



DATA SHEET—SEAGATE CONFIDENTIAL

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.





Best-Fit Applications

- 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

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

Highest 16TB hard drive performance with enhanced caching, making it perfect 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/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**





| Sandard Model FastFormat (512e/4Kn) ST16000NM001G ST16000NM002G ST14000NM001G ST1000NM001G ST1000NM001G ST14000NM001G ST1400NM001G ST1400NM001G ST1400NM001G ST1400NM000G ST140 | Specifications | SATA 6Gb/s | 12Gb/s SAS | SATA 6Gb/s | 12Gb/s SAS | SATA 6Gb/s |
|--|--|------------------|------------------|------------------|------------------|------------------|
| StriboomMooto ST14000MMooto ST14000MMoot | | | | | | |
| SED Model FaelFormal (512e/4Km) | • | | | | | |
| SEC-PIPS Fast-Formal (312e/44fo) | | | | | | |
| Helium Saled-Drive Design | ` | | | | | |
| Hellum Sealed-Drive Design | | | 3110000111110090 | | 3114000NW012G | _ |
| Protection Information (T10 DIF) | | Ves | Voc | Voc | Voc | Voc |
| SuperParity | • | | | | | |
| Low Halogen | , | Ves | | Voc | | Vec |
| PowerChoice Ide Power Technology Yes Yes | | | | | | |
| PowerBalance PowerPerformance Technology Yes | | | | | | |
| Holf-Plug Support Yes Cache, Multisegmented (MB) 256 25 | 71 | | | | | |
| Cache, Multisgreented (MB) 256 256 256 256 256 256 256 256 256 256 256 256 256 256 256 256 256 256 70ganic Solderability Preservative Yes | | | | | | |
| Organic Solderability Preservative Yes 7e70th Yes Yes Yes | 2 1. | | | | | |
| New Yes Relicibility/Data Integrity | | | | | | |
| Mean Time Between Failures (MTBF, hours) 2,500,000 | | | | | | |
| Mean Time Between Failures (MTBF, hours) 2,500,000 | , | Yes | Yes | Yes | Yes | Yes |
| Reliability Rating @ Full 24×7 Operation (AFR) 0.35% 0.36% 0.860 0.8 | | | | | | |
| Nonrecoverable Read Errors per Bits Read | , , , | | | | | |
| Power-On Hours per Year (24×7) | | | | | | |
| 512e Sector Size (Bytes per Sector) 512 512, 520, 528 512 512, 520, 528 512 4Kn Sector Size (Bytes per Sector) 4096 4096, 4160, 4224 4096 4096, 4160, 4224 4096 Limited Warranty (years) 5 5 5 5 5 Formance Spindle Speed (RPM) 7200RPM 7200RPM </td <td></td> <td></td> <td>-</td> <td></td> <td>-</td> <td>· ·</td> | | | - | | - | · · |
| AVER Sector Size (Bytes per Sector) | | | | | | |
| Limited Warranty (years) 5 5 5 5 5 5 5 5 5 | | | | | - ' ' | |
| Performance Spindle Speed (RPM) 7200RPM 7200RPM | 4Kn Sector Size (Bytes per Sector) | | | | | |
| Spindle Speed (RPM) 7200RPM 72 | Limited Warranty (years) | 5 | 5 | 5 | 5 | 5 |
| Interface Access Speed (Gb/s) | Performance | | | | | |
| Max. Sustained Transfer Rate OD (MB/s,MiB/s) 261, 249 261, 249 261, 249 261, 249 261, 249 261, 249 261, 249 245, 233 Random Read/Write 4K QD16 WCD (IOPS) 170/440 110/6 110 180 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 | Spindle Speed (RPM) | 7200RPM | 7200RPM | 7200RPM | 7200RPM | 7200RPM |
| Random Read/Write 4K QD16 WCD (IOPS) 170/440 170/4 | 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 |
| Average Latency (ms) 4.16 4.16 4.16 4.16 4.16 4.16 1.16 | Max. Sustained Transfer Rate OD (MB/s,MiB/s) | 261, 249 | 261, 249 | 261, 249 | 261, 249 | 245, 233 |
| Interface Ports | Random Read/Write 4K QD16 WCD (IOPS) | 170/440 | 170/440 | 170/440 | 170/440 | 170/440 |
| Rotation Vibration @ 20-1500 Hz (rad/sec²) 12.5 | Average Latency (ms) | 4.16 | 4.16 | 4.16 | 4.16 | 4.16 |
| Dower Consumption Idle A (W) Average | Interface Ports | Single | Dual | Single | Dual | Single |
| Idle A (W) Average 5.00W 5.0W 5.0W 5.0W 5.0W 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 | Rotation Vibration @ 20-1500 Hz (rad/sec²) | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| 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 | Power Consumption | | | | | |
