



## DATA SHEET

Exos X24—Powerful performance. Proven technology. Scalable design.



Powerful performance with proven technology—Seagate's® Exos® X24 drives are built off the platform that's shipped millions globally and deployed in leading cloud service provider solutions—making them the most sought-after drives in our datasphere. Designed with the highest rack-space efficiency and protected with Seagate Secure™, Exos X24 offers extreme market-leading capacity, earning customer confidence by delivering trusted peace of mind.



### Best-Fit Applications

- Scalable hyperscale applications/cloud data centers
- Massive scale-out data centers
- 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
- Centralized surveillance

## Maximum Storage Capacity for Highest Rack Space Efficiency

**Market-leading 24TB HDD** offering the highest capacity available for more petabytes per rack<sup>1</sup>

**Highly reliable performance** with enhanced caching—making it the logical choice for cloud data center and massive scale-out data center applications

**Hyperscale SATA model** tuned for large data transfers and low latency

**PowerBalance™** feature optimizes watts per TB

**Maximize total cost of ownership savings** through lower power and weight with helium-sealed drive design

**Proven 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**—featuring Seagate Instant Secure for safe, affordable, fast, and easy drive retirement

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

<sup>1</sup> Compared to 20TB competitive product



| Specifications                                                   | SATA 6Gb/s       |                  |                  |                  |
|------------------------------------------------------------------|------------------|------------------|------------------|------------------|
| Capacity                                                         | 24TB             | 20TB             | 16TB             | 12TB             |
| Standard Model - Seagate Instant Secure Erase (ISE) <sup>1</sup> | ST24000NM002H    | ST20000NM002H    | ST16000NM002H    | ST12000NM002H    |
| SED Model <sup>2</sup>                                           | ST24000NM001H    | ST20000NM001H    | ST16000NM001H    | ST12000NM001H    |
| SED-FIPS <sup>2</sup>                                            | —                | —                | —                | —                |
| FEATURES                                                         |                  |                  |                  |                  |
| Helium Sealed-Drive Design                                       | Yes              | Yes              | Yes              | Yes              |
| Conventional Magnetic Recording (CMR)                            | Yes              | Yes              | Yes              | Yes              |
| Protection Information (T10 DIF)                                 | —                | —                | —                | —                |
| Super Parity                                                     | Yes              | Yes              | Yes              | Yes              |
| Low Halogen                                                      | Yes              | Yes              | Yes              | Yes              |
| PowerChoice™ Idle Power Technology                               | Yes              | Yes              | Yes              | Yes              |
| PowerBalance™ Power/Performance Technology                       | Yes              | Yes              | Yes              | Yes              |
| Hot-Plug Support <sup>3</sup>                                    | Yes              | Yes              | Yes              | Yes              |
| Cache, Multisegmented (MB)                                       | 512              | 512              | 512              | 512              |
| Organic Solderability Preservative                               | Yes              | Yes              | Yes              | Yes              |
| RSA 3072 Firmware Verification (SD&D)                            | Yes              | Yes              | Yes              | Yes              |
| RELIABILITY/DATA INTEGRITY                                       |                  |                  |                  |                  |
| Mean Time Between Failures (MTBF, hours)                         | 2500000hr        | 2500000hr        | 2500000hr        | 2500000hr        |
