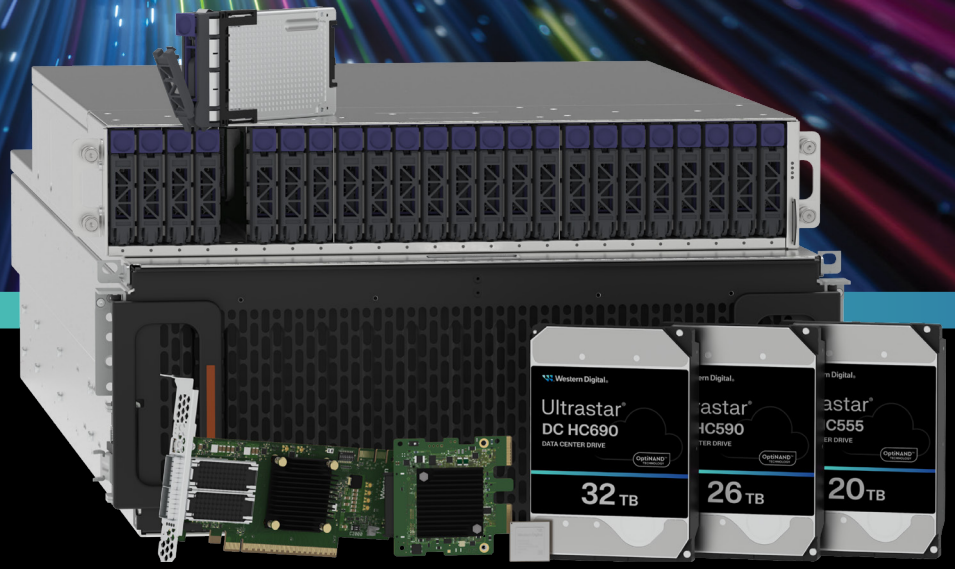
Data Center Storage Solutions



Western Digital.

Powering the Data Revolution

For more than 50 years, Western Digital® has been enabling data at scale. Our data center HDDs, fabric bridges, 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

Ultrastar Data Center HDDs

- 1st with OptiNAND™-enabled 26TB CMR & 32TB SMR HDDs
- 1st with Energy-Assisted Magnetic Recording technology
- 1st with Triple Stage Actuator
- 1st with helium-filled HDDs
- 1st with 12TB air-filled HDDs
- 1st commercially available 11 disk HDDs

Ultrastar and OpenFlex™ Platforms

- High-capacity disk storage platforms
- High-performance flash storage platforms
- Innovative ArcticFlow™ & IsoVibe™ technologies
- Open Composable Infrastructure Solutions

RapidFlex™

- High-performance Fabric Bridge Device
- Server and JBOF applications
- TCP and RoCE Offload
- Supported by Open Composable Infrastructure

Trusted Storage Delivering Innovation Across All Technologies

Helium-filled HDDs

Highest capacity HDDs for data center expansion and cost-efficient scale

Air-filled HDDs

Economical and reliable data access for traditional data center application

Platforms

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

Fabric Bridges

Enable NVMe over fabrics (NVMe-oF) attached storage systems using fabric bridge devices and adapters

Ultrastar Data Center HDDs

High-Capacity Helium SMR Hard Drives

	Ultrastar DC HC690	Ultrastar DC HC680	Ultrastar DC HC670
Interface	SATA 6Gb/s, SAS 12Gb/s	SATA 6Gb/s, SAS 12Gb/s	SATA 6Gb/s, SAS 12Gb/s
Rotational speed (RPM)	7200		
Form Factor	3.5-inch data center HDD		
Capacity (TB)[1]	30, 32	26, 27, 28	26
Format	512e/4Kn	512e/4Kn	512e/4Kn
Sustained transfer rate (MB/s, max/min)[4]	269/25	265/253	298/284
Idle_A (W), SATA/SAS[6]	2.8/3.2	5.5	265/253
ArmorCache™	Yes		
Reliability[7]	MTBF (M hours): 2.5 AFR: 0.35% Workloads: up to 550TB/year		
Security	Base (SE), SED, SED-FIPS		

Ultrastar Data Center HDDs

High-Capacity Helium CMR Hard Drives

	Ultrastar DC HC590	Ultrastar DC HC580	Ultrastar DC HC570
Interface	SATA 6Gb/s, SAS 12Gb/s	SATA 6Gb/s, SAS 12Gb/s	SATA 6Gb/s, SAS 12Gb/s
Rotational speed (RPM)	7200		
Form Factor	3.5-inch data center HDD		
Capacity (TB)[1]	24, 26	24	22, 24
Format	512e/4Kn: 4096	512e/4Kn: 4096	512e/4Kn
Sustained transfer rate (MB/s, max/min)[4]	298/284	298/284	291/277
Idle_A (W), SATA/SAS[6]	5.5/5.8	5.5	5.7/6.0
ArmorCache™	Yes		
Reliability[7]	MTBF (M hours): 2.5 / AFR: 0.35% / Workloads: up to 550TB/year		
Security	Base (SE), SED, SED-FIPS		

