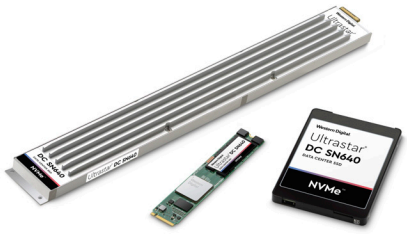
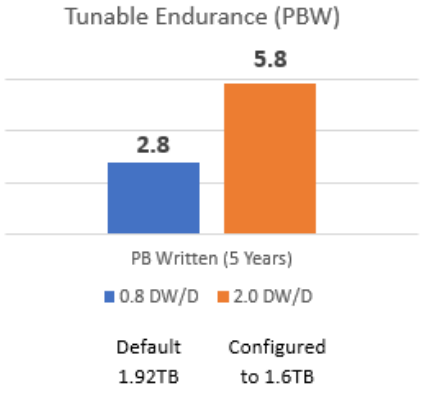


Ultrastar DC SN640 NVMe SSDs for Data Centers

The DC SN640 comes standard with the ability to sanitize the drive using Instant Secure Erase (ISE)[2]. Using cryptographic techniques, user data can be instantly erased for easy re-deployment or device retirement. The DC SN640 supports AES-256 bit data encryption and offers encryption management functionality that complies with TCG-Ruby specification. Device security is provided by requiring signed firmware downloads and a secure boot feature ensuring that only authentic firmware can operate your device.



96-Layer BiCS4 NAND

Purpose-Built NVMe SSDs for Scale-Out Storage

The Ultrastar® DC SN640 is Western Digital's data center SSD, purpose built to deliver high performance and advanced NVMe™ features across multiple form factors geared to support a variety of data center workloads. Leveraging its rich heritage of enterprise storage technology, Western Digital developed a fully vertically integrated SSD that utilizes industry-leading 96-Layer BiCS4 NAND coupled with an advanced in-house NVMe controller that is optimized for low latency and power efficiency. Delivering capacities of up to 30.72TB the DC SN640 meets the growing demand for capacity scaling of flash storage within the data center.

NVMe Performance

NVMe is quickly becoming the interface of choice for high performance storage. The SATA interface was traditionally less expensive to deploy, but comes with an inherent bandwidth bottleneck around 550MB/s. Single port NVMe SSDs offer a competitive alternative and investing in NVMe provides a large benefit by offering over 5x SATA read performance with transfers up to 3 GB/s and almost 4x the write performance with transfers up to 2 GB/s. With up to four PCIe lanes assigned to each SSD drive and directly connected to the CPU, you can maximize storage performance compared to a single SATA lane.

More Form Factors Options

The DC SN640 will be available in three form factors: 7mm U.2, M.2, and E1.L (EDSFF-L). The 2.5" U.2 form factor is most popular option for deploying flash storage. The slim 7mm width (vs 15mm alternatives) enables higher density deployments in 1U servers. The M.2 22×110mm compact form factor can be deployed in servers as stand-alone option or via an add-in-card module such as the Open Compute Project (OCP) AVA HH-HL adapter that supports up to four M.2 drives. E1.L is a variant of the new EDSFF industry standard that is designed for dense data center usage and a new future proof connector capable of supporting future PCIe Gen 5 devices. E1.L physically provides both more room for flash (translating to higher capacity points, up to 30.72TB), and includes heat sink design to support higher power modes.

Advanced Features

The Ultrastar DC SN640 is feature rich, supporting up to 128 NVMe namespaces. Managing deployed devices is made easier by supporting all mandatory commands in the NVME Management Interface (NVMe-MI), and allowing firmware updates without a device reset.

Software defined storage demands flexibility. The DC SN640 offers enhanced flexibility by allowing a tradeoff of capacity for endurance, and can thus be tuned for the specific application being deployed. Read-intensive use-cases often require 0.8 Drive Writes per Day (DW/D), which translates to 2.8 petabytes written over 5 years (PBW) for a 1.92TB drive. Using a simple resize operation to reduce capacity from 1.92TB to 1.6TB will double the drive's endurance from 0.8 DW/D (2.8PBW) to 2.0 DW/D (5.8PBW).

Ultrastar® **DC SN640**

DATA SHEET **NVMe SSDs FOR DATA CENTERS**

2.5-inch U.2 Form Factor

M.2 22×110mm Form Factor

Enterprise and Data Center Small Form Factor (EDSFF)

Specifications

Capacity[1]	U.2	M.2	E1.L
0.8 DW/D	960GB, 1.92TB, 3.84TB, 7.68TB	960GB, 1.92TB, 3.84TB	7.68TB, 15.36TB, 30.72TB
2.0 DW/D	800GB, 1.6TB,3.2TB, 6.4TB		
Active Power (max)	12W	8.25W	20W
NAND			Western Digital 96L BiCS4 3D TLC
NVMe			PCIe Gen3 x4
Endurance[3]			0.8, 2.0 DW/D over 5 years
Sequential Read/Write[4] Projected			Up to 3.0GiB/s / 2.0 GiB/s
Random Read[4] Projected			Up to 480K IOPs
Random Write[4] Projected			Up to 120K IOPs
Random (70/30) Mixed[4] Projected			Up to 240K IOPs
Reliability (MTBF)[5]			2 Million Hours
Reliability (UBER)			1 in 10^{17} bits read
Warranty[6]			5 years

[1] One gigabyte (GB) is equal to 1,000MB (one billion bytes) and one terabyte (TB) is equal to 1,000GB (one trillion bytes), and one petabyte (PB) is equal to 1,000TB when referring to solid-state capacity. Accessible capacity will vary from the stated capacity due to operating environment.
[2] Note that ISE does not offer data encryption to protect data at rest.
[3] Endurance rating based on 100% 4KiB Random Write workload.
[4] Actual performance subject to change and will vary by capacity point or with the changes in useable capacity. Consult product manual for further details. Based on full sustained mode and peak values. Sequential performance based on 128KiB and random performance based on 4KiB transfers. 1MiB= 1,048,576 bytes or 1KiB= 1,024 bytes. Values shown are for 6.4TB capacity in U.2 form factor.
[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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