| Reliability Rating @ Full 24x7 Operation (AFR)                   | 0.35%            | 0.35%            | 0.35%            | 0.35%            |
| Nonrecoverable Read Errors per Bits Read                         | <1 in 10E15      | <1 in 10E15      | <1 in 10E15      | <1 in 10E15      |
| Power-On Hours per Year (24x7)                                   | 8760             | 8760             | 8760             | 8760             |
| 512e Sector Size (Bytes per Sector)                              | 512              | 512              | 512              | 512              |
| 4Kn Sector Size (Bytes per Sector)                               | 4096             | 4096             | 4096             | 4096             |
| Limited Warranty (years)                                         | 5                | 5                | 5                | 5                |
| PERFORMANCE                                                      |                  |                  |                  |                  |
| Spindle Speed (RPM)                                              | 7200RPM          | 7200RPM          | 7200RPM          | 7200RPM          |
| Interface Access Speed (Gb/s)                                    | 6.0, 3.0         | 6.0, 3.0         | 6.0, 3.0         | 6.0, 3.0         |
| Max. Sustained Transfer Rate OD (MB/s, MiB/s)                    | 285/272          | 285/272          | 285/272          | 285/272          |
| Random Read/Write 4K QD16 WCD (IOPS)                             | 168/550          | 168/550          | 168/550          | 168/550          |
| Average Latency (ms)                                             | 4.16ms           | 4.16ms           | 4.16ms           | 4.16ms           |
| Interface Ports                                                  | Single           | Single           | Single           | Single           |
| Rotation Vibration @ 20-1500 Hz (rad/sec <sup>2</sup> )          | 12.5             | 12.5             | 12.5             | 12.5             |
| POWER                                                            |                  |                  |                  |                  |
| Idle A (W) Average                                               | 6.3              | 6.3              | 6.3              | 6.3              |
| Max Operating, Random Read/Write 4K/16Q (W)                      | 8.9, 7.1         | 8.9, 7.1         | 8.9, 7.1         | 8.9, 7.1         |
| Power Supply Requirements                                        | +12V and +5V     | +12V and +5V     | +12V and +5V     | +12V and +5V     |
| ENVIRONMENTAL                                                    |                  |                  |                  |                  |
| Temperature, Operating (°C)                                      | 10°C – 60°C      | 10°C – 60°C      | 10°C – 60°C      | 10°C – 60°C      |
| Vibration, Nonoperating: 2 to 500Hz (Grms)                       | 2.27             | 2.27             | 2.27             | 2.27             |
| Shock, Operating 2ms (Read/Write) (Gs)                           | 40Gs             | 40Gs             | 40Gs             | 40Gs             |
| Shock, Nonoperating 2ms (Gs)                                     | 200              | 200              | 200              | 200              |
| PHYSICAL                                                         |                  |                  |                  |                  |
| Height (mm/in, max) <sup>4</sup>                                 | 26.1mm/1.028in   | 26.1mm/1.028in   | 26.1mm/1.028in   | 26.1mm/1.028in   |
| Width (mm/in, max) <sup>4</sup>                                  | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in |
| Depth (mm/in, max) <sup>4</sup>                                  | 147mm/5.787in    | 147mm/5.787in    | 147mm/5.787in    | 147mm/5.787in    |
| Weight (gm/lb)                                                   | 685g/1.51lb      | 685g/1.51lb      | 685g/1.51lb      | 685g/1.51lb      |
| Carton Unit Quantity                                             | 20               | 20               | 20               | 20               |
| Cartons per Pallet/Cartons per Layer                             | 40 / 8           | 40 / 8           | 40 / 8           | 40 / 8           |

