



20TB | 7200 RPM SATA 6Gb/s and SAS 12GB/s

Highlights

- Industry's first 20TB¹ HDD for data centers
- Integration of industry first EAMR & TSA technologies with HelioSeal® and host-managed SMR to deliver 11% more capacity than 18TB CMR drives
- Purpose-built for sequential write applications
- 2.5M hours (projected) MTBF² rating
- 5-year Limited Warranty

Applications

- Big Data or Bulk Storage
- Cloud Storage
- Social Media
- Content Libraries, Streaming Media and Digital Media Assets
- Online Back-up and Replication
- Compliance, Audits and Regulatory Records

The Increasing Demand for Higher Capacity HDDs

Cloud-based workloads continue to drive demand for high capacity HDDs. Content Delivery Networks (CDNs), artificial intelligence, machine learning, video analytics are just some examples of applications that are placing greater demands on storage. Data centers depend on higher capacity HDDs to create new business models and improve existing products and services while continually lowering their Total Cost of Ownership (TCO).

Host-Managed Shingled Magnetic Recording (SMR) for the Highest Capacities

The Ultrastar® DC HC650 20TB HDD with host-managed SMR enables the highest capacity HDDs for data centers. Media tracks are overlapped (or 'shingled') with adjacent tracks, resulting in greater tracks per inch (TPI) to achieve increased areal density.

SMR drives are specifically for sequential write environments. Data streams are organized and written sequentially. Adjacent tracks can be overlapped (or 'shingled'). Overlapping tracks are grouped into bands, called zones, of fixed capacity for more effective data organization and partial update capability.

Host-managed SMR relies on the host to manage and coalesce write streams within each zone for the capacity advantage compared to conventional data center HDDs. Host-managed SMR does require application changes to call Linux® libraries to enable data sequentialization of writes to the target zone.

Raising the Capacity Bar with New Technologies

Ultrastar DC HC650 integrates a suite of technologies on a 9-disk platform to create a new class of HDDs. 20TB capacity is achieved by combining SMR with technologies that improve areal density, improve IOPS and reduce power consumption.

- The first HDD in the industry to harness Energy-Assisted Magnetic Recording (EAMR) technology that enables higher media precision and therefore increased areal density.
- The industry's first Triple Stage Actuator (TSA) enhances head-positioning accuracy, delivering better performance and data integrity to increase areal density.
- HelioSeal® technology is the foundation for Western Digital's high capacity HDDs and this is the 6th generation of HelioSeal product. Western Digital has shipped >65 million HelioSeal products to date.

Features and Benefits

	Feature / Function	Benefits
Capacity	• 20TB	• Highest data center capacity for maximum TCO savings
Data Security	• Encryption options on both SATA and SAS models	• Hardware-based encryption helps protect data from unauthorized use (SED options)
Technology	• Triple Stage Actuator and Two-Dimensional Magnetic Recording (TDMR) technology • Rotational Vibration Safeguard (RVS) • Media Cache Plus architecture • SATA 6Gb/s & SAS 12Gb/s • 512MB Cache Buffer	• More accurate head positioning, especially in multi-drive systems, for better performance and data integrity • Maintains drive performance in high rotational vibration environments and multi-drive systems • Better performance • Provides compatibility with high-performance data centers • Improves response time and data management
Reliability	• Rotational Vibration Safeguard • 2.5M hours (projected) MTBF ² and 0.35% (projected) AFR • 5-year Limited Warranty	• Retains previous firmware version for safe firmware updates, verified with an RSA signature • Unsurpassed reliability rating for Capacity Enterprise HDD for fewer failures/less service needs
Performance	• 250MB/s (max) sustained transfer rate	• Unbeaten for enterprise-class hard drives • Consistent, predictable performance for sequential workloads
Power Efficiency	• Extremely low Watts/TB • Advanced power management technology	• 10% better power efficiency, at idle, than Ultrastar DC HC550 • Additional power savings with instant-on capability

