ThinkSystem PM1655 Mixed Use SAS 24Gb SSDs
Product Guide

The ThinkSystem PM1655 Mixed Use SAS 24Gb SSDs are next-generation high-performance 24Gb SAS SSDs suitable for a wide range of applications of running on ThinkSystem servers. The drives are available in capacities of up to 6.4 TB.

The PM1655 SSDs are the follow-on to the PM1645a SSDs and offer improved performance.

Figure 1. ThinkSystem PM1655 Mixed Use SAS 24Gb SSDs

Did you know?

Unlike 6 Gb/s SATA drives, the 24 Gb/s SAS interface on these drives supports full duplex data transfer for higher performance, and enterprise-level error recovery for better availability. By combining the enhanced reliability of Samsung NAND flash memory silicon with NAND Flash management technologies, PM1655 SSDs deliver the extended endurance of up to 3 drive writes per day (DWPD) for 5 years, which is suitable for many enterprise applications.

Part number information

The following tables list the information for ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
2.5-inch hot-swap drives		
4XB7A80340	BNW8	ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD
4XB7A80341	BNW9	ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD
4XB7A80342	BNW6	ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD
4XB7A80343	BP3K	ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD
3.5-inch hot-swap drives		
4XB7A80344	BNW7	ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD
4XB7A80345	BNWA	ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD
4XB7A80346	BNWB	ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD
4XB7A80347	BP3G	ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD

The part numbers include the following items:

- One solid-state drive with a hot-swap tray
- Documentation flyer

Features

The ThinkSystem PM1655 Mixed Use SAS 24Gb SSDs have the following features:

- Server-grade SSD suitable for mixed read-write-intensive workloads
- Features Samsung's latest sixth-generation, 128-layer V-NAND storage technology
- Endurance of 3 drive-writes per day (DWPD)
- 2.5-inch or 3.5-inch industry standard form factor with hot-swap tray
- SAS 24 Gb/s interface
- Compliant with the Trusted Computing Group Enterprise Security Subsystem Class cryptographic standard (TCG Enterprise 1.01)
- 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

> **24 Gb/s SAS support**: In order to support 24 Gb/s SAS connectivity, the drive, backplane and SAS controller must all support 24 Gb/s speeds.

Read Intensive SSDs and Mixed Use 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. Mixed Use SSDs have better endurance but lower cost/IOPS ratio compared to Read 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.

Technical specifications

The following are the preliminary technical specifications for the PM1655 SSDs:

- Endurance: 3 DWPD (drive writes per day for 5 years)
- Supports SED encryption (TCG Enterprise)
- Sequential Reads: Up to 2250 MB/s
- Sequential Writes: Up to 2220 MB/s
- 4KB Random Reads: Up to 490,000 IOPS
- 4KB Random Writes: Up to 250,000 IOPS

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 2. 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)
2.5-inch hot-swap drives																					
4XB7A80340	ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
4XB7A80341	ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
4XB7A80342	ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
4XB7A80343	ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
3.5-inch hot-swap drives																					
4XB7A80344	ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80345	ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80346	ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80347	ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N

Table 3. 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)
2.5-inch hot-swap drives																				
4XB7A80340	ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
4XB7A80341	ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
4XB7A80342	ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
4XB7A80343	ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
3.5-inch hot-swap drives																				
4XB7A80344	ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80345	ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80346	ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
4XB7A80347	ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N

Operating system support

SAS 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 propduct guide for more information:

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

Warranty

The PM1655 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

PM1655 SSDs have the following physical specifications (without hot-swap tray):

- Height: 15 mm (0.6 in.)
- Width: 70 mm (2.8 in.)
- Depth: 100 mm (4.0 in.)
- Weight: 160 g (5.6 oz)

Operating environment

PM1655 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

PM1655 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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