<sup>1</sup> 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.

<sup>2</sup> Self-Encrypting Drives (SED) and FIPS 140-3 Validated drives available through franchised authorized distributors. May require TCG-compliant host or controller support.

<sup>3</sup> Supports Hotplug operation per Serial ATA Revision 3.5 specification

<sup>4</sup> These base deck dimensions conform to the Small Form Factor Standard (SFF-8301) found at <https://www.snia.org/sff>. For connector-related dimensions, see SFF-8323.



| Specifications                                                   | SAS 12Gb/s       |                  |                  |                  |
|------------------------------------------------------------------|------------------|------------------|------------------|------------------|
| Capacity                                                         | 24TB             | 20TB             | 16TB             | 12TB             |
| Standard Model - Seagate Instant Secure Erase (ISE) <sup>1</sup> | ST24000NM007H    | ST20000NM007H    | ST16000NM007H    | ST12000NM007H    |
| SED Model <sup>2</sup>                                           | ST24000NM005H    | ST20000NM005H    | ST16000NM005H    | ST12000NM005H    |
| SED-FIPS <sup>2</sup>                                            | ST24000NM006H    | ST20000NM006H    | ST16000NM006H    | ST12000NM009H    |
| FEATURES                                                         |                  |                  |                  |                  |
| Helium Sealed-Drive Design                                       | Yes              | Yes              | Yes              | Yes              |
| Conventional Magnetic Recording (CMR)                            | Yes              | Yes              | Yes              | Yes              |
| Protection Information (T10 DIF)                                 | Yes              | Yes              | Yes              | Yes              |
| Super Parity                                                     | Yes              | Yes              | Yes              | Yes              |
| Low Halogen                                                      | Yes              | Yes              | Yes              | Yes              |
| PowerChoice™ Idle Power Technology                               | Yes              | Yes              | Yes              | Yes              |
| PowerBalance™ Power/Performance Technology                       | Yes              | Yes              | Yes              | Yes              |
| Hot-Plug Support <sup>3</sup>                                    | Yes              | Yes              | Yes              | Yes              |
| Cache, Multisegmented (MB)                                       | 512              | 512              | 512              | 512              |
| Organic Solderability Preservative                               | Yes              | Yes              | Yes              | Yes              |
| RSA 3072 Firmware Verification (SD&D)                            | Yes              | Yes              | Yes              | Yes              |
| RELIABILITY/DATA INTEGRITY                                       |                  |                  |                  |                  |
| Mean Time Between Failures (MTBF, hours)                         | 2500000hr        | 2500000hr        | 2500000hr        | 2500000hr        |
| Reliability Rating @ Full 24x7 Operation (AFR)                   | 0.35%            | 0.35%            | 0.35%            | 0.35%            |
| Nonrecoverable Read Errors per Bits Read                         | <1 in 10E15      | <1 in 10E15      | <1 in 10E15      | <1 in 10E15      |
| Power-On Hours per Year (24x7)                                   | 8760             | 8760             | 8760             | 8760             |
| 512e Sector Size (Bytes per Sector)                              | 512, 520, 528    | 512, 520, 528    | 512, 520, 528    | 512, 520, 528    |
| 4Kn Sector Size (Bytes per Sector)                               | 4096, 4160, 4224 | 4096, 4160, 4224 | 4096, 4160, 4224 | 4096, 4160, 4224 |
| Limited Warranty (years)                                         | 5                | 5                | 5                | 5                |
| PERFORMANCE                                                      |                  |                  |                  |                  |
| Spindle Speed (RPM)                                              | 7200RPM          | 7200RPM          | 7200RPM          | 7200RPM          |
| Interface Access Speed (Gb/s)                                    | 12.0, 6.0, 3.0   | 12.0, 6.0, 3.0   | 12.0, 6.0, 3.0   | 12.0, 6.0, 3.0   |
| Max. Sustained Transfer Rate OD (MB/s, MiB/s)                    | 285/272          | 285/272          | 285/272          | 285/272          |
| Random Read/Write 4K QD16 WCD (IOPS)                             | 168/550          | 168/550          | 168/550          | 168/550          |
| Average Latency (ms)                                             | 4.16ms           | 4.16ms           | 4.16ms           | 4.16ms           |
| Interface Ports                                                  | Dual             | Dual             | Dual             | Dual             |
| Rotation Vibration @ 20-1500 Hz (rad/sec <sup>2</sup> )          | 12.5             | 12.5             | 12.5             | 12.5             |
| POWER                                                            |                  |                  |                  |                  |
| Idle A (W) Average                                               | 6.5              | 6.5              | 6.5              | 6.5              |
| Max Operating, Random Read/Write 4K/16Q (W)                      | 9.8, 8.2         | 9.8, 8.2         | 9.8, 8.2         | 9.8, 8.2         |
| Power Supply Requirements                                        | +12V and +5V     | +12V and +5V     | +12V and +5V     | +12V and +5V     |
| ENVIRONMENTAL                                                    |                  |                  |                  |                  |
| Temperature, Operating (°C)                                      | 10°C – 60°C      | 10°C – 60°C      | 10°C – 60°C      | 10°C – 60°C      |
| Vibration, Nonoperating: 2 to 500Hz (Grms)                       | 2.27             | 2.27             | 2.27             | 2.27             |
| Shock, Operating 2ms (Read/Write) (Gs)                           | 40Gs             | 40Gs             | 40Gs             | 40Gs             |
| Shock, Nonoperating 2ms (Gs)                                     | 200              | 200              | 200              | 200              |
| PHYSICAL                                                         |                  |                  |                  |                  |
| Height (mm/in, max) <sup>4</sup>                                 | 26.1mm/1.028in   | 26.1mm/1.028in   | 26.1mm/1.028in   | 26.1mm/1.028in   |
| Width (mm/in, max) <sup>4</sup>                                  | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in |
| Depth (mm/in, max) <sup>4</sup>                                  | 147mm/5.787in    | 147mm/5.787in    | 147mm/5.787in    | 147mm/5.787in    |
| Weight (gm/lb)                                                   | 685g/1.51lb      | 685g/1.51lb      | 685g/1.51lb      | 685g/1.51lb      |
| Carton Unit Quantity                                             | 20               | 20               | 20               | 20               |
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