



DATA SHEET

Scalable. Responsive. Innovative.

Exos X16



Seagate manufactures hard drives that specifically address the needs of the hyperscale storage market. As the flagship of the Seagate® X class, the Exos® X16 enterprise hard drives are the highest-capacity hard drives in the fleet.



Maximum Storage Capacity for Highest Rack Space Efficiency

Industry's first 16 TB drive for 33% more petabytes per rack¹

Highest 16 TB hard drive performance with enhanced caching, making it perfect for cloud data centre and massive scale-out data centre applications

Hyperscale SATA model tuned for large data transfers and low latency

PowerBalance™ feature optimises Watts/TB

Helium sealed-drive design delivers lower total cost of ownership through lower power and weight

Next-generation helium side-sealing weld technology for added handling robustness and leak protection

Digital environmental sensors to monitor internal drive conditions for optimal operation and performance

Data protection and security: Seagate Secure™ features for safe, affordable, fast, and easy drive retirement

Proven enterprise-class reliability backed by **5-year limited warranty and 2.5M-hr MTBF rating**

Best-Fit Applications

- Hyperscale applications/cloud data centres
- Massive scale-out data centres
- Big data applications
- High-capacity density RAID storage
- Mainstream enterprise external storage arrays
- Distributed file systems, including Hadoop and Ceph
- Enterprise backup and restore — D2D, virtual tape
- Centralised surveillance

¹ Compared to 12 TB competitive product



Specifications	SATA 6 Gb/s	12 Gb/s SAS	SATA 6 Gb/s	12 Gb/s SAS	SATA 6 Gb/s
Capacity	16 TB	16 TB	14 TB	14 TB	12 TB
Standard Model FastFormat™ (512e/4Kn) ¹	ST16000NM001G	ST16000NM002G	ST14000NM001G	ST14000NM002G	ST12000NM001G
SED Model FastFormat (512e/4Kn) ^{1,2}	ST16000NM003G	ST16000NM004G	ST14000NM003G	ST14000NM004G	ST12000NM003G
SED-FIPS FastFormat (512e/4Kn) ^{1,2}	—	ST16000NM009G	—	ST14000NM012G	—
Features					
Helium Sealed-Drive Design	Yes	Yes	Yes	Yes	Yes
Protection Information (T10 DIF)	—	Yes	—	Yes	—
SuperParity	Yes	Yes	Yes	Yes	Yes
Low Halogen	Yes	Yes	Yes	Yes	Yes
PowerChoice™ Idle Power Technology	Yes	Yes	Yes	Yes	Yes
PowerBalance™ Power/Performance Technology	Yes	Yes	Yes	Yes	Yes
Hot-Plug Support ³	Yes	Yes	Yes	Yes	Yes