| Power Supply Requirements | Idle A (W) Average | 5.00W | 5.0W | 5.00W | 5.0W | 5.0W |
| Environmental Temperature, Operating (°C) 5°C - 60°C 2.27 2.20 20 20 | 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 |
| Temperature, Operating (°C) 5°C - 60°C 2.27 2.20 20 20 20 20 20 20 20 20 | Power Supply Requirements | +12 V and +5 V |
| Vibration, Nonoperating: 2 to 500Hz (Grms) 2.27 2.27 2.27 2.27 2.27 Shock, Operating 2ms (Read/Write) (Gs) 50 50 50 50 50 Shock, Nonoperating 2ms (Gs) 200 200 200 200 200 Physical Height (mm/in, max) ⁴ 26.11mm/1.028in | Environmental | | | | | |
| Shock, Operating 2ms (Read/Write) (Gs) 50 50 50 50 50 Shock, Nonoperating 2ms (Gs) 200 200 200 200 200 200 Physical Height (mm/in, max) ⁴ 26.11mm/1.028in < | Temperature, Operating (°C) | 5°C – 60°C |
| Shock, Nonoperating 2ms (Gs) 200 200 200 200 200 Physical Height (mm/in, max) ⁴ 26.11mm/1.028in | Vibration, Nonoperating: 2 to 500Hz (Grms) | 2.27 | 2.27 | 2.27 | 2.27 | 2.27 |
| Physical Height (mm/in, max) ⁴ 26.11mm/1.028in 26.11mm/1.02 | Shock, Operating 2ms (Read/Write) (Gs) | 50 | 50 | 50 | 50 | 50 |
| Height (mm/in, max) ⁴ 26.11mm/1.028in 26. | Shock, Nonoperating 2ms (Gs) | 200 | 200 | 200 | 200 | 200 |
| Width (mm/in, max) ⁴ 101.85mm/4.010in 101.85mm/4.0 | Physical | | | | | |
| Depth (mm/in, max) ⁴ 147.00mm/5.787in 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 20 20 20 20 20 | Height (mm/in, max) ⁴ | 26.11mm/1.028in | 26.11mm/1.028in | 26.11mm/1.028in | 26.11mm/1.028in | 26.11mm/1.028in |
| Depth (mm/in, max) ⁴ 147.00mm/5.787in 147.00mm/5.7 | Width (mm/in, max) ⁴ | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in |
| Weight (g/lb) 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 670g/1.477lb 20 20 20 20 20 20 | | 147.00mm/5.787in | 147.00mm/5.787in | 147.00mm/5.787in | 147.00mm/5.787in | 147.00mm/5.787in |
| Carton Unit Quantity 20 20 20 20 | | 670g/1.477lb | 670g/1.477lb | 670g/1.477lb | 670g/1.477lb | 670g/1.477lb |
| | | | 20 | | 20 | |
| | • | 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 authorized 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 6Gb/s | 12Gb/s SAS |
|--|--------------------|--------------------|--------------------|
| Capacity | 12TB | 10TB | 10TB |
| 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, Multisegmented (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 24×7 Operation (AFR) | 0.35% | 0.35% | 0.35% |
| Nonrecoverable Read Errors per Bits Read | 1 sector per 10E15 | 1 sector per 10E15 | 1 sector per 10E15 |
| Power-On Hours per Year (24×7) | 8760 | 8760 | 8760 |
| 512e Sector Size (Bytes per Sector) | 512, 520, 528 | 512 | 512, 520, 528 |
| 4Kn Sector Size (Bytes per Sector) | 4096, 4160,4224 | 4096 | 4096, 4160,4224 |
| Limited Warranty (years) | 5 | 5 | 5 |
| Performance | | • | |
| Spindle Speed (RPM) | 7200RPM | 7200RPM | 7200RPM |
| 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/sec²) | 12.5 | 12.5 | 12.5 |
| Power Consumption | | | |
| Idle A (W) Average | 5.00W | 5.0W | 5.0W |
| 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, Nonoperating: 2 to 500Hz (Grms) | 2.27 | 2.27 | 2.27 |
| Shock, Operating 2ms (Read/Write) (Gs) | 50 | 50 | 50 |
| Shock, Nonoperating 2ms (Gs) | 200 | 200 | 200 |
| Physical | | | · |
| Height (mm/in, max) ⁴ | 26.11mm/1.028in | 26.11mm/1.028in | 26.11mm/1.028in |
| Width (mm/in, max) ⁴ | 101.85mm/4.010in | 101.85mm/4.010in | 101.85mm/4.010in |
| | 147.00mm/5.787in | 147.00mm/5.787in | 147.00mm/5.787in |
| Depth (mm/in, max) ⁴ Weight (g/lb) | 670g/1.477lb | 670g/1.477lb | 670g/1.477lb |
| Carton Unit Quantity | 20 | 20 | 20 |
| Cartons per Pallet/Cartons per Layer | 40 / 8 | 40 / 8 | 40 / 8 |
| Cartono por i anoti Cartono por Layer | 40 / 0 | TO / O | + 0 / 0 |

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 authorized 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.

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