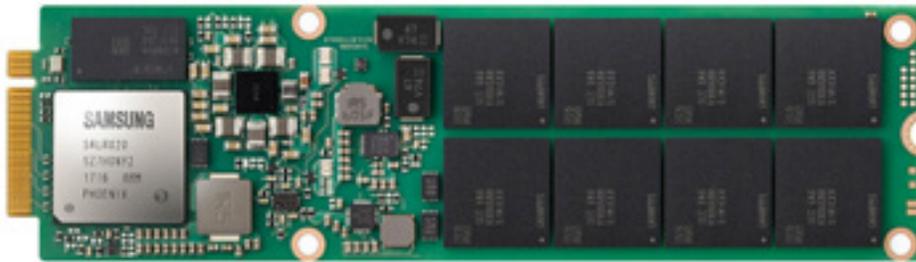


Samsung PM983 NF1 NVMe PCIe SSD

Unmatched Scale-Out Density
and Performance

Product Brief



Highlights

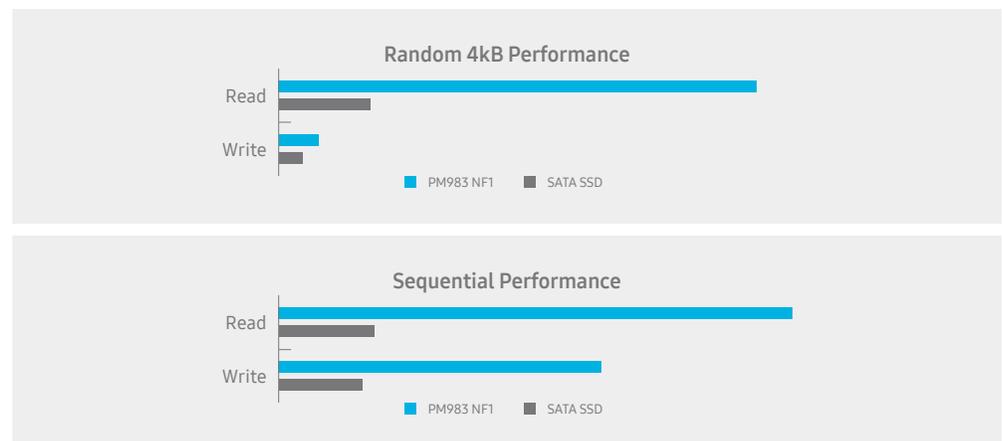
Samsung PM983 NF1 delivers:

- **Unmatched Density** – Six times the front-accessible storage system density of comparable U.2 SSDs.
- **High-Performance** – Four times the performance of SATA SSDs, using Samsung state-of-the-art 3D vertical-NAND (V-NAND) flash memory. An optimized Samsung NVMe controller with a native PCIe Gen 3.0 x4 host interface supplies 32 Gb/s of bandwidth.
- **Exceptional Value** – The same low cost per gigabyte as slower SATA SSDs. By providing four times the IOPS per dollar, data center operators can continue to scale workload utilization on their servers, decreasing the cost of computing.

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 24/7, 365 days a year. Considering each of these factors, IT and data center managers are tasked with finding optimal storage solutions.

Samsung provides data centers with solid-state drives (SSDs) that deliver exceptional performance in public cloud applications, such as content delivery networks (CDN), infrastructure as a service (IaaS), shared hosting, NoSQL databases, and cloud data storage. Compared to SATA SSDs, these high-performing NVMe SSDs deliver four times the read performance and lower latency, while still maintaining SATA cost and low-power consumption. 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, providing the highest levels of quality.

The Samsung PM983 SSD in the NF1 form factor allows data center architects to deliver the highest density of both capacity and storage performance. The NF1 form factor combines U.2 capacity and serviceability in a M.2 size.



