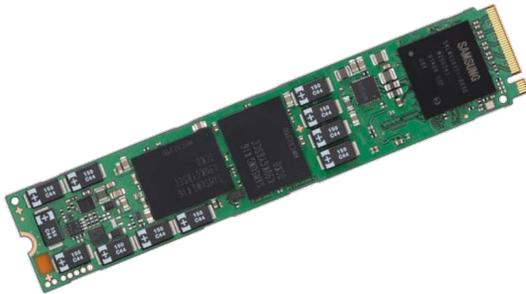


Samsung PM9A3 NVMe PCIe SSD

A new generation of
Data Center performance

Product Brief



Highlights

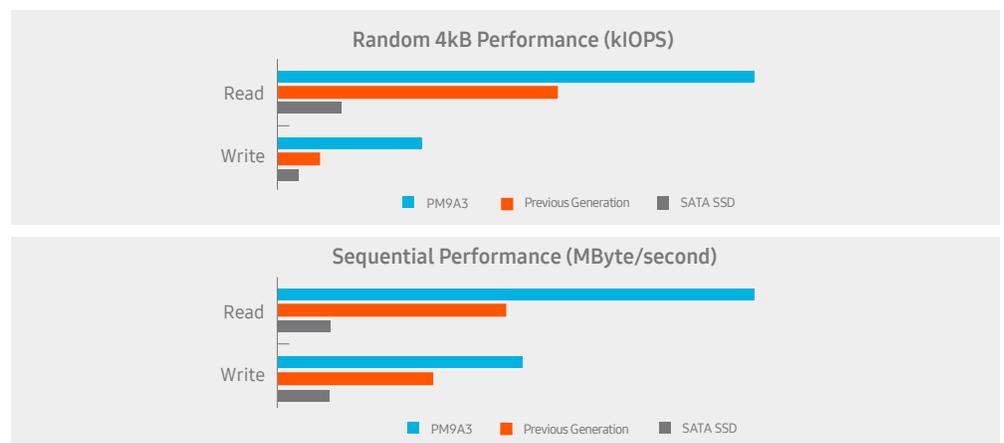
Samsung PM9A3 delivers:

- **High-Performance**
PCI Express Gen 4 x4 interface for up to twice the read performance of PCIe Gen 3 SSDs, and dedicated hardware accelerators for more than three times the random write performance of the previous generation.
- **Enterprise Features**
Protects your data confidentiality and integrity with TCG Opal 2.0 encryption management, secure boot, end to end data protection with DIF/DIX and extended sector size support, and power loss protection circuitry.
- **Form Factor Flexibility**
Available in a variety of form factors to meet the needs of multiple system types in your server deployment. All form factors are built using the same Samsung SSD controllers and V-NAND®, for high volume availability and simplified SSD qualification.

Data center architects face challenging requirements when delivering reliable computing and storage resources at the lowest total cost. Data center servers require high levels of I/O performance to keep their CPUs fully utilized, and high system density, to minimize total cost. The storage systems that supply that I/O performance need to deliver consistent performance and latency to all tenant virtual machines and containers 24/7, 365 days a year.

Samsung provides data centers with solid-state drives (SSDs) that deliver exceptional performance in public cloud applications, such as infrastructure as a service (IaaS), content delivery networks (CDN), shared hosting, NoSQL databases, and cloud data storage. Compared to SATA SSDs, these high-performing NVMe SSDs deliver more than ten times the read performance and lower latency, while still maintaining SATA cost and low-power consumption per IOP. As a pioneer in NVMe SSDs, Samsung has been delivering the advantages of industry standard NVMe performance longer than anyone else. Samsung also has the added advantage of being a vertically integrated supplier of SSDs, enabling the highest levels of quality and support.

The Samsung PM9A3 delivers PCIe Gen 4 Performance to the Data Center



Samsung PM9A3 NVMe PCIe SSD

High Performance

The Samsung PM9A3 NVMe SSD supports PCI Express Gen 4, breaking through the read performance bottleneck experienced by SSDs that only support PCI Express Gen 3, and delivering up to 900k IOPS of random read performance. With the PM9A3, I/O operations benefit from hardware acceleration, which improves performance, while containing power consumption. Random write performance of up to 200k IOPS is more than three times as fast as the previous generation of mainstream Samsung NVMe SSDs.