Ultrastar Data Center HDDs

Mid-Capacity Helium CMR Hard Drives

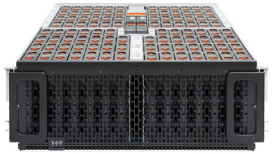
	Ultrastar DC HC560	Ultrastar DC HC555	Ultrastar DC HC550	Ultrastar DC HC520
Interface	SATA 6Gb/s, SAS 12Gb/s			
Rotational speed (RPM)	7200			
Form Factor	3.5-inch data center HDD			
Capacity (TB)[1]	20	12, 14, 16, 18, 20	14, 16, 18	12
Format	512e			
Sustained transfer rate (MB/s, max)[5]	291	269	269 (18TB) 262 (16TB)	243
Idle_A (W), SATA/SAS[6]	6.1/5.8	5.3/5.7	5.6/5.8	5.0/6.1
ArmorCache™	Yes			
Reliability[7]	MTBF (M hours): 2.5 AFR: 0.35% Workloads: up to 550TB/year			
Security	Base (SE), SED, SED-FIPS			

Ultrastar Data Center HDDs

Low-Capacity Air-filled CMR Hard Drives

	 Ultrastar DC HA340	 Ultrastar DC HC330	 Ultrastar DC HC320	 Ultrastar DC HC310	 Ultrastar DC HA210
Interface	SATA 6Gb/s	SATA 6Gb/s, SAS 12Gb/s			SATA 6Gb/s
Rotational speed (RPM)	7200				
Form Factor	3.5-inch data center HDD				
Capacity (TB)[1]	4, 6, 8, 10, 12	10	8	4, 6	1, 2
Format	512e	512e	512e	512n available on 4TB capacity	512n
Sustained transfer rate (MB/s, max)	267	262	255	255 233 w/512n	200 (2TB) 184 (1TB)
Idle (W), SATA/SAS	5.8/8.4	8.0/9.0	7.4/8.4	5.9/7.0	5.9/NA
Reliability	MTBF (M hours): 2 AFR: 0.44% Workloads: up to 550TB/year				
Security	Base (SE), SED, SED-FIPS				SE

Ultrastar Data Center Platforms

	Hybrid Storage Platforms	
		
	Ultrastar Data60	Ultrastar Data102
Storage Type	HDD	
Interface	SATA/SAS	
# Drives (up to)	60	102
Maximum Capacity (PB)[1]	1.8	3.06
Dimension	4U	
Features	IsoVibe ArcticFlow	

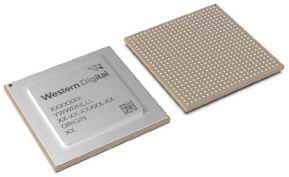
OpenFlex Data Center Platforms

	NVMe-oF Storage Platforms	
		
	OpenFlex Data24	**OpenFlex Data24 4000 Series**
Storage Type	SSD	SSD
Interface	NVMe (NVMe-oF) 2, 4, or 6 NICs	NVMe (NVMe-oF) 6 RapidFlex A2000s
Connection Type	RoCE	RoCE or TCP
# Drives (up to)	24	24
Maximum Capacity (TB)[1]	368	1474.56
Dimension	2U	2U

Ultrastar Transporters

	Data Transport Servers
	 Ultrastar Transporter
Device Type	Data Transporter and Edge Storage
Maximum Storage	24 Ultrastar DC SN650 NVMe SSDs 15.36TB per SSD, 1 DW/D, ISE (Instant Secure Erase)
Network Interface	Dual Port 200GbE QSFP112
Memory	128GiB DDR4 ECC DRAM
Display	Six-button, LCD/Character
Management	IPMI 2.0 system management Dual 10GBase-T RJ-45

RapidFlex Data Center Fabric Bridge

	NVMe-oF Controllers		
			
	RapidFlex A2000	**RapidFlex C2000**	**RapidFlex C2110**
Device Type	ASIC Fabric Bridge Device	Half-height / half-length NVMe Adapter	SFF-TA-1008 to SFF-8639 Interposer
Network Interface	vDual Ports 100 / 50 / 25 GbE		
PCIe Interface	PCIe Gen 4 x 16 lanes	PCIe Gen 4 x 16 lanes	PCIe Gen 4 x 4 lanes
NVMe Capability	NVMe 1.4 Compatible NVMe-oF 1.1 Compatible TCP and RoCEv2		
Dimension	25mm BGA	129.41mm x 68.95mm	68.8mm x 68.6mm
Features	Bridges NVMe to NVMe-oF running on Ethernet Fabrics Enables Composable Disaggregated Infrastructure (CDI)		

[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 1,000 TB. Actual capacity may be less due to operating environment.

[2] Endurance rating based on DW/D using 4KiB 100% random write and JESD 219 workloads over 5 years.

[3] Based on internal testing. Performance will vary by capacity point, changes in useable capacity, or security option. Consult product manual for further details. All performance measurements are in full sustained mode and are peak values. Subject to change.

[4] MTBF and AFR specifications are 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.

[5] Idle specification is based on use of Idle_A

[6] Based on internal testing; performance may vary depending on host environment, drive capacity, logical block address (LBA), and other factors. 1MiB = 1,048,576 bytes (2^20), 1MB = 1,000,000 bytes (10^6)

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

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