40 µs	40 µs	40 µs	40 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 (20-2000 Hz)	20 G (20-2000 Hz)	20 G (20-2000 Hz)	20 G (20-2000 Hz)	20 G (20-2000 Hz)
Typical power (R/W)	2.1 W / 3.2 W	2.2 W / 3.2 W	2.2 W / 3.2 W	2.2 W / 3.2 W	2.2 W / 3.2 W

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

Part Number	Description	2S AMD V3				2S Intel V3		4S 8S Intel V3				Multi Node		GPU Rich		1S V3				
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
2.5-inch hot-swap drives for ThinkSystem																				
4XB7A72441	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N	N	N
3.5-inch hot-swap drives for ThinkSystem																				
4XB7A87461	ThinkSystem 3.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	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	Edge				Super Computing				1S Intel V2		2S Intel V2				
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)
2.5-inch hot-swap drives for ThinkSystem																
4XB7A72441	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y
3.5-inch hot-swap drives for ThinkSystem																
4XB7A87461	ThinkSystem 3.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y

Table 5. Server support (Part 3 of 4)

Part Number	Description	AMD V1				Dense V2				4S V2	8S	4S V1		1S Intel V1					
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS	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)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)
2.5-inch hot-swap drives for ThinkSystem																			
4XB7A72441	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N	Y
3.5-inch hot-swap drives for ThinkSystem																			
4XB7A87461	ThinkSystem 3.5" PM893 3.84TB Read Intensive SATA 6Gb 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	2S Intel V1								Dense V1				
		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 for ThinkSystem														
4XB7A72441	ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
3.5-inch hot-swap drives for ThinkSystem														
4XB7A87461	ThinkSystem 3.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD	N	N	N	N	N	N	N	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 ThinkSystem PM893 Read Intensive SATA 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 PM893 SSDs have the following physical specifications:

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

- Height: 7 mm (0.3 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 58 g (2.1 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.)
- Weight (hot-swap): 433 g (1.0 lb)

Operating environment

The PM893 SSDs are supported in the following environment:

- Temperature: 0 - 70 °C (32 - 158 °F)
- Relative humidity: 5 - 95% (noncondensing)
- Maximum altitude: 3,050 m (10,000 ft)

Agency approvals

The PM893 SSDs conform to the following regulations:

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

Related publications and links

For more information, see the following documents:

- Samsung Data Center SSDs product page:
<https://www.samsung.com/semiconductor/ssd/datacenter-ssd/>
- Lenovo ThinkSystem storage options product web page
<https://lenovopress.com/lp0761-storage-options-for-thinksystem-servers>
- Lenovo ThinkSystem SSD Portfolio comparison:
<https://lenovopress.com/lp1261-lenovo-thinksystem-ssd-portfolio>
- Lenovo server options product page
<https://www.lenovo.com/us/en/data-center/options/>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>
- Lenovo RAID Management Tools and Resources
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>

Related product families

Product families related to this document are the following:

- [Drives](#)

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