To meet the demand for high-utilization, high-duty cycle data centers, the PM9A3 SSD utilizes firmware which prioritizes quality of service (QoS) for sustained random workloads, to keep all virtual machines and containers running quickly and smoothly. The firmware is optimized for always-on, always-busy workloads ready to respond quickly to incoming work requests. Consistent latency on mixed read/write workloads is enhanced by the ability to suspend flash erase and program operations, in order to prioritize incoming read operations.

Best of all, Samsung PM9A3 delivers these high performance SSD features to the mainstream cost points, comparable to SATA SSDs, and with the ability to support high-volume cloud datacenter deployments.

Enterprise Functionality

Samsung's PM9A3 SSD has the power efficiency and cost effectiveness for large scale cloud datacenter deployment, but delivers features usually reserved for high-end enterprise NVMe SSDs.

Samsung's PM9A3 SSD keeps your private data confidential, with encryption via a hardware based AES-XTS 256-bit encryption engine, and management via the TCG Opal 2.0 standard. The new secure boot feature cryptographically verifies the integrity of every firmware image's RSA 3072 digital signature prior to execution, helping defend against advanced security threats that target device firmware.

Samsung's PM9A3 SSD supports out-of-band drive management through NVMe Basic Management Command over SMBus. This enterprise functionality allows board management controllers to inventory and provision SSDs without operation system dependencies.

Samsung's PM9A3 SSD includes enterprise power loss protection (PLP). During normal power-off periods, the host server allocates time to preserve data integrity by transmitting a standby command to each device. In the event of an unexpected power loss, though, the cached data in a storage device's internal DRAM buffers can be lost. This can occur with unexpected power outages, or when users unplug devices from the system. However, the Samsung PM9A3 SSD has been designed to prevent data loss resulting from unexpected power shutdowns with its PLP architecture. Upon detection of a failure, the SSD immediately uses the stored energy from its PLP capacitors to provide enough time to transfer the cached data in DRAM to the flash memory, ensuring no loss of data.

Samsung PM9A3 specifications

Form factor	U.2	E1.S	M.2
Capacity	960 GB, 1.92 TB, 3.84 TB, 7.68 TB	960 GB, 1.92 TB, 3.82 TB, 7.68 TB	960 GB, 1.92 TB, 3.84 TB
Sequential read	Up to 6,500 MB/s	Up to 6,500 MB/s	Up to 4,500 MB/s
Sequential write	Up to 3,500 MB/s	Up to 3,200 MB/s	Up to 1,750 MB/s
Random read	Up to 900,000 IOPS	Up to 900,000 IOPS	Up to 550,000 IOPS
Random write	Up to 200,000 IOPS	Up to 150,000 IOPS	Up to 70,000 IOPS
Physical Dimensions	70 x 100 x 7 mm	31.5 x 111.49 x 5.9 mm	22 x 110 x 3.8 mm
Power consumption	Read: <= 9.4W, Write: <= 14.5W	Read: <= 9.7W, Write: <= 11.7W	Read: <= 6.4W, Write: <= 7.8W
Host interface	PCIe Gen 4 x4		
NAND flash memory	Samsung V6 (128 Layer) V-NAND®		
Uncorrectable Bit Error Rate (UBER)	1 sector per 10 ¹⁷ bits read		
Mean Time Between Failure (MTBF)	2,000,000 hours		
Endurance	1.3 DWPD for 3 years		
Bytes per Sector	512/520/4096/4104/4160 Bytes with Data Integrity Field (DIF) / Data Integrity Extension (DIX) Support		
Spec Compliance	NVMe spec rev. 1.3c PCI Express Base Specification Revision 4.0		
Encryption	AES-XTS 256-bit Encryption Engine with TCG Opal 2.0 Compliant Management, and Secure Boot Support		
Manageability	NVMe Basic Management Command over SMBus		
Operating Temp	0 - 70 C		