SAMSUNG

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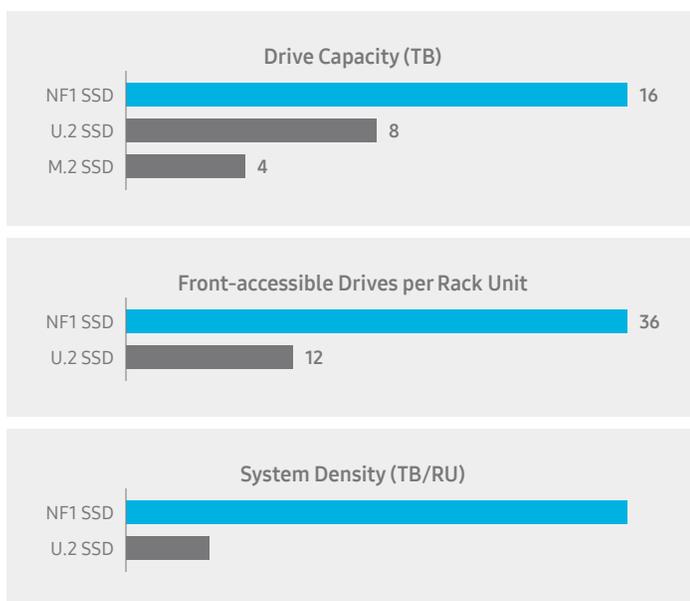
NF1, the highest density form factor

By building the NF1 form factor for SSDs in 1U servers, maximum system density can be achieved.

Starting with drive capacity, the NF1 form factor can support twice the capacity of contemporary U.2 7mm thick SSDs, and up to four-times the capacity of contemporary M.2 SSDs. Samsung's PM983 NF1 offers capacities of up to 15.36TB.

Furthermore, the NF1 form factor allows up to 36 front-accessible SSDs to fit in a single 1U server. Compared to a typical 2U server using 24 U.2 SSDs, NF1 allows three times the number of front-accessible SSDs per rack unit.

The combination of higher drive capacity and higher system-level density, NF1 enables up to six times the storage capacity of traditional U.2 SSDs.



NF1 extends the M.2 SSD ecosystem

Similar to M.2 server SSDs, NF1 systems utilize the same connector as the M.2 form factor (which is ubiquitous in notebook PCs) providing access to a cost-effective, high-volume component supply chain. The NF1 form factor SSDs also have a keyed connector, to prevent backwards insertion, protecting the drive and server.

NF1 SSDs further extends M.2, by adding hot-plug capability, allowing NF1 SSDs to serve applications that require enterprise serviceability without server downtime. This capability was previously limited to U.2 SSDs.

Optimized for at-scale data centers

To meet the demand for high-utilization, high-duty cycle data centers, the PM983 SSD utilizes firmware which prioritizes quality of service (QoS) for sustained random workloads, to keep all virtual machines running quickly and smoothly. The firmware is also optimized for always-on, always-busy workloads ready to respond quickly to incoming work requests. The Samsung PM983 SSD leverages the same controller and NAND flash memory as high volume laptop PCs, allowing data center to deploy NVMe SSDs cost-effectively at scale.

Enterprise-grade power loss protection

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 buffers (DRAM) can be lost. This can occur with unexpected power outages, or when users unplug devices from the system. However, the Samsung PM983 SSD has been designed to prevent data loss resulting from unexpected power shutdowns with its power-loss protection architecture. Upon detection of a failure, the SSD immediately uses the stored energy from tantalum capacitors to provide enough time to transfer the cached data in DRAM to the flash memory, ensuring no loss of data.

Samsung PM983 NF1 specifications

Form factor	NF1
Capacity	3.84 TB, 7.68 TB, and 15.36 TB
Host interface	PCIe Gen 3 x4 @ 32 Gb/s
Spec Compliance	NVMe spec rev. 1.2 (partial), PCI Express CEM spec rev. 3.0, PCI Express base specification rev. 3.0
NAND flash memory	Samsung V-NAND
Power consumption	Active read/write up to 8.7/10.6 W, Idle 4.0 W (typical)
Write Endurance (@4K random write)	1.3 DWPD for 3 Years. Up 21,864 TBW.
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
Sequential read	Up to 3,000 MB/s
Sequential write	Up to 1,900 MB/s
Random read	Up to 520,000 IOPS
Random write	Up to 45,000 IOPS
Physical Dimensions	30.5 x 110 x 4.8 mm