Specifications

	SATA Models	SAS Models
Model Number	WSH722020ALN6Lz*	WSH722020AL420z*
Configuration		
Interface	SATA 6Gb/s	SAS 12Gb/s
Capacity ¹	20TB	←
Format: Sector size (bytes) ³	4Kn: 4096 512e: 512	4Kn: 4096, 4160, 4224 512e: 512, 520, 528
Areal Density (Gbits/sq. in, max)	1160	←
Performance		
Data buffer ⁴ (MB)	512	←
Rotational speed (RPM)	7200	←
Latency average (ms)	4.16	←
Interface transfer rate (MB/s, max)	600	1200
Sustained transfer rate ⁵ , projected (MB/s, max) / (MiB/s, max)	250/238	←
Reliability		
Error rate (non-recoverable bits read)	1 in 10 ¹⁵	←
Load/Unload cycles (at 40°C)	600,000	←
Availability (hrs/day x days/wk)	24x7	←
MTBF ² (M hours, projected)	2.5	←
Annualized Failure Rate ² (AFR, projected)	0.35%	←
Workloads	Up to 550 TB/year	←
Limited warranty (yrs)	5	←

* See **How to Read Model Number** for possible values for z.

¹ One MB is equal to one million bytes, one GB is equal to one billion bytes and one TB equals 1,000GB (one trillion bytes). Actual user capacity may be less due to operating environment.

² Projected values. 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, workload 220TB/year and temperature 40C. 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.

³ Advanced Format drive: 4K (4096-byte) physical sectors.

⁴ Portion of buffer capacity used for drive firmware

⁵ Based on internal testing; performance may vary depending on host environment, drive capacity and other factors. 1MiB = 1,048,576 bytes (2²⁰), 1MB = 1,000,000 bytes (10⁶)

⁶ SATA models: Random RW 50/50 8KB QD=1, SAS models: Random RW 50/50 4KB QD=4

⁷ Idle specification is based on use of Idle_A

	SATA Models	SAS Models
Acoustics		
Idle/Operating (Bels, typical)	2.0/3.6	←
Power		
Requirement	+5 VDC, +12VDC	←
Operating ⁶ (W)	6.3	8.4
Idle ⁷ (W)	5.6	5.8
Power consumption efficiency at idle (Watts/TB)	0.28	0.29
Physical Size		
z-height (mm)	26.1	←
Dimensions (width x depth, mm)	101.6 (+/-0.25) x 147	←
Weight (g, max)	690	←
Environmental (Operating)		
Ambient temperature	5° to 60°C	←
Shock (half-sine wave, 2ms, G)	50	←
Vibration (G RMS, 5 to 500Hz)	0.67 (XYZ)	←
Environmental (Non-operating)		
Ambient temperature	-40° to 70°C	←
Shock (half-sine wave, 2ms, G)	250 (2ms)	←
Vibration (G RMS, 2 to 200Hz)	1.04 (XYZ)	←
How to Read Model Number		

Example: WSH722020ALN6L4 = 20TB SATA 6Gb/s, 4Kn, legacy P3, Base (SE)

W = Western Digital

S = Ultrastar

H = Helium (vs. S for Standard)

72 = 7200 RPM

20 = Full capacity (20TB)

20 = Capacity this model (20TB)

A = Generation code

L = 26.1 z-height

N6/42 = Interface

N6=4Kn SATA 6Gb/s,

42=4Kn SAS 12Gb/s)

L = Power Disable Pin 3 status

(0 = Power Disable Pin 3 support

L = Legacy Pin 3 config – No Power Disable Support)

z = Data Security Mode

1 = SED**: Self Encrypting Drive.

TCG-Enterprise and Sanitize Crypto Scramble / Erase.

4 = Base (SE)**: No Encryption. Sanitize Overwrite only.

5 = SED-FIPS: SAS w/ certification (SAS only).

** ATA Security Feature Set comes standard on SATA

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