Western Digital.

PRODUCT BRIEF

Western Digital® Ultrastar DC SN340 NVMe™ SSDs for Data Centers

96-Layer BiCS4 NAND

Expanding Flash Tiers in Data Centers

SSDs have become the de-facto choice for application acceleration due to higher random IOPS performance over HDDs. Endurance concern have led many to select high-endurance SSDs that were highly over-provisioned and carried higher cost for lower capacities. However, many modern applications are strongly biased towards reads over writes, typically working with data that is written once and read back many times. For example, the growing use of machine learning techniques analyzes large data sets repeatedly. This is driving the need for an additional flash storage tier that supports consistently fast reads but does not require higher endurance ratings of traditional enterprise SSDs.

A new class of data center SSDs referred to as Very Read Intensive (VRI) SSDs have emerged as a more cost-efficient alternative to deploy Warm Storage tiers for large data analytics such as AI. The Ultrastar DC SN340 NVMe SSD is purpose-built as a high-capacity SSD for the Warm Storage Tier. Based on 96-Layer 3D NAND coupled with an advanced in-house NVMe controller, the Ultrastar DC SN340 targets VRI workloads focused on low read latency, high read bandwidth and best-in-class power efficiency.

Purpose-Built NVMe SSDs for Cloud Warm Storage

The Ultrastar DC SN340 NVMe SSD Gen3 x4 SSD is offered in dense capacities of 3.84TB[1] and 7.68TB in a thin profile 7mm/2.5" U.2 form factor, enabling high capacity all-flash servers. Delivering up to 420K random read IOPS performance at 6.5W makes the Ultrastar DC SN340 the most power-efficient NVMe SSD in Western Digital's Ultrastar SSD portfolio. Utilizing PCIe Gen 3×4 interface the Ultrastar DC SN340 can reach speeds of up to 3.1GiB/s and 1.4GiB/s sequential read and write performance. Western Digital's innovative SSD controller design minimizes latency by incorporating hardware-based acceleration engines to deliver as low as 500us read latencies in 99.99% of data requests, even at high queue depths. A VRI class SSD delivers 0.3 drive writes per day endurance based on 32KB random writes or 1.2 drive writes per day for 32KB aligned sequential writes. By designing for larger block writes typical for modern VRI workloads, the Ultrastar DC SN340 delivers high-capacity NVMe SSDs with competitive TCA.

Videos and AI Everywhere

Video data created is exploding, with 694K hours of video streamed by a major content provider in a single minute. (Source: What Happens in an Internet Minute in 2019, AllAccess.com). Video On Demand (VOD), streaming and caching videos have become the entertainment standard. Ultrastar DC SN340 enables IT organizations to optimize their applications and infrastructure to meet higher numbers of parallel users/streams (RIOPS), saturate their network (GB/s Read Bandwidth), meet data center power constraints with efficient power design (IOPS/Watt) and reduce number of racks needed (dense multi-TB SSDs, while meeting IOPS/TB required ratio). Ultrastar DC SN340, cost-efficiently delivers the endurance level businesses need (large block write) and the read performance their applications require.

1TB SATA SSDs can be used to meet the typical video streaming ratio of TB to IOPS to Bandwidth, but SATA drives do not scale IOPS or sequential performance to the level needed to maintain the ratio for denser 4TB and 8TB SSD sizes. Businesses have since moved to NVMe to allow scale and optimize their infrastructure TCO model.

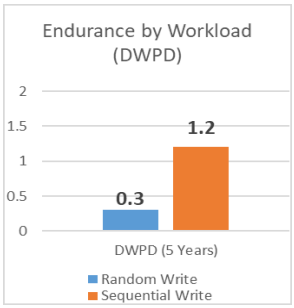
Emerging technologies like autonomous drive, surveillance and voice recognition rely heavily on video, image, and audio data streams. These industries are incorporating Artificial Intelligence and Machine Learning training procedures to improve safety and accuracy. In addition, Neural Network Training and Inference workloads demand higher sequential read and write performance. Neural network training epochs run on datasets that are massive e.g., image detection on a video file streaming at 4K requires frequent consecutive I/O reads, low latency and high read bandwidth. With competitive sequential read and write, and strong read IOPS, Ultrastar DC SN340 exceeds those requirements.

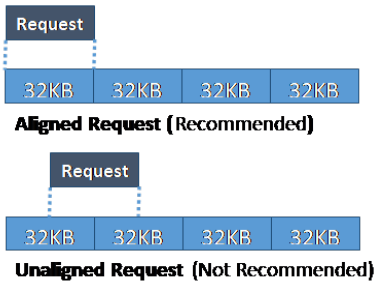
Distributed No-SQL Databases – like Apache Cassandra® & MongoDB® - utilize log-structure engines that sequentially write in append mode, avoid overwrites, are well-suited for VRI SSDs, and benefit from high-bandwidth of PCIe Gen3 x4 and NVMe's inherent low read latency. Ultrastar DC SN340 is purpose-built for these workloads, enabling exceptional SSD TCO, superior read performance, and balanced endurance.

Move to NVMe

Scale is critical for Warm Storage, and this tier benefits significantly from PCIe Gen3 x4 higher parallelism and superior performance at high queue depths. Better IOPS/$ means better TCO.

Ultrastar DC SN340, with its superior sequential performance (read bandwidth, 5x better than SATA), random performance (4x better than SATA), and power efficiency (IOPS/Watt, 2x better than SATA) enables businesses to meet application performance with fewer racks.





Ultrastar DC SN340 requires requests be 32KB aligned. For other alignments, Ultrastar DC SN640 may be a more suitable option.

Ultrastar DC SN340 NVMe SSDs

Specification	U.2
Capacity[1]	3.84TB, 7.68TB
NAND	Western Digital 96L TLC
Interface	PCIe Gen 3 x4 (NVMe compliant)
Endurance[2]	0.3 DW/D over 5 years
Sequential Read/Write[3]	Up to 3.1GiB/s / 1.4 GiB/s
Random Read[3]	Up to 420K IOPs
Random Write[3]	Up to 7K IOPs
Random Mixed[4]	Up to 139K IOPs
Reliability (MTBF)[5]	2 Million Hours
Reliability (UBER)	1 in 10^{16} bits read
Limited Warranty[6]	5 years
Active Power (Max)	6.5W

[1] One gigabyte (GB) is equal to 1,000MB (one billion bytes) and one terabyte (TB) is equal to 1,000GB (one trillion bytes) when referring to solid-state capacity. Accessible capacity will vary from the stated capacity operating environment.
[2] Endurance rating based on 100% 32KiB Random Write workload.
[3] Performance will vary by capacity point or with the changes in useable capacity. Consult product manual for further details. All performance measurements are in full sustained mode and are peak values. Subject to change. Sequential performance based on 128KiB, random write based on 32KiB transfers, and random read based on 4KiB. 1MiB= 1,048,576 bytes or 1KiB= 1,024 bytes. Data shown is for 7.68TB capacity.
[4] Random mixed IOPS refers to 75/25 R/W (4K/32K) where both reads and writes are on QD128
[5] MTBF and AFR targets are based on a sample population and are estimated by statistical measurement and acceleration algorithms under median operating conditions. MTBF and AFR rating do not predict an individual drive's reliability and do not constitute a warranty.
[6] The lesser of 5 years from the date of manufacture of the product or the date on which the product's relevant endurance thresholds set forth in the product specifications are reached.

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