Cache, Multi-segmented (MB)	256	256	256	256	256
Organic Solderability Preservative	Yes	Yes	Yes	Yes	Yes
RSA 2048 Firmware Verification (SD&D)	Yes	Yes	Yes	Yes	Yes
Reliability/Data Integrity					
Mean Time Between Failures (MTBF, hours)	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Reliability Rating @ Full 24x7 Operation (AFR)	0.35%	0.35%	0.35%	0.35%	0.35%
Non-recoverable Read Errors per Bits Read	1 sector per 10E15	1 sector per 10E15	1 sector per 10E15	1 sector per 10E15	1 sector per 10E15
Power-On Hours per Year (24x7)	8,760	8,760	8,760	8,760	8,760
512e Sector Size (Bytes per Sector)	512	512, 520, 528	512	512, 520, 528	512
4Kn Sector Size (Bytes per Sector)	4,096	4,096, 4,160, 4,224	4,096	4,096, 4,160, 4,224	4,096
Limited Warranty (years)	5	5	5	5	5
Performance					
Spindle Speed (RPM)	7,200 RPM	7,200 RPM	7,200 RPM	7,200 RPM	7,200 RPM
Interface Access Speed (Gb/s)	6.0, 3.0	12.0, 6.0, 3.0	6.0, 3.0	12.0, 6.0, 3.0	6.0, 3.0
Max. Sustained Transfer Rate OD (MB/s, MiB/s)	261, 249	261, 249	261, 249	261, 249	245, 233
Random Read/Write 4K QD16 WCD (IOPS)	170/440	170/440	170/440	170/440	170/440
Average Latency (ms)	4.16	4.16	4.16	4.16	4.16
Interface Ports	Single	Dual	Single	Dual	Single
Rotation Vibration @ 20-1500 Hz (rad/sec ²)	12.5	12.5	12.5	12.5	12.5
POWER CONSUMPTION					
Idle A (W) Average	5 W	5 W	5 W	5 W	5 W
Max Operating, Random Read/Write 4K/16Q (W)	10.0, 6.3	10.2, 6.2	10.0, 6.3	10.2, 6.2	9.5, 6.0
Power Supply Requirements	+12 V and +5 V	+12 V and +5 V	+12 V and +5 V	+12 V and +5 V	+12 V and +5 V
Environmental					
Temperature, Operating (°C)	5°C – 60°C	5°C – 60°C	5°C – 60°C	5°C – 60°C	5°C – 60°C
Vibration, Non-operating: 2 to 500 Hz (Grms)	2.27	2.27	2.27	2.27	2.27
Shock, Operating 2 ms (Read/Write) (Gs)	50	50	50	50	50
Shock, Non-operating 2 ms (GS)	200	200	200	200	200
Physical					
Height (mm/in, max) ⁴	26.11 mm/1.028 in	26.11 mm/1.028 in	26.11 mm/1.028 in	26.11 mm/1.028 in	26.11 mm/1.028 in
Width (mm/in, max) ⁴	101.85 mm/4.01 in	101.85 mm/4.01 in	101.85 mm/4.01 in	101.85 mm/4.01 in	101.85 mm/4.01 in
Depth (mm/in, max) ⁴	147 mm/5.787 in	147 mm/5.787 in	147 mm/5.787 in	147 mm/5.787 in	147 mm/5.787 in
Weight (lb/g)	670 g/1.477 lb	670 g/1.477 lb	670 g/1.477 lb	670 g/1.477 lb	670 g/1.477 lb
Carton Unit Quantity	20	20	20	20	20
Cartons per Pallet / Cartons per Layer	40/8	40/8	40/8	40/8	40/8

