



Western Digital®

# Data Center Storage Solutions

## Powering the Data Revolution



For nearly 50 years, Western Digital has been enabling data at scale. Our data center SSDs, HDDs and platforms enable our customers to gain and leverage insights that they can extract from the zettabytes of data being generated by smart factories, connected endpoints, autonomous vehicles, IoT devices and more. Our robust portfolio and our outstanding customer service help companies and individuals transform their businesses with data.

## Essential Data Infrastructure for the Zettabyte Age

**Western  
Digital®**



### Ultrastar® Data Center SSDs

Portfolio breadth and depth for cloud computing to high-performance servers

Industry leading NAND

Vertically integrated controllers and firmware



### Ultrastar Data Center HDDs

1st with 18TB CMR HDDs, the industry's highest capacity

1st with Energy-Assisted Magnetic Recording technology

1st with Triple Stage Actuator

1st with helium-filled HDDs



### Ultrastar and OpenFlex™ Platforms

High capacity disk storage platforms

High performance flash storage platforms

Innovative ArcticFlow™ & IsoVibe™ technologies

Open Composable Infrastructure Solutions

## Trusted Storage Delivering Innovation Across All Technologies



### NVMe™ SSDs

Full range of NVMe solutions from Main-stream to Performance for modern data center performance and scale-out designs



### Boot & Edge SSDs

SATA and NVMe for boot, cache and edge compute



### Memory Extension Drive

Scale in-memory computing infrastructure at a better TCO



### Helium-filled HDDs

Highest capacity HDDs drive lower TCO for hyperscale, cloud and enterprise storage



### Air-filled HDDs

Economical and reliable data access for traditional data center application



### Platforms




Complete portfolio of storage platforms and servers for SATA, SAS, NVMe and NVMe-oF™



## Optimize Your Data Center with Ultrastar SSDs





	Performance NVMe	Mainstream NVMe	Boot & Edge		Memory
	Ultrastar DC SN840	Ultrastar DC SN640	Western Digital CL SN720	Ultrastar DC SA210	Ultrastar DC ME200
Compute Intensive/HPC	✓				
All Flash Array Primary Storage	✓				
Relational Databases	✓				
Artificial Intelligence/ Machine Learning	✓				
Converged/ Hyperconverged Infrastructure	✓	✓			
OLTP	✓	✓			
OLAP	✓	✓			
Virtualization	✓	✓			
noSQL Databases	✓	✓			
Content Caching	✓	✓	✓		
File/Object Storage	✓	✓	✓		
Cloud Compute/Cloud Storage		✓			
Edge Compute			✓	✓	
Boot			✓	✓	
In Memory Compute					✓

## Ultrastar Data Center NVMe SSDs




	Performance NVMe	Mainstream NVMe
	 <b>Ultrastar DC SN840</b>	 <b>Ultrastar DC SN640</b>
Interface	PCIe 3.1 1x4, 2x2, NVMe 1.3c	PCIe 3.1 1x4, NVMe 1.3c
Form Factor	U.2, 15mm	U.2, 7mm
Endurance/Capacity (GB) <sup>1,2</sup>	3 DW/D: 1600, 3200, 6400 1 DW/D: 1920, 3840, 7680, 15360	2 DW/D: 800, 1600, 3200, 6400 0.8 DW/D: 960, 1920, 3840, 7680
NAND	3D TLC	
Seq R/W (MiB/s), up to <sup>3</sup>	3,311/3,184	3,100/2,000
Random R/W/Mixed (KIOPS), up to	780/257/503	473/116/307
Reliability <sup>4</sup>	Unrecoverable Bit Error Rate (UBER): 1 in 10 <sup>17</sup> MTBF (M hours): 2.5, projected AFR: 0.35%, projected	Unrecoverable Bit Error Rate (UBER): 1 in 10 <sup>17</sup> MTBF (M hours): 2 AFR: 0.44%
Security	SE, ISE, TCG Ruby, (FIPS 140-2 coming later)	SE, ISE, (TCG Ruby coming later)



## Ultrastar Data Center Boot, Edge and Memory Extension SSDs






	VRI NVMe	SATA	Memory Extension
	 <b>Western Digital CL SN720</b>	 <b>Ultrastar DC SA210</b>	 <b>Ultrastar DC ME200</b>
Interface	PCIe Gen3 x4 NVMe 1.3	SATA 6Gb/s	PCIe Gen3
Form Factor	M.2 2280	M.2 2280 U.2 7mm	U.2 15mm HH-HL Add-in card (AIC)
Capacity Endurance	256, 512, 1000, 2000GB 200/400/800/1600 TBW	120, 240, 480, 960, 1920GB 21/43/87/175/350 TBW	Software-defined Memory Capacity: 1024, 2048, 4096 GiB
NAND	3D TLC		N/A
Seq R/W, up to	3,470/2,800 (MB/s)	510/475 (MiB/s)	N/A
Random R/W/Mixed (KIOPS), up to	500/410/-	64/5/11	N/A
Reliability	Unrecoverable Bit Error Rate (UBER): 1 in 10 <sup>17</sup> MTBF (M hours): 2 AFR: 0.44%		
Security	TCG Opal 2.01 support		N/A