¹ FastFormat models ship in 512e format state. When switching from 512e to 4Kn by executing the FastFormat routine, all data on the drive will be deleted. Note that data must be aligned to 4K sectors to see improved performance in 4Kn format.

² Self-Encrypting Drives (SED) and FIPS 140-2 Validated drives available through franchised authorised distributors. May require TCG-compliant host or controller support.

³ Supports Hotplug operation per Serial ATA Revision 3.3 specification

⁴ These base deck dimensions conform to the Small Form Factor Standard (SFF-8301) found at www.sffcommittee.org. For connector-related dimensions, see SFF-8323.



Specifications	12Gb/s SAS	SATA 6 Gb/s	12 Gb/s SAS
Capacity	12 TB	10 TB	10 TB
Standard Model FastFormat™ (512e/4Kn) ¹	ST12000NM002G	ST10000NM001G	ST10000NM002G
SED Model FastFormat (512e/4Kn) ^{1,2}	ST12000NM004G	ST10000NM003G	ST10000NM004G
SED-FIPS FastFormat (512e/4Kn) ^{1,2}	ST12000NM008G	—	ST10000NM010G
Features			
Helium Sealed-Drive Design	Yes	Yes	Yes
Protection Information (T10 DIF)	Yes	—	Yes
SuperParity	Yes	Yes	Yes
Low Halogen	Yes	Yes	Yes
PowerChoice™ Idle Power Technology	Yes	Yes	Yes
PowerBalance™ Power/Performance Technology	Yes	Yes	Yes
Hot-Plug Support ³	Yes	Yes	Yes
Cache, Multi-segmented (MB)	256	256	256
Organic Solderability Preservative	Yes	Yes	Yes
RSA 2048 Firmware Verification (SD&D)	Yes	Yes	Yes
Reliability/Data Integrity			
Mean Time Between Failures (MTBF, hours)	2,500,000	2,500,000	2,500,000
Reliability Rating @ Full 24x7 Operation (AFR)	0.35%	0.35%	0.35%
Non-recoverable Read Errors per Bits Read	1 sector per 10E15	1 sector per 10E15	1 sector per 10E15
Power-On Hours per Year (24x7)	8,760	8,760	8,760
512e Sector Size (Bytes per Sector)	512, 520, 528	512	512, 520, 528
4Kn Sector Size (Bytes per Sector)	4096, 4160, 4224, 4096, 4160, 4224	4,096	4096, 4160, 4224, 4096, 4160, 4224
Limited Warranty (years)	5	5	5
Performance			
Spindle Speed (RPM)	7,200 RPM	7,200 RPM	7,200 RPM
Interface Access Speed (Gb/s)	12.0, 6.0, 3.0	6.0, 3.0	12.0, 6.0, 3.0
Max. Sustained Transfer Rate OD (MB/s, MiB/s)	245, 233	245, 233	245, 233
Random Read/Write 4K QD16 WCD (IOPS)	170/440	170/440	170/440
Average Latency (ms)	4.16	4.16	4.16
Interface Ports	Dual	Single	Dual
Rotation Vibration @ 20-1500 Hz (rad/sec ²)	12.5	12.5	12.5
POWER CONSUMPTION			
Idle A (W) Average	5 W	5 W	5 W
Max Operating, Random Read/Write 4K/16Q (W)	10.0, 6.2	9.5, 6.0	10.0, 6.2
Power Supply Requirements	+12 V and +5 V	+12 V and +5 V	+12 V and +5 V
Environmental			
Temperature, Operating (°C)	5°C – 60°C	5°C – 60°C	5°C – 60°C
Vibration, Non-operating: 2 to 500 Hz (Grms)	2.27	2.27	2.27
Shock, Operating 2 ms (Read/Write) (Gs)	50	50	50
Shock, Non-operating 2 ms (GS)	200	200	200
Physical			
Height (mm/in, max) ⁴	26.11 mm/1.028 in	26.11 mm/1.028 in	26.11 mm/1.028 in
Width (mm/in, max) ⁴	101.85 mm/4.01 in	101.85 mm/4.01 in	101.85 mm/4.01 in
Depth (mm/in, max) ⁴	147 mm/5.787 in	147 mm/5.787 in	147 mm/5.787 in
Weight (lb/g)	670 g/1.477 lb	670 g/1.477 lb	670 g/1.477 lb
Carton Unit Quantity	20	20	20
Cartons per Pallet / Cartons per Layer	40/8	40/8	40/8, 40 / 8

¹ FastFormat models ship in 512e format state. When switching from 512e to 4Kn by executing the FastFormat routine, all data on the drive will be deleted. Note that data must be aligned to 4K sectors to see improved performance in 4Kn format.

² Self-Encrypting Drives (SED) and FIPS 140-2 Validated drives available through franchised authorised distributors. May require TCG-compliant host or controller support.

³ Supports Hotplug operation per Serial ATA Revision 3.3 specification

⁴ These base deck dimensions conform to the Small Form Factor Standard (SFF-8301) found at www.sffcommittee.org. For connector-related dimensions, see SFF-8323.

© 2019 Seagate Technology LLC. All rights reserved. Seagate, Seagate Technology, and the Spiral logo are registered trademarks of Seagate Technology LLC in the United States and/or other countries. Exos, the Exos logo, FastFormat, PowerBalance, and PowerChoice are either trademarks or registered trademarks of Seagate Technology LLC or one of its affiliated companies in the United States and/or other countries. All other trademarks or registered trademarks are the property of their respective owners. When referring to drive capacity, one gigabyte, or GB, equals one billion bytes; and one terabyte, or TB, equals one trillion bytes. Your computer's operating system may use a different standard of measurement and report a lower capacity. In addition, some of the listed capacity is used for formatting and other functions, and thus will not be available for data storage. Actual data rates may vary depending on operating environment and other factors, such as chosen interface and disk capacity. The export or re-export of Seagate hardware or software is regulated by the U.S. Department of Commerce, Bureau of Industry and Security (for more information, visit www.bis.doc.gov), and may be controlled for export, import and use in other countries. Seagate reserves the right to change, without notice, product offerings or specifications. DS2011.2-1910GB October 2019