## Ultrastar Data Center Helium-filled HDDs



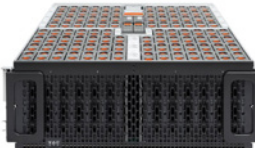
	CMR with HelioSeal®		
	 Ultrastar DC HC550	 Ultrastar DC HC530	 Ultrastar DC HC520
Interface	SATA 6Gb/s, SAS 12Gb/s		
Rotational speed (RPM)	7200		
Form Factor	3.5-inch data center HDD		
Capacity (TB)	18, 16	14	12
Format	512e		
Sustained transfer rate (MB/s, max) <sup>5</sup>	269 (18TB) 262 (16TB)	267	243
Idle_A (W), SATA/SAS <sup>6</sup>	5.6/5.8	5.5/5.9	5.0/6.1
Reliability <sup>7</sup>	MTBF (M hours): 2.5, projected AFR: 0.35%, projected Workloads: up to 550TB/year		
Security	Base (SE), SED, SED-FIPS		






## Ultrastar Data Center HDDs

	CMR, Air-filled			
				
	Ultrastar DC HC330	Ultrastar DC HC320	Ultrastar DC HC310	Ultrastar DC HA210
Interface	SATA 6Gb/s, SAS 12Gb/s			SATA 6Gb/s
Rotational speed (RPM)	7200			
Form Factor	3.5-inch data center HDD			
Capacity (TB)	10	8	6, 4	2, 1
Format	512e 512n available on 4TB capacity			512n
Sustained transfer rate (MB/s, max)	262	255	255 233 w/512n	200 (2TB) 184 (1TB)
Idle (W), SATA/SAS	8.0/9.0	7.4/8.4	5.9/7.0	5.9/NA
Reliability	MTBF (M hours): 2.5 AFR: 0.44% Workloads: up to 550TB/year			
Security	Base (SE), SED, SED-FIPS			SE

## Ultrastar and OpenFlex Data Center Platforms

	JBOF/JBOD		
			
	<b>OpenFlex Data24</b>	<b>Ultrastar Data60</b>	<b>Ultrastar Data102</b>
Storage Type	SSD	HDD & SSD	
Interface	NVMe (NVMe-oF)	SATA/SAS	
# Drives (up to)	24	60 (up to 24 can be SSD)	102 (up to 24 can be SSD)
Capacity (up to)	368TB	1080TB	1.8PB
Dimension	2U	4U	
Features	Low Latency	IsoVibe ArcticFlow	

## Ultrastar and OpenFlex Data Center Storage Servers & Composable Infrastructure

	Storage Servers		Composable Infrastructure
			
	<b>Ultrastar Serv24-A</b>	<b>Ultrastar Serv60+8</b>	<b>OpenFlex F3200</b>
Storage Type	SSD	HDD & SSD	SSD
Interface	SATA	SATA/SAS	NVMe-oF
# Drives (up to)	24	60 HDDs (up to 24 can be SSDs) 8 SSDs	10
Capacity (up to)	368TB	1.2PB	614TB
Dimension	2U	4U	3U
Features	Portable	IsoVibe ArcticFlow	Low Latency

<sup>1</sup> One megabyte (MB) is equal to one million bytes, one gigabyte (GB) is equal to 1,000MB (one billion bytes), one terabyte (TB) is equal to 1,000GB (one trillion bytes), and one petabyte (PB) is equal to 1,000TB. Actual user capacity may be less due to operating environment.

<sup>2</sup> Endurance rating based on DW/D using 4KiB random write workload over 5 years.

<sup>3</sup> Based on internal testing. 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.

<sup>4</sup> MTBF and AFR specifications are/will be based on a sample population and are estimated by statistical measurements and acceleration algorithms under typical operating conditions for this drive model. MTBF and AFR ratings do not predict an individual drive's reliability and do not constitute a warranty.

<sup>5</sup> Based on internal testing; performance may vary depending on host environment, drive capacity and other factors. 1MB = 1,000,000 bytes (10<sup>6</sup>)

<sup>6</sup> Idle specification is based on use of Idle\_A

<sup>7</sup> MTBF and AFR specifications are/will be based on a sample population and are estimated by statistical measurements and acceleration algorithms under typical operating conditions, workload 220TB/year and temperature 40°C. Derating of MTBF and AFR will occur above these parameters, up to 550TB writes per year and 60°C ambient (65°C device temp). MTBF and AFR ratings do not predict an individual drive's reliability and do not constitute a warranty.



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